cases, but concerned fundamental phenomena common to all animals in which neurosecretion has been studied.

Stahl and Seite (France), DeLerma (Italy), Enami, and M. Thomsen described various aspects of the cytology and cytochemistry of neurosecretory cells in different animals. The view, advanced some years ago, that neurosecretory material is formed in the cell at the expense of basophil constituents has not been refuted by newer observations, but has not been definitely proved. Comparatively little use has as yet been made of methods permitting the observation of living neurosecretory cells. Passano (USA) and Carlisle demonstrated the suitability of phase microscopy, E. Thomsen that of darkfield illumination. The physical and chemical properties of the substances produced by neurosecretory cells are under investigation in various laboratories, but the results do not yet permit generally applicable conclusions.

The question was often raised: In which way is the study of neurosecretion likely to proceed? One of the major problems concerns the mechanism by which the hypothalamus controls the adenohypophysis. Benoit and Assenmacher presented evidence obtained in birds that neurosecretion may play a role, but this was contested by Zuckerman (England) on the basis of observations in mammals. In various animals there are additional groups of secretory neurons the investigation of which may lead to the discovery of new hormones. Indeed, Waterman (USA) and Enami added the lateral white body ("rudimentary eye") of the xiphosuran *Tachypleus* to the neurosecretory organs whose functions are still to be explored.

The success of the symposium was due to the cooperation and hospitality of the Stazione Zoologica, now again a center of biological research in Europe, and the financial assistance rendered to individual participants by government agencies and private foundations of the countries represented at the symposium.

The next meeting on neurosecretion will be held at the University of Lund, Sweden, at the invitation of Professor Bertil Hanström.

Friends of Pleistocene Glacial Geology Field Meeting, Ayer Quadrangle, Massachusetts

L. W. Currier

Barnum Museum, Tufts College, Medford, Massachusetts

THE ANNUAL FIELD MEETING of the Friends of Pleistocene Glacial Geology was held on Saturday and Sunday, May 23 and 24, in the Ayer, Massachusetts, quadrangle and adjacent areas. About 75 geologists were present. The meeting was under the leadership of L. W. Currier, assisted by J. H. Hartshorn and others of the staff of the Massachusetts cooperative geologic program, of the U.S. Geological Survey.

The recently published surficial geology map of Ayer quadrangle, by R. H. Jahns, was used as a background for the meeting. This map is on a scale of 2 inches to a mile and shows, in great detail, the various glacial and Recent landforms of the area, and bedrock exposures. A special feature is a smaller colored map (scale 1:48,000) that shows numerous outwash sequences in relative chronological order, and that illustrates a new method of field mapping and geologic cartography in New England, as devised by Jahns. The principal object of the field trip was to study the outwash sequences and the basis for separation of the outwash features into the various sequences. The first day was spent in the eastern half of Ayer quadrangle. The second day was spent in the northeastern quarter of Hudson quadrangle and the northwestern quarter of Maynard quadrangle, both mapped recently by W. R. Hansen and the maps now in preparation for publication.

Identifiable end moraines are conspicuously absent in southern New England except on Cape Cod, around Buzzards Bay, and in the coastal part of southern Rhode Island and southeastern Connecticut. The late Pleistocene (Wisconsin) deglaciation appears to have been characterized by the stagnation and disintegration of the frontal zone of the ice sheet, leaving blocks and essentially motionless tongues of ice in the valleys. Meltwater deposited impressively great quantities of outwash materials around and within the blocks as kame terraces, kame plains, and ice-channel fillings, and along the valleys as pitted outwash plains. The whole assemblage might be broadly considered as making up long valley trains in which ice-content forms are particularly abundant. Locally deltaic deposits (deltas and kame deltas) and lake bottom deposits were formed in small lakes of relatively short duration, where valley outlets were blocked by ice, glacial deposits, or bedrock; subsequent melting of ice barriers within valleys and lowering of other barriers by erosion permitted draining of these ponded areas through various and successive outlet channels.

For the most part present swamp areas were the sites of remnant ice blocks that persisted while outwash gravel and sand were being deposited around and on them, or in channels across them. Some swamps, generally the smaller ones, however, occupy depressions in glacial deposits. Till covers the upland areas and

doubtless underlies much of the "valley train" outwash deposits; except for the drumlins, which are numerous in parts of the region, the till sheet is comparatively thin.

Two kinds of till are recognizable. The stratigraphically lower till is hard, compact, and brownish gray in color; the upper till is mostly light gray, loose, and granular. In places both tills display thin oxidation zones. It is controversial, however, whether the tills represent two distinct advances of the ice, or subglacial and englacial (or supraglacial) tills of a single advance. No undoubted soil, loess, or lake deposits have been found between the tills in their region. On the other hand, wherever seen together in an exposure, the loose light-gray till overlies the compact brownish-gray till, and in numerous places fragments of the lower till have been found in the upper till. Although it seems unquestionable, from a consideration of the Pleistocene stratigraphy of Long Island, Cape Cod, and the islands south of the Cape, that earlier ice sheets crossed the region, no tills of undoubted earlier Pleistocene age have yet been identified in the region to the north.

The delineation of individual outwash sequences within valleys was based upon a correlation of altitudes of outwash forms to conform with a systematic gradient of deposition, continuity of deposits, and gradation of materials. Thus, a single sequence is characterized by relatively high kame terraces at the head which merge into lower kame terraces and finally into pitted outwash plains at the lower ends; along the course, but particularly in the central and upper parts, ice-channel deposits conform roughly in altitude with the lateral kame terraces. Deposition of a sequence ceased when, within a valley, a lower outlet was opened by shrinking of ice blocks, and the subsequent outwash deposits then became graded to a lower and different local base-level to form a new sequence. The base-level of a given sequence would thus be determined by a bedrock or till threshold, a temporary lake, or the base-level of an unpitted outwash plain. Several sequences, therefore, may be found in a single major valley, and they would be distinguished chiefly by several distinct levels of kame terraces, each of which could be coordinated into a systematic depositional profile.

That deglaciation proceeded by progressive disintegration and retreat of a frontal "stagnation zone" is considered to be supported by (1) the absence of identifiable end moraines, (2) the abundance, variety, and distribution of outwash forms with ice-contact boundaries, and (3) integration and correlation of multiple outwash sequences in major valleys. The "stagnation zone" doubtless varied in width in different parts of the region. The minimum width at any time would be measured by the distance between the lowest pitted outwash plain and the highest terraces of the sequence. For the Ayer quadrangle, Jahns estimates the minimum width to have been about three miles, but elsewhere the width may have been considerably greater.

Doubtless several conditions favored the formation of a frontal stagnation zone instead of a simple integrated ice front during the retreatal stage. Probably the most important factor in causing stagnation and disintegration was the topography of the region over which the ice rode. Much of southern New England had, in preglacial times, reached an early old-age state of development, but rejuvenation by at least two uplifts had deepened the valleys markedly. As the ice sheet thinned by ablation, the uncovering of divides left thin tongues or masses of ice within the valleys and in these motion ceased. Continued wastage, and broadening and flattening of the ablation surface, possibly by relatively rapid increase of atmospheric temperature, would inevitably result in disintegration of the ice into smaller blocks. It may well have been true that the last ice sheet was comparatively thin in these latitudes so that end moraines were scant or wanting even in the initial stage of recession. Had the region been one of less relief, even with a thin ice sheet end moraines might have been expected to form at first and to be followed by stagnation.

The conditions were somewhat different from those north and northwest of the Boston Basin, for the land mass was less dissected and the general relief was less, especially in the coastal plain area (Plymouth-Buzzards Bay-Cape Cod). Here the ice sheet could retain a mobile condition for a longer time. It is suggested that this, at least in part, accounts for the presence of end moraines and kame moraines in this southeastern area, in contrast with the glacial forms found in the areas to the north, particularly west of north of the Boston Basin, where outwash sequences seem to be more sharply defined. Indeed the area just south and southwest of the basin seems to be transitional between these two areas. From the general vicinity of Plymouth, for instance, the bedrock surface declines southeasterly below the present sea level, and it lies deeply buried beneath the entire Cape Cod region. Thus, some of the general conditions and interpretations relating to wasting and stagnation described by Flint for Connecticut and eastern New England appear to be well supported by features in the Ayer quadrangle and adjacent areas.