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NOTES ON SOME UNCOMMON CRANE-FLIES FROM THE  
WHITE MOUNTAINS, NEW HAMPSHIRE.

BY CHARLES P. ALEXANDER,  
Amherst, Massachusetts.

During the past decade a considerable amount of work has been done on collecting and studying the crane-flies, Tipulidae, of New England. Johnson's basic list of the Diptera of this area (List of the Diptera or Two-Winged Flies. Occas. Papers Boston Soc. Nat. Hist., VII; 1925) recorded 264 nominal species, of which seven have been removed as being synonyms or as being based on mis-determinations. In the intervening years, 73 additions have been made to this list, bringing the corrected total to date to 330 species.

Some of the most interesting of these additions have been made on the Presidential Range of the White Mountains, New Hampshire, particularly at high altitudes on Mount Washington. A few brief facts concerning this area may give a clearer appreciation of the records of Tipulidae to be discussed.

Mount Washington has been defined by several earlier writers as being "an arctic island in the temperate zone." It is located at 44°, 15' N. latitude, yet has virtually the same climate as northern Labrador, at 60°, or more than 1000 miles to the northeastward. Numerous physical factors are involved in the production of the climate of the alpine zone, the determination of the upper limits of tree-growth, and the final composition of the insect fauna.

The rainfall on the summit and higher levels of the mountain totals as much as 80 inches, or virtually twice that of the surrounding lowlands. Much of this precipitation falls as snow, which is blown by the almost universal westerly and north-westerly winds into one or another of the gulfs and ravines on the lee side of the range, more especially into the Huntington and Tuckerman's Ravines. In the latter, on the southeast side of the mountain, the snow drifts

reach a depth of hundreds of feet and persist as a miniature glacier and finally as a snow-arch until mid-July or even later. The U. S. Signal Service has made a study of the wind velocity and has determined that compared with the reading at sea-coast (Portland, Maine) there is an increase of nine or ten per cent in velocity for each one hundred feet of elevation. This tremendous sweep of wind, at times reaching almost to tornado proportions (to 231 miles per hour), by removing the snow covering, permits deep freezing of the soil and a subsequent dry-killing of plant life in winter. The settling of cold air in the glacial ravines, such as Tuckerman's, chills the surroundings and seriously affects forest growth, moreover being largely responsible for late spring and early fall frosts. The culmination of all of these unfavorable factors has definitely limited the timber-line, this being at a slightly higher altitude on the easterly slopes than on the westerly. Above the limits of tree-growth is fell-field, a rocky flat or plateau, the vegetation consisting of a diversified flora of dwarf size, with an abundance of lichens and mosses. The Alpine Garden, above the rims of Huntington and Tuckerman's Ravines, and Bigelow's Lawn, on the col between the cone of Washington and Boott Spur, are examples of fell-fields on the Presidential Range.

The Tipulidae so far discovered at and above 5000 feet on Mount Washington are all Arctic or Hudsonian forms, or else are endemic species, not known elsewhere.

A few of the rare species that were secured in 1932 and 1933 may be discussed briefly.

1. *Tipula (Schummelia) idei* Alexander. Known from the Hudsonian zone in Ontario and Quebec. A male taken on the Tuckerman Trail, 2700 feet, July 4, 1933, by Mr. Walter Harrison. A second male by the writer at 2800 feet, July 7, 1933.

2. *Tipula (Oreomyza) nebulipennis* Alexander. Known from Labrador and the Hudsonian zone of North Gaspé, Quebec. A male along Carriage Road, 4700 feet, by Mabel M. Alexander, July 8, 1933. A second male found in my coffee cup in the Lakes of the Clouds hut, 5000 feet, on the night of July 8, 1933.

3. *Nephrotoma penumbra* Alexander. Described from the high summits of Mount Washington and nearby peaks, and still known only from this immediate vicinity. Very abundant on morning of July 9, 1933, on slopes of Monroe and Washington, above 5000 feet. A teneral specimen was found just emerging from its pupal skin that protruded from a cushion of *Diapensia*. This is the most common and characteristic crane-fly of the alpine summits of the Presidential range.

4. *Dicronota (Rhaphidolabis) petiolata* (Alexander). Described from the Hudsonian zone of the Rocky Mountains, Colorado. Later found under similar Hudsonian conditions on cliffs along the north shore of Gaspé, Eastern Quebec. A male taken just at summit of headwall of Tuckerman's, altitude 5000 feet, August 24, 1932.

5. *Pedicia (Nasiternella) hyperborea* (Osten Sacken). Originally described from a single male specimen taken in Labrador. The only other published record was of a small series of males, taken July 21, 1875, by Mr. George Dimmock, at the Camp of the Cambridge Entomological Club, on Chandler Ridge a short distance below the Half-way House on Mount Washington. This camp has been

well described and figured by Emerton (Psyche, 31:1-6, fig. 1; 1924).

This species has always been one of the rarest and most desirable of all American crane-flies. A slightly more detailed account of its re-discovery on the Mountain in 1933, and of the finding of the hitherto unknown, almost wingless female, may be of interest.

Our party, consisting of Mr. Walter Harrison, botanist and naturalist, and of Mrs. Alexander and myself, was progressing slowly up the Tuckerman Trail, when at 2700 feet my wife captured a fine male of a Tipulid new to her, and which upon examination proved to be the lost *P. hyperborea*. I at once began sweeping all the herbage and shrubbery along the mountain streams, but before I was able to find a single specimen, Mrs. Alexander had located three or four more, all males. In the dense balsam forest at about 3800 feet, between Hermit Lake and the floor of the ravine, we finally found a dozen or so males. The forest floor is strewn with great boulders, thickly carpeted with mosses and lycopodia, and with an abundance of *Chiogenes*, *Oxalis*, *Acetosella*, *Clin-tonia*, and other characteristic Canadian and low Hudsonian plants. Characteristic breeding birds of this spot were hermit thrush, winter wren, and blackpoll warbler. The specimens of *hyperborea* found that day were all males, all behaving quite differently from any other member of this tribe (Pediini) in their habits of searching for the females. Those found were crawling continually about over the prostrate rotting logs, progressing by a fluttering motion, part walking, part flying. They were so sluggish or intent that they were most readily captured by merely picking with one's fingers. Only rarely did they take flight, and then low over the ground. This habit is eminently characteristic of males in the crane-fly genera *Tipula* and *Limnophila* having subapterous females, and we at once became suspicious that the unknown female might prove to be flightless. The following day, July 4, we confirmed this idea by finding a male in copula with a still teneral female. In this sex the wings are greatly reduced but still showing the characteristic venation of the subgenus.

As a summary, we found the species on these two days at altitudes of between 2700 and 4000 feet, along this trail and a side trail to the Lion's Head. It seems certain that the immature stages live beneath the thick layers of moss, possibly in the saturated wood of prostrate logs. The males are always most in evidence where there is a dense carpet of mosses and shiny clubmosses. On July 8, Mrs. Alexander found still another male, being buffeted by the wind along the Carriage Road at 4200 feet. It should be noted that only one other genus of Tipulidae (*Chionea*), in northeastern North America is subapterous in either sex.

In addition to the above, mention might be made to two other Tipulidae, both still known only from unique types taken in the White Mountains. Constant search in recent years has failed to reveal these two flies.

*Tipula* (*Oreomyza*) *insignifica* Alexander. Alpine Garden, Sept. 21, 1919; collector unknown (Boston Society Natural History).

*Dicranota* (*Eudicranota*) *pallida* Alexander. White Mountains, collected by Morrison, presumably in 1874 or 1875 (United States National Museum).