serve. No specimens of larvae or adults were taken at Stann Creek Village, although *A. albimanus* was breeding freely in the lagoon behind the town.

The occurrence of *A. darlingi* elsewhere in the region is very probable, as through the courtesy of Dr. J. R. de Leon and Dr. Julio Herrera of the Departamento de Sanidad of Guatemala, the writer was permitted to examine their collections of mosquitoes from Guatemala. A series of six female specimens collected at Panzos, near El Estor, on the northern shore of Lago Izabal (Golfo Dulce), some 50 miles west of Puerto Barrios, Guatemala, was found in the collections. These females lacked the two lines of white scales on the first abdominal sternite, characteristic of *A. albitarsis* L. Arrib., and differed in color markings from the specimens of *A. argyritarsis* R.-D as found in Guatemala. They resembled in every respect the female *darlingi* collected by the writer at Silk Grass Camp in British Honduras. It is therefore extremely probable that *A. darlingi* is present over a wide area of the neighboring coastal lowlands.

The larval and adult specimens from British Honduras, and two females from Panzos, Guatemala, were submitted to Dr. H. W. Kumm, who has had extensive experience with *A. darlingi* in Brazil. He confirmed the writer's identification of the material as *A. darlingi*.

The occurrence of *A. darlingi* so far north of its usual range is unexplained, and its distribution should be further investigated, in view of its dangerous powers as a carrier of malaria. A full account of the conditions under which *A. darlingi* was found in British Honduras will be published elsewhere.

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SOILS AND PERIGLACIAL PHENOMENA IN THE CAROLINAS

STUDENTS of the Pleistocene will welcome the observations of Eargle[1] and his associates of the Soil Conservation Service which tend to show that many of the deeper soil phenomena and the land forms of the southern Piedmont date back to the cooler times of the Pleistocene.

Many years ago Kerr[2] pointed out that mass movement was recorded in the soils of North Carolina and following, but not referring to the interpretation of the Reverend O. Fisher,[3] he held that the movement was induced by frost action more intense than that characteristic of the present climate. At present such an interpretation seems reasonable enough on the general ground that at many European localities far south of the ice border, the evidences of a severe periglacial climate have been found in the form of a warp or solifluction layer.[4] The former extension of a cold and continental type of climate as far south as the James and Tennessee Rivers has been established by the discovery of ice scratched boulders and cobbles in the terraces of southern rivers by Wentworth.[5] These scratches testify to the existence of ice jams in rivers now entirely free of such phenomena. Von Lozinski[6] has gone so far as to suggest that the earth mounds of Arkansas are the remnants of frost-heaved earth mounds, "palsen" or "busen," attributable to the cold climate prevailing at the time of glaciation. This suggestion assumes a very much greater extension of cold climate toward the south than is otherwise indicated.

Eargle notes soil movement and the consequent burial of organic matter containing the pollen of fir and spruce. He implies that this movement is the result of creep, earth flow and slump by soil materials in Post-glacial time, but it must be kept in mind that the Abbé Breuil[7] has distinguished several superimposed warps or solifluction layers ranging in age from the Gunz to the Würm.

The complexity of soil phenomena of the Piedmont was somewhat dimly perceived by the writer during a short field season in North Carolina in 1935, and with Kerr's paper in mind he was prepared to attribute a part of them to periglacial frost movement, but refrained from publication in the hope of further opportunity for more minute observation. He congratulates the Soil Conservation Service for opening this new field of attack in an area of the Piedmont a little further south.

The habit of attributing soils to the weathering of underlying formations extends into New England and New York. Here nearly all soils are described by the Soil Survey as the result of the weathering of either till or outwash. In large areas of New England a layer of frost-heaved material, a warp or solifluction layer, overlies the undisturbed till or outwash and forms the actual surface of the ground. In other places patches of loess[8] a few inches to two or more feet thick overlie the warp. The soil is immature in its development and the A-horizon lies wholly in the loess or warp. Only the limonite stain of the imperfect B-horizon extends in places into the undisturbed glacial material. In parts of Southern New England

[1] D. H. Eargle, SCIENCE, 91: 337–338, 1940.

[2] W. C. Kerr, *Am. Jour. Sci.*, 3rd ser., 21: 343–358, 1881.

[3] O. Fisher, *Quart. Jour. Geol. Soc. London*, 22: 553–565, 1866.

[4] P. Kessler, "Das Eiszeitliche Klima und seine geologischen Wirkungen im nicht vereisten Gebieten," 210 pp. Stuttgart, 1925.

[5] C. K. Wentworth, *Geol. Soc. Amer. Bull.*, 39: 941–954, 1928. J. J. Petty, *Denison Univ. Jour. Sci. Laboratories*, 29: 195–204.

[6] W. von Lozinski, *Neues Jahrb. f. Min.*, etc., Beil. Bd. 71, pt. B: 18–47, 1933.

[7] Henri Breuil, *Rev. de Geogr. physique*, etc., 7: pp. 269–284, 1934.

[8] H. T. U. Smith and H. J. Fraser, *Amer. Jour. Sci.*, 5th ser., 30: 16–32, 1935.

the glacial materials are older than the last ice advance and are stained by limonite derived from interstadial or interglacial weathering.

There is thus evidence over large areas in New England that an interval of time characterized by intensive frost action and accompanied by deposition of loess has intervened between glacial deposition and the beginning of soil formation. In the Highlands of the Hudson, Denny[9] has shown that during this interval most of the original glacial forms were destroyed, and the warp differs materially from the underlying till not only in texture but also in lithology and hence in chemical composition. The soils, therefore, have a C-horizon quite different, and a course of development unlike what they would have if developed merely by the weathering of the local till.

Fortunately the drainage of New England soils is largely determined, not by the character of the soil horizons which are quite immature, but by the underground. Hence soils developed on till are generally ill-drained and "cold" and those on outwash are generally well-drained and "warm." The existing soil maps which are virtually mere maps of till and outwash have utility in spite of the erroneous theory of soil formation on which they are based.

The perception that many of the minor details of our existing topography in the Piedmont and in New England date back to processes conditioned by a periglacial climate of Pleistocene time represents a great advance. In geomorphology and in soil science the bounds of this advance can not be easily predicted.

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DIRECTION FINDING AT 1.67-METER WAVES

SINCE direction finding at ultra high frequency is drawing more interest, I should like to give a brief report on the direction finding work at 1.67-meter waves which has been done in this laboratory.

Up to about two years ago we had been working on a radio-meteorograph[1] sent up with balloons to get the atmospheric temperature, pressure and humidity at various levels from the ground up into the stratosphere. This instrument was developed in this laboratory, and it has been used successfully by the United States Weather Bureau in securing data for weather forecasting.

Different antenna systems were tested for both horizontal and vertical directivity on this wave-length at distances of from seven to thirty miles. The antennas used in these experiments included parabolic antenna, V-type, double V-type, Adcock antennas, etc.

Using an Adcock antenna the azimuth of the incoming electromagnetic wave can be defined within one half degree accuracy, and with a slight modification of the receiving elements to form a horizontal H antenna, the vertical angle of the incoming wave can also be obtained with the same degree of accuracy. The former antenna can be converted into the latter by mechanical means within a few seconds and thus both vertical and horizontal angles can be measured with the same antenna set-up.

With the antenna one and a half wave-lengths above the ground and with the ground surface homogeneous in the immediate vicinity of the receiving antenna, the direction of the incoming electromagnetic wave coincides with that of the transmitter emitting the wave, within the same accuracy of one-half degree.

Since the frequency used is so high that there is no reflection from the Heaviside layer, this eliminates the erroneous directions experienced with longer wave-lengths.

The main difficulty of this experiment seems to lie in the surface conditions of the ground in the vicinity of the receiving antenna. When the ground is wet, and especially when the moisture is not uniformly distributed, deviation of the incoming wave from the true direction of the transmitter arises. Attempts are now being made to overcome this difficulty.

The receiver used for this experiment is a superheterodyne receiver specially designed for this purpose using a resistance-coupled intermediate-frequency amplifier. It is very stable in operation and has ample sensitivity.

The main purpose of this experiment is to apply the directional effect to get wind velocities using the same type of radio-meteorograph and balloons as mentioned above.

The work is being continued in this laboratory and the complete details will be published later.

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COLOR FLICKER IN FLUORESCENT LAMPS

MESSRS. Scull, Grosscup and Witting, in their letter published April 12 on the "Apparent Splitting of Light from Fluorescent Lamps into Component Parts by Moving Objects," approximated but did not fully describe what we consider is the explanation of the phenomenon which they describe.

As noted in a paper by Thayer and Barnes,[1] in fluorescent lamps, "the light from the low-pressure mercury discharge is extinguished completely every half cycle on AC operation, but the light from many phosphors decays slowly enough to furnish appreciable light in the interim." Therefore, any inspection by

[9] C. S. Denny, Black Rock Forest *Bull.*, 8, 70 pp. 1938.

[1] O. C. Maier and L. E. Wood, *Jour. Aero. Sci.*, August, 1937.

[1] *Jour. Optical Soc. Amer.*, 133–134, March, 1939.