

THE LARGE-WINGED MITES OF FLORIDA

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(Continued from page 31)

In determining the commonest species, the frequency of occurrence, that is the number of lots in which a species occurs, is used instead of the number of individuals because these animals tend to be colonial. For instance one lot has 115 individuals of one species. This also is in accord with experience in other groups. The commonest species are *Zetes elimatus louisianae*, *Galumna flagelliferum*, *G. curvum*, and *Z. weberi*, then follow, in order of frequency, *Z. minutus*, *Holokalumma coloradensis*, *Parakalumma robustum*. The others are local. Thus there is no outstandingly abundant species as in the Phthiracaridae (11). *Zetes* has by far the largest number of species—in the litter.

Of the forty-three lots, only thirteen yield three or more species. Lot G75, which was a rich lot for Phthiracarids, contains the largest number of species of Galumninae (seven), namely, *Protokalumma depressum*, *Parakalumma robustum*, *Zetes elimatus louisianae*, *Z. minutus*, *Holokalumma coloradensis*, *Galumna flagelliferum*, and *G. curvum*. Lot G115 (Wellborn) yielded the same species except that *Z. weberi* replaces *Z. elimatus*, and *P. depressum* is absent. *P. robustum* drops out to the southward.

By contrast, nine species (five of them found about Gainesville) have been taken from one *locality* in Connecticut.

Sixteen lots secured by Prof. J. R. Watson between December 1928 and March 1930, chiefly from the Gainesville region give the following occurrences:

<i>P. robustum</i>	11 (4)	and two indiv. from Crystal R.
<i>P. robustum floridanum</i>	1 (1)	
<i>Z. elimatus louisianae</i>	4 (3)	and one indiv. from Royal Palm
<i>Z. emarginatus</i>	1 (1)	and three from Worthington
18. <i>Z. banksi</i>	1 (1)	and two other collectors!
<i>H. coloradensis</i>	3 (2)	
19. <i>G. lanceatum octopunctatum</i>	31 (5)	
<i>G. flagelliferum</i>	4 (3)	

It is interesting to note how these few additional lots yield two new records to the state list, even though 27 lots had already been secured from this locality (Gainesville region). This is

due to collecting from different niches, as on tree trunks and tree boles.

Finally, the twentieth species *Holokalumma floridae* was obtained from Cocoa, and the twenty-first *Zetes bradleyi* from near Tarpon Springs.

ECOLOGICAL DATA

None of the more severe habitats harbored Galumninae, thus they are not as resistant as *Pseudotritia ardua*. There seems to be some habitat preference. For example *Zetes weberi* is associated with fallen live oak leaves and also long-leaf pine. As usual, dry pine and spruce litter is rather barren, except that *H. lyricum*, the longest bristled species, was found in this habitat. *Z. elimatus louisianae* and *Holokalumma coloradensis* seem to prefer drier habitats. *G. curvum* was found on a magnolia tree bole, so that again it shows a tendency to ascend vegetation. On the whole the species of this subfamily are more abundant on oak and long-leaf pine land. In one case (lot G67) shore bay debris yielded five species.

Protokalumma depressum x pterotum, only found in the horticultural grounds at Gainesville, is either a recent introduction or the offspring of two individuals introduced with plants. I have noted no other such hybrids from further north where both species occupy the same territory.

Collections from other habitats may yield other species. Compare Watson's lots with Grossman's.

GEOGRAPHICAL DISTRIBUTION

The distribution of the different species may be visualized by means of the following table:

1. *Protokalumma depressum x* Gainesville, hort. grounds
2. *Parakalumma robustum* w. Fla. to Tarpon Springs and
..... White City
3. *P. robustum floridanum* n. peninsular
4. *Zetes macroptera matecumbei* Key Largo, Lower Matecumbe
5. *Z. elegantulus* Bradenton, Dunedin
6. *Z. bradleyi* near Tarpon Springs
7. *Z. emarginatus* n. Fla.
8. *Z. emarginatus laevis* n. Fla.
9. *Z. elimatus louisianae* peninsular, except s. tip
10. *Z. weberi* all Fla.
11. *Z. weberi plumalae* Astor, Mulberry
12. *Z. minutus* w. Fla. to Vero Beach
13. *Z. banksi* Gainesville (probably n. Fla.)

14. <i>Holokalumma coloradensis</i>	w. Fla. to Vero Beach and Miami
15. <i>H. lyricum</i>	Campville, Tarpon Springs
16. <i>H. floridæ</i>	Cocoa
17. <i>Galumna lanceatum octopunctatum</i>	Gainesville
18. <i>G. alatum hispidum</i>	Fort White, Gainesville
19. <i>G. curvum</i>	peninsular, s. to Fort Lauderdale
20. <i>G. flagelliferum</i>	peninsular
21. <i>G. flagelliferum circumum</i>	Cortez, Vero Beach, Miami

This distribution contrasts markedly with that of the Phthiracaridae (11). There are some very much localized species. All of the species, as far as can be judged from the present data, have come in from the north and west and spread chiefly down the east coast. For instance *Z. minutus* and *H. coloradensis* are not yet reported from the west coast. This was also the case with the abundant and ubiquitous *Pseudotritia ardua sinensis*. Thus, as in the Phthiracaridae, the chief element governing distribution within the state, seems to be physiographic.

To further check up on this factor, an analysis of the distribution of the passerine birds of Florida was made (8). The passerine birds were chosen as better known and less interfered with by man. Two distinct types of distribution were found: (1) tension zone of two subspecies, (2) southern limit of northern birds.

A species occupying the whole state often breaks into two subspecies between the Apalachicola and the Aucilla rivers. The Pine-woods Sparrow, Towhee, Cardinal and Crow stop at the Aucilla. On the other hand some of the peninsular species follow along the coast to Apalachicola, as the Boat-tailed Grackle, Florida Redwing and Florida Wren.

Northern species range south to the borders of the Lower Austral, that is to the middle of the peninsula. Those which extend to the center of the peninsula are the Acadian Flycatcher, Rough-winged Swallow, Southern Blue Jay, Chickadee, White-breasted Nuthatch, Catbird, Brown Thrasher, Yellow-throated Vireo, Red-eyed Vireo, Prothonotary Warbler, Parula Warbler, Blue Grosbeak, Towhee, Lecont's Sparrow, Henslow's Sparrow, Sharp-tailed Sparrow, Field Sparrow, Swamp Sparrow and Song Sparrow. This distribution is significant because it applies to many of the overwintering sparrows as well as to so many of the nesting birds. This midpeninsular boundary fluctuates with the species but it usually cuts diagonally across from northwest to southeast as in figures 41, 44, 47, 57, 58, and 60 (8). This

is the same avoidance of the west coast, and trend toward the east coast, as was observed in the Galumninae.

At least one botanist (17) divides the peninsula across the center (without mentioning definite boundaries or citing data).

The only clue to this distributional pattern was found in connection with the distribution of craneflies (16, p. 27, last ¶). Reference to the phytogeographic map (17, p. 69) shows the trend of hardwoods to be along northern Florida to the Alapaha branch of the Suwannee River. Here this hardwood belt trends southeastward. A glance at the state soil map (7) also brings out this southeastward trend. The hammock land adjacent to Bradenton also explains the larger number of Oribatoidea found at this locality. Diptera were found to be much more abundant in these hammocks and in the swamp woods than along the coasts (15, p. 39, last ¶).

To summarize: the distribution of certain groups of animals within the state seems to be largely dependent on the trend of vegetation types which in turn are dependent upon physiography and soil types.

The Florida species of Galumninae extend into the following life zones: endemics (at least temporarily): *Parakalumma robustum floridanum*, *Z. macroptera matecumbei*, *Zetes elegantulus*, *Z. bradleyi*, *Z. emarginatus laevis*, *Z. weberi*, *Z. weberi plumalae*, *Holokalumma lyricum*, *H. floridae*, *G. alatum hispidum*, *G. flagelliferum circulum* (eleven); lower austral: *Z. elimatus louisiana*, *Z. banksi*; upper austral: *Z. minutus*, *H. coloradensis*, *G. flagelliferum* (three); transitional: *Protokalumma depressum*, *Parakalumma robustum*, *Z. emarginatus*, *G. lanceatum octopunctatum*, *G. curvum* (five).

Eight hundred species of Florida diptera (15), 117 species of Odonata (3), and 128 species of Craneflies of northern Florida (16) were found to have the following life zone ratios:

	Diptera	Odonata	Craneflies
Endemics	15%	17%	19%
Lower austral	12%
Upper austral	35%	42% (Indiana) }	69%
Transitional	20%	35% (Conn.) }	
Tropical	15%	23%	9%
Mex. and s. Calif.	3%
Cosmopolitan	14%	1.4%

Thus the enormously high ratio of endemic Galumninae seems to be due to lack of knowledge of the distribution of these species in the other southern states.

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