

It is impossible to interpret and picture data of this sort satisfactorily in two dimensions. Fortunately, the data lend themselves well to a three dimensional interpretation. Since the data are quantitative, it is possible to construct three-dimensional models (Fig. 3). By use of the percentage values obtained by the precipitin tests, each animal may be located on the model in relation to the others. Such a model serves to summarize the relationships of the species tested.

In summary, the use of serological techniques in the study of saline soluble proteins extracted from the tissues of animals has been found to be of value in the determination of animal relationships. It is not suggested that such methods of study be used to the exclusion of others, but that these methods may yield important data which, when used along with data from other fields, may help to give a clearer idea of the relationships of the groups being studied.

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## **Bee Visitors of *Penstemon ellipticus* (*Scrophulariaceae*) on Eddy Peak, Sanders County, Mont., in Summer of 1954**

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Eddy Peak, in the Cabinet National Forest of northwest Montana, is part of a large fault system in which thousands of feet of shale were thrust up to form an escarpment overlooking the Clark Fork River. The summit elevation is 7500 feet. Fracturing of the uppermost layers of shale has resulted in many talus slopes, some of them hundreds of yards from top to bottom, on the dip side of the strata. Parts of the mountain crest consist of nothing but a jumble of shale blocks in a very unstable state. During the summer of 1954 several slides occurred. Apparently for this reason, vegetation was sparse on the slopes, and heavier on the cliff side. The only plant which could be found on both sides of the crest was *Penstemon ellipticus* Coult. & Fisher. For the first two weeks of July the mountain top was almost wholly covered by snow, and snow persisted in shaded areas throughout the

season. Consequently patches of the penstemon were blooming throughout the summer in the wake of the retreating islands of snow.

Collections of wild bee visitors were begun on the 20th of July, 1954, and terminated the last week of August. Four families were present, represented by five genera and nine species (determinations by the author) :

| Family       | Species  | No.<br>Collected |
|--------------|--|------------------|
| COLLETIDAE   | <i>Hylaeus</i> sp.                                   | 3                |
| HALICTIDAE   | <i>Lasioglossum</i> sp.                              | 2                |
| MEGACHILIDAE | <i>Hoplitis (Cyrtosmia) hypocrita</i><br>(Cockerell) | 21               |
|              | <i>Hoplitis (Producta) interior</i> Michener         | 2                |
|              | <i>Osmia dakotensis</i> Michener                     | 6                |
| APIDAE       | <i>Bombus edwardsii</i> Cresson                      | 22               |
|              | <i>Bombus occidentalis</i> Greene                    | 2                |
|              | <i>Bombus ternarius</i> Say                          | 4                |
|              | <i>Bombus terricola</i> Kirby                        | 1                |

Specimens are located at the Herbarium, Southern Methodist University, Dallas, Texas. All the bees were taken at elevations of 7300 feet or above, and all were taken only after they had actually entered the corollas of the penstemon. The nearest forest of any extent was at least  $\frac{1}{2}$  mile from the area in which the collections were made.

There were several days in which the flowers received no visitors. Wind velocities of 20 miles an hour were not uncommon. Excessive accumulation of cumulus clouds overhead, whether they brought rain or not, were always sure to reduce or completely stop any visitation.

Bumblebees made up the bulk of the visitors, the species found most often being *Bombus edwardsii* Cresson. All were workers and showed considerable variation in quantity and coloration of abdominal hairs. This has been remarked upon by Franklin in his monograph "The Bombidae of the New World", but his description did not cover specimens with completely glabrous tergal surfaces. Three of my specimens show such a character. Yet the thoracic and head characters for *B. edwardsii* do not differ in any of the specimens I have, except for slight color variations of the pile.

Almost as abundant as *B. edwardsii* were *Hoplitis hypocrita* (Cockerell) and *Osmia dakotensis* Michener, which could be seen every sunny day on fully opened penstemon flowers. These three species were regular visitors. The rest were of only occasional appearance.

Only three individuals of *Hylaeus* were collected. These differed in no way from specimens in the collection at Southern Methodist University which were taken from north central Texas and Michigan. They are probably *H. rubbeckiae* Ckll. & Csd. as described by C. W. Metz (1911) under *Prosopis*. A description of my specimens (of which all were female) follows:

Length 7 mm. Wing spread 9 mm. Head and thorax dull black, evenly punctate, hairless. Abdomens evenly but minutely punctate, shining between punctations, hairless except for sparse appressed white pubescence on tergal segments 3-6 and sterna. Basal one-third of posterior tibia and posterior lobe of notum-1 pale yellow, impunctate. Two sub-parallel yellow markings on para-ocular areas immediate to compound eyes, filling areas below, extending and narrowing above until opposite antennal sockets.

More bumblebees were collected in the earlier part of the flowering season than in the later part, during which the smaller bees (*Osmia*, *Lasioglossum*, *Hylaeus*, and *Hoplitis*) predominated. The robust bumblebees could force their way into barely opened corollas or into those corollas whose lips were closed. The widely opened corollas were visited by all the genera, but by fewer bumblebees.

The most interesting feature of the collection was that any bee which came to the penstemon was there for that purpose only. *Penstemon ellipticus* and beargrass (*Xerophyllum tenax*) were the only two plants flowering on the summits. Below, on the cliff face and in the open comparatively level meadows and forests, was an abundance of species of flowering plants and certainly better weather conditions for the bees than the windswept colder heights. Several large clumps of beargrass grew in and about the penstemon and yet, even on days of greatest insect activity, I saw no bee visitors. Pollination of the beargrass must have been achieved solely by Syrphid flies which swarmed in great numbers about the white plumes.

Kerner (1878) mentions various "means of protection against those injurious influences and attacks by which the advantages which accrue to the plant from bearing flowers might be lost." One of the disadvantageous visitors frequently noted by Kerner is the ant. Several colonies of ants were in evidence on the mountain, some among clumps of penstemon. Yet there were no ants on the penstemon flowers. A close examination of the plants provides what might be the answer. The upper parts of the flowering stems, the

pedicels, and especially the sepals are densely glandular-hairy. Such hairs could well serve as a barrier to any terrestrial insect the size of an ant. The entire corolla surface is glabrous. The only portions of the flower bearing hairs are the calyx and the anthers. The hairs on the anthers, which are not glandular, tend to reduce the size of the corolla opening, which allows pollination by smaller bees.

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Notes On Texas Compositae — X<sup>1</sup>

Lloyd H. Shinnery

*LIATRIS MUCRONATA* DC. f. *Tharpii* Shinnery, f. nov. Corollis albis. TYPE: abundant on limestone prairie about five miles north of Austin at Walnut Creek, *B. C. Tharp & Barton H. Warnock 45-35*, Oct. 3, 1945. Color forms ordinarily are scarcely worth the trouble of giving Latin names. This one is a striking variant of an endemic which is also commonly cultivated, and has itself been introduced into cultivation. It seems desirable to assign a name to a plant with excellent horticultural possibilities, and appropriate to name it in honor of the man who brought it into cultivation.

*ISOCOMA megalantha* Shinnery, sp. nov. Perennis erecta glabra e radice lignosa. Caules plures supra basin simplices ca. 15 cm. alti. Folia crebra sessilia angustissime linearia integra, inferiora 1.5-2.5 cm. longa, superiora gradatim minora. Capitula terminalia solitaria vel rarius geminata (tum inaequalia). Involucra campanulata 7-9 mm. alta, 9-13 mm. lata, ca. 48-flora. Phyllaria imbricata 4-6-seriata oblonga (mediocria 1.5 mm. lata) acuta subcoriacea stramineo apice viridia. Corollae tubulosae exsertae (involucro duplo

<sup>1</sup>Cited collections are in the Herbarium of Southern Methodist University if not otherwise stated.