

Protura of Wayne County, Indiana

WALTER BRIGADIER¹, and GERTRUDE L. WARD, Earlham College

The most recent account of Indiana Protura was published in 1957 by Leland Chandler (2) who collected various nymphal and adult stages in 1954 from a woods near West Lafayette. The present study concerns forms collected in Wayne County during October, 1963, near Richmond. It is an attempt to correlate soil types and vegetation with the insects' habitat.

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Proturans were found six miles south of Richmond off of U. S. 27 in Sedgwick's Woods and in the Hayes Arboretum near U. S. 40 at the eastern city limits. On October 2 a total of 36 specimens were obtained from Sedgwick's Woods, and on October 26 an additional 104 specimens were collected. Also on October 26 soil samples from the Hayes Arboretum yielded nine proturans. All the specimens, a total of 149, have been placed tentatively in the family Eosentomidae. A series has been sent to S. L. Tuxen at Copenhagen, and the remainder are on deposit in the Joseph Moore Museum at Earlham College. Table 1 shows the nymphal and adult stages collected from each locality.

TABLE 1.

Nymphal and adult stages of Protura collected at two sites in Wayne County, Indiana, in 1963.

Form	Locality and Date		
	Sedgwick's Woods	Hayes Arboretum,	
	Oct. 2	Oct. 26	Oct. 26
Protonymph	6	21	3
Deuteronymph	10	25	1
Tritonymph	13	29	3
Adults: Male	5	18	0
Female	2	11	2
Total: 149	36	104	9

Collection Method

A simple Berlese funnel was used for all soil samples and the insects dropped into 70% ethanol. The delicate body wall is subject to rupture.

Soils

The soil in Sedgwick's Woods from which the insects were obtained consists entirely of Miami silt loam. Bushnell *et al.* (1) describes this soil as consisting of "... light brown friable silt loam over light yellowish-brown friable silt loam which grades rather abruptly, at a depth of 10 inches, into yellowish-brown silty clay loam. The upper layers tend to have a fine granular structure. The subsurface layer lacks definite arrangement. Surface drainage is naturally good." The soil was basic with a pH of approximately 7.4.

¹Present address: Peace Corps, Nairobi, Kenya.

The soil samples from Hayes Arboretum consist primarily of Miami silt loam and some Fox silt loam with a gradual mutual intergrade. Bushnell *et al.* (1) say, "The cultivated surface soil of Fox silt loam, to a depth of about 8 inches, consists of brown friable silt loam, which grades slightly into brown silt loam underlain, at a depth of 12 or 15 inches, by reddish-brown silty clay loam." This soil is well drained into surrounding soils. Here too the pH was approximately 7.4.

Proturans were never found below the first two inches of soil and the best yield in numbers was from the decaying lower leaves and the first one-half inch of soil.

Plants

Ewing (3) says, "... In woods where the trees form a complete canopy overhead proturans are seldom found." However, all our specimens were found in wooded areas where an almost complete canopy was present. In Hayes Arboretum the trees are mostly beech (*Fagus grandifolia*) with a few widely scattered maples. In this particular section there is no secondary layer of trees or shrubs, and the ground plants are sparse. In October a few *Botrychium*, *Smilax*, *Lappula* and *Bidens* are present. Sedgwick's Woods is predominantly beech-maple. A few scattered *Juglans nigra*, *Quercus alba* and *Juniperus virginiana* are present. Much layering is evident, but the canopy is not as complete as in the Hayes Arboretum. Many more ground plants are present, including *Trillium* spp., *Eupatorium rugosum*, and *Vitis* spp. In both areas there were approximately two inches of decaying leaves and newly fallen leaves. It has been suggested that proturans live on partially decayed leaves. Where areas were leafless there were never proturans present in the soil. This may be as much a matter of moisture as of feeding.

Moisture

When the first samples were collected, the area had been virtually without rain for 44 consecutive days, and when the second specimens were found, for 68 days. The total rainfall for September and October was 0.28 of an inch in contrast to 1962's 4.14 inches. Only in 2 percent of the samples were proturans obtained directly from the leafy organic matter. The remaining samples were from beneath decaying logs where more moisture was retained. Under logs there was very little non-decayed leafy matter, but various fungi were present. It is possible that these plants serve as food.

Conclusion

We suggest that the proturans of Wayne County prefer a basic, well drained soil found in a woodland. Three other soil areas were extensively sampled. Two of these were slightly acid, and the other was neutral. The vegetation differed considerably from the two areas described above. No proturans were obtained.

Literature Cited

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3. Ewing, H. E. 1940. The Protura of North America. Ann. Ent. Soc. Amer. 33(3): 495-551.