

A SURVEY OF THE DROSOPHILIDAE OF UNAKA MOUNTAIN, TENNESSEE-NORTH CAROLINA¹

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In an earlier paper there was reported a study of the altitudinal distribution of the genus *Drosophila* on Unaka Mountain, Tennessee-North Carolina (Stevenson, 1952). This is a continuation of that study, with the addition of other genera of the family Drosophilidae.

In the summers of 1951, 1952, and 1954 collections were again made at the previously selected sites on the mountain, and the data were treated as before. It was necessary in a few cases to change the stations, although the same altitudes and essentially the same ecological situations prevailed at these new stations.

During the four-year period, 34,576 flies of seven genera were collected on the mountain (Table I). Of these seven, only one genus, *Drosophila*, was taken at all collecting stations. Most of the lesser genera were collected at the higher elevations, although *Scaptomyza* was found at most of the stations. In all, only 21 representatives of *Amiota*, *Rhinoleucophenga*, *Leucophenga*, *Chymomyza*, *Mycodrosophila*, and *Scaptomyza* were taken.

The *affinis* subgroup of the genus *Drosophila* represented by far the greatest part of the collection, with 16,875 flies identified as members of this complex. Within the subgroup, *D. affinis* was the predominant species. In a sample of 5110 male flies, 98.3% were identified as *D. affinis*, the remainder being almost equally divided between *D. algonquin* and *D. athabasca*. *D. affinis* occurred at all stations, while the other two species were more or less restricted to the higher elevations.

D. immigrans occurred in the next largest numbers and was found at all stations. As the season progressed it became more abundant and by September it generally represented the largest part of the collections, replacing *D. affinis* in this respect. Numerically, however, *D. immigrans* never approached *D. affinis*.

The third largest collections were those of *D. robusta*. It was collected at all stations, but in greater abundance below 4200 feet.

D. melanogaster was present at all elevations, but was more common at the lower elevations. This is a domestic species and occurred in greater numbers at those stations most frequented by man.

D. transversa occurred nearly as frequently as *D. melanogaster* but was more common at the intermediate elevations, and generally in very moist situations. This was true also of *D. putrida*.

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Both of these species have been taken from fungi, and also were abundant in collections made from baited cans.

D. hydei, although collected at all stations, was more abundant at the lowest elevations. Over 96% of the specimens were

TABLE 1. Collection record of the genera and species of the family Drosophilidae, Unaka Mountain, 1950-1954.

Species	Number	Species	Number
Rhinoleucophenga sp.	1	immigrans	6829
Leucophenga sp.	1	melanogaster	1487**
Chymomyza sp.	6	melanica	207
Mycodrosophila sp.	1	micromelanica	1
Scaptomyza sp.	11	nigromelanica	28
Amiota sp.	1	magnafumosa	3
Drosophila		putrida	892
<i>affinis</i>	16,875*	robusta	3649
<i>busckii</i>	802	sigmoides	3
<i>colorata</i>	31	testacea	59
<i>duncani</i>	2	transversa	1231
<i>hydei</i>	1257	tripunctata	199
		TOTAL:	34,576

*In a sample of 5110 males of the *affinis* subgroup, 98.3% were *D. affinis*, 0.9% were *D. algonquin*, and 0.7% were *D. athabasca*.

**Includes *D. simulans*.

taken at 2200 and 2500 feet, in the first three summers, but during 1954 the species was very common at the 4000 foot level.

Another domestic species, *D. busckii*, occurred in about the same proportions but in slightly smaller numbers. Like *D. hydei*, this species was more abundant at 2500 feet and below.

The other nine species collected were generally spotty in their distribution, and their numbers were too small to be of any statistical value. These include *D. duncani*, *D. tripunctata*, *D. colorata*, *D. Junebris*, *D. magnafumosa*, *D. melanica*, *D. nigromelanica*, and *D. testacea*.

Patterson and his colleagues (1943) reported six genera of the family Drosophilidae from Tennessee, mainly from the Great Smoky Mountain National Park. Thirty-one species of *Drosophila* were collected. *D. melanogaster-simulans* were collected in the largest numbers, followed by *D. putrida*, *D. busckii*, the *affinis* subgroup, and *D. robusta* in that order.

This difference may be explained in part by the smaller number of specimens taken on Unaka Mountain and by the fact that much of the mountain was severely burned in 1925, thus limiting the breeding area and probably rendering the area unfavorable as a habitat for several species reported by Patterson. Another factor may be that of altitude. Members of the *virilis* group were not collected on Unaka Mountain, although there are several places where these species were expected to be found. The lowest point in the collecting area was 2200 feet, in contrast

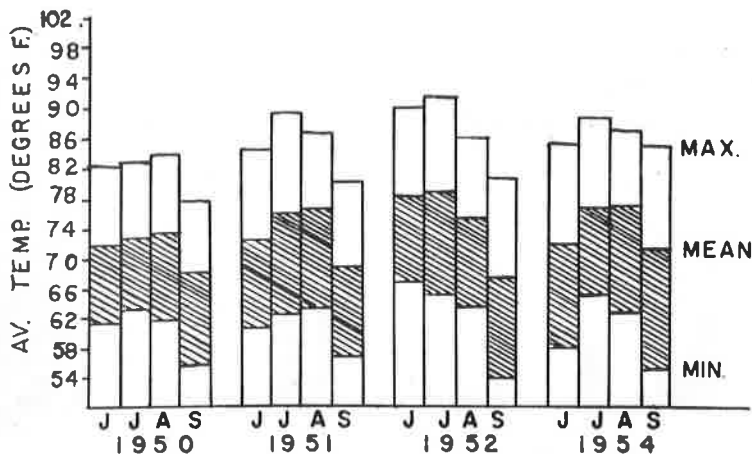


Fig. 1. Average monthly temperatures for Johnson City, Tennessee, for June, July, August, and September, 1950, 1951, 1952, and 1954.

to the valleys of the Smokies, a thousand feet or so lower. Furthermore, since this study began in 1950, several of the better collecting sites have been disturbed by logging operations.

An attempt has been made to correlate temperature and rainfall with the number of species, the number of flies, and their distribution. The results are far from conclusive. Monthly temperature averages for the collecting area were not available, but those for Johnson City, some twenty miles away, are shown in fig. 1. Monthly rainfall records (fig. 2) are available for two sites within the area, Limestone Cove, at an elevation of 2300 feet, and Beauty Spot, at 4200 feet. By comparing these climatic records with the average number per collection of three of the more common species, the *affinis* subgroup, (fig. 3), *D. robusta* and *D. immigrans* (fig. 4), some correlation can be seen. The highest temperatures at Johnson City were recorded in July, 1952, and the lowest precipitation occurred in the summer of

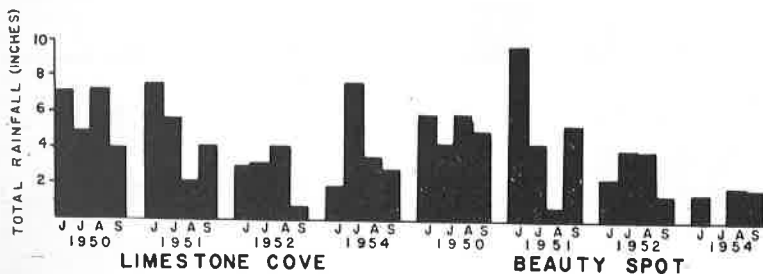


Fig. 2. Monthly rainfall for two sites within the Unaka Mountain area, for June, July, August, and September, 1950, 1951, 1952, and 1954. The record for July, 1954, at Beauty Spot was not available.

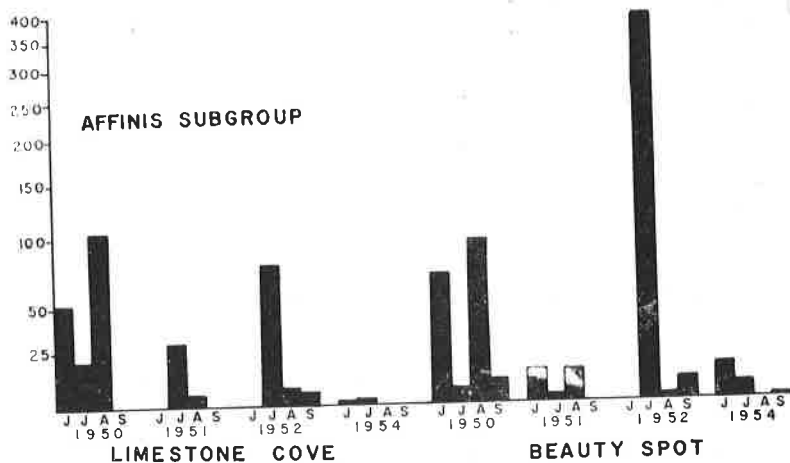


Fig. 3. Average number of flies of the affinis subgroup collected near Limestone Cove (elevation 2300 feet) and Beauty Spot (4200 feet). The average numbers are arranged logarithmically along the ordinate, the months on the abscissa.

1952 at Limestone Cove. During the summer of 1954, the temperatures were uniformly high and the rainfall at Beauty Spot was less than two inches for June, August, and September, the July records being unavailable. The *affinis* subgroup seems less sensitive to high temperatures than the other two species, the largest numbers of *affinis* being taken in July, 1952, when the temperature was highest and the rainfall well below average. *D. robusta* and *D. immigrans* were collected in the largest numbers in September, 1952, near Limestone Cove, where the average mean temperature was the lowest of the entire collecting period.

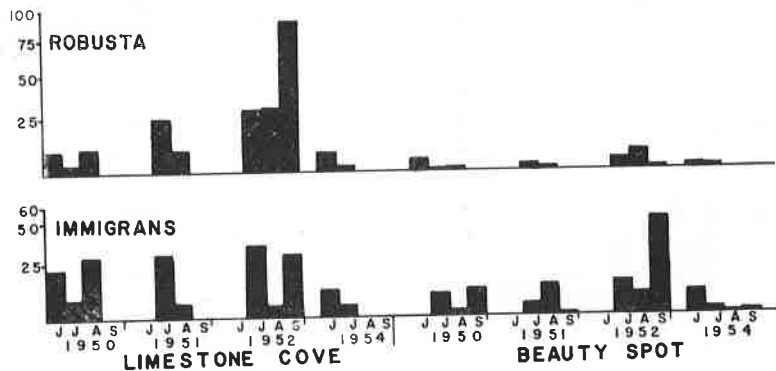


Fig. 4. Average number of specimens of *D. robusta* (above) and *D. immigrans* collected near Limestone Cove and Beauty Spot. Ordinates and abscissae same as in fig. 3.

SUMMARY

A four-year survey of the Drosophilidae of Unaka Mountain, Tennessee-North Carolina, is reported. Seven genera and 21 species were identified, and of this number 18 species were of the genus *Drosophila*. The most abundant species were *D. affinis*, *D. immigrans*, and *D. robusta*, in that order. The unfavorable ecology over much of the mountain was caused by a fire that occurred in 1925. This may in part account for the relatively small number of species that were collected. An attempt to correlate temperature and rainfall with the number of flies collected was inconclusive, but during the collecting period the temperature tended to increase from year to year, and the rainfall to decrease.

REFERENCES CITED

- Patterson, J. T. 1943. The Drosophilidae of the Southwest. *The Univ. of Tex. Pub.* No. 4313:7-216.
 Stevenson, Richard. 1952. Altitudinal distribution of species of the genus *Drosophila* (Diptera) on Unaka Mountain, Tennessee-North Carolina. *J. Tenn. Acad. Sci.* 27:97-103.
 U. S. Dept. Commerce, Weather Bureau. *Climatological Data. Tennessee.* 1950, 1951, 1952, 1954.

NEWS OF TENNESSEE SCIENCE

(Continued from Page 108)

University of Tennessee Department of Botany:

Dr. R. A. Dietz resigned March 20, 1954, to become Professor of Biology at the State College in Troy, Alabama.

Dr. Leander Johnson resigned August 31, 1954, and joined the Plant Pathology staff in the University of Tennessee Experiment Station.

Dr. Janice C. Beatley resigned August 21, 1954, and joined the Biology staff at East Carolina College, Greenville, North Carolina.

Dr. Thomas H. Campbell after a year at the Lederle Laboratories, Pearl River, New York, returned as an assistant professor in charge of plant pathology and mycology.

Drs. P. A. Hyppio, C. C. Laing and Herman Silva Forest joined the staff September 1, 1954, as instructors in Botany.

Dr. H. S. Forest's "Handbook of Algae with Special Reference to Tennessee and the Southeastern United States" was published by The University of Tennessee Press in December, 1954.

Dr. L. R. Hesler received another grant from the National Science Foundation of \$6000 for 1955-56 to continue his studies of the Agarics of Southeastern United States.

Dr. A. J. Sharp taught bryology and lichenology at the University of Michigan Biological Station near Cheboygan, Michigan, in the summer of 1954 and will return there in the summer of 1955.

Drs. R. E. Shanks and T. H. Norris participated in the Southeastern Conference on Biology Teaching held at Gainesville, Florida, August 28-September 6, 1954. Dr. Shanks was the leader of the Section on Ecology and Conservation.

The National Science Foundation has granted a total of \$9000 for a three year period, to complete the manuscript on the flora of Tennessee.

(Continued on Page 140)