DIFFUSION OF THE HAWK MOTHS IN NORTH AMERICA.*

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In the issue of *Psyche* for April, 1903, I published a paper on the diffusion of insects in North America, in which reference was made in a footnote to the probable trend of diffusion in the Sphingidæ, and this may be looked upon as supplementary to that publication. In the former paper I could not deal with this phase of the problem of diffusion of insects, to the extent that this family deserves, nor am I certain that this is possible even now, but it seems desirable to point out some suggestive features of the present distribution and probable diffusion of this interesting family of moths.

The Sphingidæ, or Hawk moths, are noted for their stout, spindle-shaped bodies, and for possessing the most powerful wings of all the Lepidoptera, these last being long and slender, and provided with exceedingly strong muscles, thus resembling those of sea birds. They are in this way fitted for long flights, and are not infrequently driven by the winds far out at sea, where they are encountered by ships long distances from any land. They are primarily tropical insects, though they have become widely diffused, have adapted themselves to almost frigid climates, and are thus found throughout all the principal regions, except in New Zealand, where there is but a single form closely allied to, if not identical with, the almost cosmopolitan *Sphinx convolvuli*, Linnæus. That these insects have existed structurally the same since a very remote period is shown by the occurrence of an insect in Prussian amber that belongs to this family, and has been referred to the genus *Sphinx*. The specimen cited by Wallace as having been found in the Upper Oolite of Bavaria seems to have been another insect and not one of the Hawk moths.

We have in North America 82 species belonging to 31 genera. Of these, 48 species, or more than one-half, are found in the eastern United States, and 21 of these are known to occur southward through Florida and in South America, while of the remainder many are known to extend southward into Mexico. The 21 species have most assuredly reached North America by way of what I have termed the Antillian trend of diffusion. Of the remaining 26 of the 48 species, some few of them range far enough to the west to indicate a diffusion from Mexico, or northward through that country, though the majority of them are more or less closely

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allied to South American forms. Of the remaining 34 species, many can be traced into Mexico, where, owing to lack of knowledge of the insect fauna, they are lost in obscurity.

Taking up the genera, and following Dr. Dyar's recent List, because of the more definite information given relative to the distribution of the species, we find many interesting facts. In the genus *Hemaris* we have one species occurring over the eastern portion of the country with varieties scattered from the Pacific Northwest through British Columbia and California to New Mexico; another occurs in Colorado and Utah; the other two from Labrador and Canada to Florida, and west to the Mississippi river. Some day we may find out that the Pacific coast and south-western forms are more remote from the eastern forms than we now suppose, and have had their origin in the west, while we may be able to find a similar connecting link between the eastern forms and the stem species from which both branches have evolved, somewhere in Central America, or north-west South America. The genus *Lepisesia* has one species in arctic America; another ranging from Northern California to Utah; one in Southern California; one generally distributed over the Southern States; one each in Texas and New Mexico, and another extending from Mexico into Georgia, all of which indicates a northern trend of diffusion from Mexico or beyond. The three genera, *Aellopos*, *Triptogon* and *Calliomma*, each with a single species; the first inhabiting South America and the Southern States; the second South America, Mexico, West Indies, Florida and occasionally northward, and the last being found also in South America and Florida. The next three genera, *Amphion*, *Sphecodina* and *Deidamia*, each with a single species, the first ranging from Florida to Canada, and west to Iowa; the second and third having much the same habitat. *Deilephila* has two species, both introduced, but the genus is represented in South America also. The genus *Theretria* has two species, one ranging from South America, Central America and the West Indies, through the Southern States and north into Canada, while the other is found in both South America and Florida. *Argeus*, with a single species, occurs in South America and Florida, northward along the coast to Canada, though it is rare north of Florida. *Pachylia*, likewise with a single species, is found in South America and Florida. *Pholus* (*Philampelus*) with five species, two ranging from South America through Central America, Cuba and the Southern States, northward along the eastern coast to New England; another generally distributed over the entire United States and Canada, and another covering the country east of the Great Plains; the fifth and

last ranging through Mexico into Arizona certainly indicate their ancient home and that they have come to us both from the south-east and south-west, from the South American tropics. *Ampelophaga* comprises three species; one ranging from Florida to Canada and west to Iowa, and another from Georgia to Canada and west to Missouri and Iowa, while the third extends from Brazil throughout the Atlantic Coast States and west to the Mississippi valley. Two genera, *Cocytius* and *Pseudosphinx*, have one species each, the former occurring in the Antilles and Florida and the latter extending from South America through the Antilles into Florida. The genus *Dilophonota*, seven species, every one of which occurs in South America and Florida, some occasionally farther to the northward. The two genera, *Cautethia* and *Diludia*, containing respectively one and two species, all three of which are found in the Antilles and Southern Florida. *Phlegethontius* contains five species; one ranging over the United States and Canada, and another from South America, Mexico and West Indies, northward over the entire United States into Canada; a third being found in South America and the West Indies, northward as far as New York; the fourth extending from Brazil to Canada and over the United States to the Pacific coast and in Hawaii, while the fifth is the cosmopolitan species, *P. convolvuli*, which ranges over the British Islands, Europe, Asia, Africa, Australia, New Zealand and the entire Southern States. Dr. Dyar considers the last two as one, the latter species. The genus *Sphinx* has nineteen species and two doubtful. Omitting these doubtful species, two cover the entire United States from Florida to Canada and westward; two from Georgia to Canada and west to Mississippi River States; one from Florida to Canada and west to Mississippi River States; two range over the Atlantic States east of the Mississippi; one is found from New England to Newfoundland and west to Ohio; two cover the Southwestern States by their distribution; one the Southern States; one is known from Missouri only; one each occur in Texas and Colorado; one in Arizona, and one extends from Arizona to Utah; two are confined to California, and the last ranges over the Western and Rocky Mountain States, the genus together showing about an equal number of species that can be accredited to the south-east and south-western diffusion. *Dolba*, with one species, occurs from Florida to Canada and west to Iowa, while *Chlænogramma*, also with a single species, is known from Georgia to Canada and west to States bordering the Mississippi River; *Ceratonia* has four species, two ranging from the Carolinas to Canada and west to States bordering the Mississippi; one

ranges over the Southern States as far north as Southern Illinois, Indiana, Ohio and Pennsylvania, while the fourth is confined to Texas. *Lapara* with two species, one covering the territory from Florida to Canada and west to the Mississippi Valley, and the other nearly the same area. *Exedrium* with its single species is confined to Florida; *Marumba*, also with a single species, ranges over the United States and Canada. *Smerinthus* with two species; one covering the entire northern portion of the United States and Canada, and the other confined to the eastern section from Virginia to Canada and west to Iowa, while the closely-allied genus *Paonias* has three species, one being found from Pennsylvania to Canada, and the other two from Florida to Canada and west to the Mississippi. *Cressonia* has but one species, that occurs from Florida to Canada, and west to the Mississippi River in the north and to Texas in the South; the last genus, *Arctonotus*, has also a single species, that occurs throughout the Pacific coast.

FIG. 3.—Map illustrating the trend of diffusion in the Sphingidae of North America.

When we consider the number of species that we know occur from South America northward through Florida, and from there range more or less north and west, but not sufficiently far west to indicate a Mexican habitat, and those so closely allied to these, also distributed over the eastern United States, we find that in this family of insects the south-

eastern or Antillian trend of diffusion has greatly affected the Sphingid fauna of America north of Mexico. I cannot leave the subject, however, without calling attention to the fact that South American forms make their way into the United States by several lines of diffusion. A species may make its way up through the Windward and Leeward Islands and the larger islands of the West Indies into Florida; it may make its way northward through Panama to Honduras, and thence through Cuba to Florida, or continue northward through Central America and Mexico, sometimes both, but in the latter case we are likely to find it in both Florida and Texas. With the Sphingidæ it would seem that the species had for the most part either followed the Antilles, or crossed over from Honduras, and entered the United States by way of Florida, sometimes holding closely to the Atlantic coast, and in other species spreading westward around the lower extremity of the Appalachian Mountain system. But, excepting those species that we know have been introduced from other countries within the temperate zone, we can trace almost every North American species of Sphingidæ, either directly or by closely-allied species, to their ancient and original home in tropical South America, and of the doubtful remainder there are few indeed that cannot be traced into Mexico, where we lose track of them in the obscurity surrounding the entomological fauna of that country.

CONCERNING SOME PHILIPPINE MOSQUITOES.

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In connection with the work on the Philippine mosquitoes carried on by the authority of the Surgeon-General, U. S. Army, and "for and with the co-operation of the Medical Corps, U. S. A.," a lot of mosquitoes recently received from Cottabato, Mindanao, P. I., makes it possible to describe a new *Myzomyia*; to state definitely all the differences between *Stegomyia scutellaris*, Walker, and the variety *Sumarensis*, Ludlow; and to make a small correction in the description of *Myzorhyncus pseudobarbirostris*, Ludlow.

Myzomyia Thorntonii, n. sp.—Female: Head dark brown, with tuft of white scales on the vertex, and white hairs projecting forward between the eyes, a few white scales around the eyes; antennæ brown, verticles and pubescence white, basal joint testaceous, a few white scales on first and second joints; proboscis brown on basal half, apical half dull yellow, with narrow brown band at apex, tip dull yellow; palpi, ultimate joint