

Collegiate División

The following five articles are abstracts of papers presented at the Collegiate Division of the Tennessee Academy of Science in Nashville on December 11, 1959.

THE EFFECT OF LOW TEMPERATURE ON THE DEVELOPING EMBRYO OF *HABROBRACON*¹

KENNETH R. BARKER AND GEORGE McCORMICK
Southwestern at Memphis

Embryos of the ecto-parasitic wasp, *Habrobracon juglandis* (Ashmead), representing twelve different stages of development were exposed to a low temperature of 0°C for one hour with the hope of arriving at a better understanding of developmental phenomena by correlating the results of this low-temperature study with an ultraviolet (UV) study (Amy and Ernst).

The following relative sensitivity was observed. From 68% at 15 minutes of embryonic development the relative sensitivity rises to 100% at one hour, falls to 14% at 8 hours, and then varies between the limits of 18% and 42%. These results present an interesting contrast to those of the UV study where maximum sensitivity existed at 22 hours.

It is planned to make histological studies to try to at least partially explain the events occurring in the embryo which are responsible for this differential sensitivity.

A SURVEY OF THE VEGETATION OF MASTER KNOB AND DIVIDING RIDGE, WASHINGTON COUNTY, TENNESSEE

JAMES D. PERRY
*Department of Biology, East Tennessee State College
Johnson City, Tennessee*

The aims of the study were:

1. To give a systematic listing of the mosses, ferns, flowering plants, and trees occurring on Master Knob and Dividing Ridge;
2. To give, as completely as possible, information with regard to the density, frequency, and distribution of the individual plants;
3. To list edaphic, climatic, and biotic factors influencing the above-named considerations;
4. To determine the presence, if any, of distinct plant communities;

1. This work was done in connection with the Southwestern Undergraduate Research Participation Program.

5. To reach conclusions concerning the makeup of these communities and the degree to which they have been influenced by the environmental factors.

During the course of a year, from November, 1958, through November, 1959, an attempt was made to identify all the plants found in the areas under study and to collect a specimen of each. At the same time, data were obtained giving the density, frequency, and distribution of the individual plants.

Several methods were used to obtain this data, among which were direct counts, count quadrats, and a belt transect.

Master Knob rises from a broad base of 1,650 feet in elevation to a flattened summit of about 2,080 feet. Dividing Ridge rises sharply from an elevation of about 1,600 feet to a narrow summit of 1,800 feet. Both ridges are 2.5 miles north from the center of Johnson City, Tennessee.

The rock formations of both ridges are of calcareous shale, Ordovician age. A few outcroppings of sandstone of Cambrian age occur on Master Knob.

Soils are very shaly and friable and are best suited to forestry. The profile is not well developed, and the soil is very erodible.

The climate of eastern Tennessee is characterized by relatively mild temperatures and a moderately heavy rainfall.

Thirty-two bryophytes, representing fifteen families, were collected on both Master Knob and Dividing Ridge. Eleven ferns were collected, one of which, *Cheilanthes lanosa*, has not been, as far as has been determined, reported from Washington County. This fern occurs in a limited area on a southwestern slope of Master Knob. One hundred two flowering plants, representing forty families, were collected from Dividing Ridge alone.

Thirty-two species of trees were identified, and, on Master Knob, four communities were recognizable. An extensive post oak community is present on the dry southwestern slopes. On the flat summit may be found a yellow poplar community, while in a moist northern facing cove is a sugar maple community. On a south-eastern slope is a stand of young scrub pines. Dividing Ridge has a very heterogeneous tree population, not easily lending itself to classification.

Of the environmental factors considered, the edaphic factor seems to the writer to be most influential in determining the density, frequency, and distribution of the individual plants. The exposure to sunlight, as well as the density of the overhead tree and shrub layers, also are important considerations. However all the environmental factors react on Master Knob and Dividing Ridge to produce a pattern of vegetation which is widely varied and which is, in some cases, strikingly dissimilar.

STUDIES ON THE CAROTID BODY

THOMAS TREANOR, JR.

Tennessee Polytechnic Institute

An insulin series of 8 females and 8 males were used to study changes in the carotid body due to insulin injection. The injections were based on 4 units per kilo. Rats were injected intraperitoneally and were sacrificed at one hour intervals. The carotid body, adrenals, pancreas and spleen were removed for histological study. At no time did any animal go into hypoglycemia. At the fifth hour the carotid body was more radically changed than at any other hour. The cells were lacking structures except for reticular structures in the cytoplasm. This corresponds with the blood picture observed in an animal under insulin stress in that at approximately the fifth hour the total leucocyte count reaches its peak.

Six rats were used in a series for ACTH stress. ACTH injections were based on 25 units per kilo. The same procedure was used as in the insulin series. It was found again that the greatest change occurred at the same time that the highest blood count was noted. The cells seemed to be very granular and no reticular structures were noted.

From this point on all changes in the carotid body are related to histological changes due to changes in the pH of the blood. Six rats were used for this series to establish control pH and histological sections. One cc. of blood was obtained directly from the heart by a syringe dampened with Heparin. The rat was immediately sacrificed and the carotid body taken out and placed in Gendre's fixative. The average pH was 7.41. There were no visible changes in the carotid body.

A series of eight rats were used for CO₂. The rats were exposed to pure CO₂ for 15 seconds, after which the average pH was 7.11. The cell structure was the same as that obtained in the insulin series.

Pure oxygen was administered to four rats steadily for ten minutes and then the carotid body and pH were obtained by the same procedure as that of the controls. The average pH was 7.6 and the cellular structure was similar to the ACTH cells.

Work is now being done in changes in the carotid body due to acid being introduced into the stomach. Solutions of 5, 10, 15% HCl were used. Ulcers were found in the stomach using all solutions of the acid. Blood was taken from the heart 25, 15, 10 and 5 minutes from the time the acid was introduced to the time the blood was taken from the heart. Each different time was used for each different percentage. Results obtained indicate a change in the carotid body but as yet the results are still inconclusive.

In some slides of the carotid body a picture of a possible cortex and medulla is seen. Work has now started with a mitochondria stain to look into the possibility of there being a cortex. Also the PAS iron stain is being used to study the possibility of there being different types of nuclei.

EFFECTS OF NON-SPECIFIC STRESS ON LEUCOCYTE COUNT IN MICE

DAVID FITZPATRICK, JAMES NEELY AND LANDON SMITH
Tennessee Polytechnic Institute

The purpose of this report is to present an account of the studies being made on the effects of various non-specific stress agents on the total and differential leukocyte counts in mice.

At last year's Academy meeting, we reported on our blood studies on albino mice, in which we employed the HCl dilution method for total counts and Wright-Giemsa stain for differentials. We soon realized that this method was inadequate for our "mass studies" because of the time required to stain the cells with this particular dye, so, after trying different staining techniques, it was found that a phloxine-methylene blue stain would give us speedy, accurate counts, and was standardized for use in all blood work.

The mice used were kept in an airconditioned room at a temperature of from 74-80 degrees F., and fed a standard laboratory diet prior to and during these studies. All experimental animals were fasted overnight prior to the studies.

Counts were made once every hour for 8 hours on each animal without any stress other than that which results from handling and cutting the tail. These counts were made in order to establish a control, or normal pattern. After allowing the mouse a minimum of at least a week for recuperation, during which time counts on other mice were done, either insulin or ACTH injection was made intraperitoneally. The amounts of each of the stress agents was determined experimentally by injecting the greatest amount that the mouse could stand without dying. These were found to be 0.04 units of U40 insulin and 0.25 units of ACTH. An initial count prior to injection was adopted as standard procedure.

The data were compiled, averaged, and graphs constructed. It was found that under stress the total counts of normal mice showed a sharp decrease during the first two hours, but almost invariably something happened during the third hour, usually a rise in count. As for the differential, the lymphocyte and granulocyte counts started off at their characteristic high and low respectively and there was a complete reversal, so that the granulocytes become more numerous than the lymphocytes. At the third hour there was again a change, a levelling off of both lymphocytes and granulocytes, which after eight hours showed

a tendency of going back to normal. Dwarf mice did not seem to react to stress as much as did normal mice.

For the past three months we have been making counts over a 16 hour period, making one count every two hours, hoping to find that the total and differential counts would go back to normal during this period. They did not, but they did indicate more and more the trend was toward normality, so now we plan to count over a 24 hour period or more in an attempt to find out the hour when the counts come back to normal.

The figures used in plotting the graphs are not based on a few animals, but upon many series of from 8-10 mice each. This runs into something like 3,500 blood counts that have been made during the past two years.

Besides the 24 hour counts that we intend to do, we also plan to study other phases of this blood picture, namely the determination of the specific cells within the bone marrow, and other cell forming organs, in which these cells originate and the difference between the reactions of the various types of stress.

A MAMMAL COLLECTION OF AN AREA OF DAVIDSON COUNTY

LAURRECE CARTER

Tennessee A and I State University

A full description of Tennessee mammals has not been completely developed. In view of this fact, a study was started to describe the mammals of a restricted area of Davidson County with the hope that interest would be developed towards furnishing a more complete list of the entire mammal population of Tennessee.

Both Hamilton (1943) and Grossenheider (1952), in their listing of distribution of Tennessee mammals, depend almost entirely upon reports of Rhodes (1896) and Kellogg (1939).

The following mammals have been collected or observed in this area showing a wide range of distribution:

Rattus norvegicus
Neotoma floridana
Rattus rattus
Procyon lotor
Didelphis virginiana
Sylvilagus floridanus
Mus musculus
Scalpus aquaticus
Sciurus carolinensis
Peromyscus leucopus

Evidences gathered from field observations indicate that these mammals are widely distributed in the sparsely populated areas of Davidson County.