consulting staffs include: Professor G. W. Bain, of Amherst College, who studied the promising marble deposits of Canada Bay and Sops Arm; Professors A. O. Hayes and H. Johnson, of Rutgers University, who investigated the Bay St. George Carboniferous area; Professor B. F. Howell, of Princeton University, authority on Cambrian formations; Professor W. H. Twenhofel, chairman of the Department of Geology of the University of Wisconsin, authority on Silurian rocks. In addition ten Princeton geologists, chief among whom were Professor A. F. Buddington, chairman of the Department of Geology, Professor E. Sampson and Dr. H. H. Hess, engaged in faculty research, consultation to mining companies or collection of data for theses.

Through the participation of Mr. J. W. Sullivan, graduate student at Yale University, the studies in the geology of the west coast made by four Yale expeditions since 1910 were continued.

The Geological Section also acts in an advisory capacity to the Labrador Mining and Exploration Company, Ltd., holders of a mineral concession of over 20,000 square miles in Newfoundland Labrador, on which extensive work was begun last summer and is to be continued for a number of years.

The present geological activities are being followed up by prospecting and exploration by local, Canadian, United States and English interests, and it is anticipated that a number of the campaigns now in progress will yield tangible results in the form of development of latent resources and afford some amelioration of the economic difficulties which confront Newfoundland.

A. K. SNELGROVE

PRINCETON UNIVERSITY

THE THIRTY-THIRD MEETING OF THE ASSOCIATION OF AMERICAN GEOGRAPHERS

THE American Geographers met in Syracuse, N. Y., in their thirty-third annual meeting on December 31, 1936, and January 1 and 2, 1937, Professor William Herbert Hobbs, of the University of Michigan, president of the association, in the chair. The meetings were exceptionally well attended, and the papers presented aroused a great deal of interest and discussion.

The secretary, Preston E. James, of the University of Michigan, had constructed the program about several major themes. Among them were: "North America, the Northeast," four papers; "South America," two papers; "The Classification and Use of Soils," four papers; "North America, Urban Studies," five papers; "North America, the Western Mountains," six papers; "Polar Exploration," seven papers; "North America, the Appalachians and the South," six papers; "North America, Climatic Studies," four papers; "The Far East," four papers, and "Europe," four papers.

A memorial to the late Oliver L. Fassig; a special symposium on "Problems in the Cultural Geography of North America" for the members only; an illustrated lecture on "Kano," one of the principal centers of life in the Sudan, by Derwent Whittlesey, of Harvard University; the annual banquet, at which Acting Chancellor William P. Graham welcomed the membership to Syracuse University, the award for studies in physical geography was announced and President William Herbert Hobbs delivered his presidential address on "Discovery and Exploration within the Arctic Circle"; a number of desultory but valuable papers, not directly related to the group papers, completed the program. The arrangement of papers in selected fields expedited discussion by concentrating interest upon those fields and enabled the presiding officer to run the program quite on schedule.

Among the studies which elicited most discussion and interest were: "Season of Birth, and the Distribution of Civilization," by Ellsworth Huntington; three papers dealing with erosion surfaces and the physiographic evolution of the Rocky Mountain region by the Wallace W. Atwoods, of Clark University, father and son, who have made that region their major field of research these many years; "An Optical Phenomenon and Its Relation to the Discovery of Polar Lands," whereby William H. Hobbs submitted his arguments that the long-sought "Crocker Land" of the Arctic Ocean may still remain to be discovered though farther at sea than has been supposed, and that the mapping of land in the Antarctic by Wilkes and others where no land has since been shown to exist can be fully explained by a peculiar form of mirage; "Lower Mississippi Valley Loess," in which Richard Joel Russell, of Louisiana State University, implied a residual genesis for some of the deposits bordering the Mississippi Delta, and the groups of papers on soils, the Far East and Europe. A particularly valuable paper by W. L. G. Joerg, of the American Geographical Society, "The Geography of the Antarctic: The Advances of a Decade, 1926–1936," summarized a field which has been prominent in public news and attention for many years.

A noteworthy feature of the banquet program was the first award of the fund for research in physical geography, recently established by Wallace W. Atwood, of Clark University, formerly president of the Association of American Geographers, to Richard Joel Russell, of Louisiana State University, in recognition of his meritorious original investigation of a number of problems in physical geography and in approval of a special study of the Volga delta to which he plans to devote the funds. The fund will be administered

by the executive council of the association and awarded, at intervals, whenever, in its opinion, an outstanding project is proposed by some member of the association who has already achieved notable results in original research.

The officers chosen for the ensuing year are: *President,* W. L. G. Joerg, of the American Geographical Society, New York; *Vice-President,* Guy-Harold Smith, Ohio State University, Columbus; *Secretary,* Preston E. James, University of Michigan, Ann Arbor; *Treasurer,* John E. Orchard, Columbia University, New York; *Editor,* Derwent Whittlesey, Harvard University, Cambridge, Mass. The councilors are: C. C. Colby, University of Chicago; William H. Hobbs, University of Michigan; Kirk Bryan, Harvard University; Richard Joel Russell, Louisiana State University, and Richard Hartshorne, University of Minnesota.

The executive council has decided upon Ann Arbor, Michigan, as the place of the next annual meeting.

SPECIAL ARTICLES

LOCALIZED CORTICAL GROWTH AS THE IMMEDIATE CAUSE OF CELL DIVISION

CHAMBERS[1] supports the theory that cell division is caused by the growth of two viscous astral spheres separated by a liquid zone, in combination with a probable change in surface tension. Gray[2] thinks the growing asters displace fluid peripheral cytoplasm to the walls of the furrow, where cleavage occurs apparently because the fluid material is reduced in amount by conversion into the more viscous substance of the aster (see especially his figure 92). Spek[3] assigns the dominant rôle to an increase of surface tension in the region of the furrow and to the subsequent flow of peripheral cytoplasm into the furrow. Heilbrunn[4] is inclined to the view that astral rays "pull on the surface membrane of the cell" (p. 272).

In an analysis of the surface kinetics of the cleaving amphibian egg, I have obtained results which point to a mechanism different from any of the above. Vogt's method of localized vital staining,[5] in combination with a study of serial sections, was used to obtain a fairly detailed picture of the behavior of the egg cortex in the Pacific Coast newt, *Triturus torosus.* The explanation suggested seems equally applicable to certain invertebrate eggs, to judge from the recent descriptions of Motomura.[6] The main phenomena observed in *Triturus torosus* are as follows:

(1) Cleavage is initiated by a contraction of the egg cortex at the site of the future furrow. This is a contraction in the sense that the cortex becomes thicker and bulges toward the egg interior. At the same time the surface of the egg is displaced toward the site of thickening.

(2) The mid-portion of the contracted cortex begins to expand within one to two minutes after the above contraction (at temperatures ranging from 22° to 26° C.). The pigment of this expanding portion is rearranged in irregular streaky lines, plainly indicating that the cytoplasm is being stretched. The surface of the stretched material sinks below the general egg surface much as does the surface of a fluid material stretched between relatively firm supports. Chambers[1] gives other evidence that this zone is liquid in his observation of Brownian motion and his micro-dissection experiments. The stretched cortical material ("the primary furrow") has a lower concentration of pigment per unit surface and therefore appears lighter than the rest of the upper hemisphere (see Fig. 1).

(3) A secondary furrow appears at about the center of the primary furrow. It gives evidence of additional stretching of its materials.

(4) The pigmented cortex bounding the lightly pigmented "primary furrow" becomes the site of intense growth directed toward the egg interior. Vitally stained marks placed in this position are drawn out into long delicate hair-lines as the furrow deepens. Only a narrow strip of the cortex adjacent to the early furrow undergoes growth; this applies to the top (pigmented) surface of the egg (see Fig. 1). On the *lower* (unpigmented) side of the egg a much wider strip of cortex is involved. As surface-cortex is converted into furrow-cortex, its content of clear cytoplasm increases, with a corresponding decrease in the concentration of pigment and yolk "granules."

The streaming of peripheral cytoplasm from the sides of the egg into the furrow, which has been described by a number of persons,[7] is noticeably absent in the cortex. The streaming observed was in all probability a *sub*-cortical movement only, as has been suggested by Motomura[6] also. This is supported by the recent work of Motomura[6] and of Brown[8] as well as

[1] R. Chambers, in "General Cytology," ed. by E. V. Cowdry, Section V, 1924.

[2] J. Gray, "A Textbook of Experimental Cytology," chapter 9, 1931.

[3] J. Spek, *Arch. f. Entw.-mech.,* 44: 5, 1918.

[4] L. V. Heilbrunn, "The Colloid Chemistry of Protoplasm," chapter 15, 1928.

[5] W. Vogt, *Arch. f. Entw.-mech.,* 106: 542, 1925.

[6] I. Motomura, *Sci. Reports of the Tohoku Imper. Univ.,* 4th Series, 10: 212, 1935.

[7] See the works of Chambers, Gray and Spek already cited.

[8] D. E. S. Brown, *Jour. Cell. and Comp. Physiol.,* 5: 335, 1934.