

Fig. 3. The flukes, the hinder edges of which are bordered with a dark tint; there is also a dark stripe on the middle line of the tail.

Fig. 4. Atlas; *a* and *b*, tubercles corresponding with transverse processes; *c*, articulating surface for the odontoid process; *d d*, articulating surfaces for the occiput.

Fig. 5. Axis; *a*, odontoid process and the surface with which it articulates with the atlas.

Fig. 6. Anal and genital region; *a*, anus; *b*, cavities containing the rudimentary mammary glands; *c*, fissure including the male organ.

ART. XVII. — *Remarks on some Characteristics of the Insect-Fauna of the White Mountains, New Hampshire.*
By SAMUEL H. SCUDDER.

[Communicated May 20, 1863.]

IT has long been known, through the researches of Humboldt, and others since his day, that as we ascend a high mountain-peak within the tropics or the temperate zone, we pass successively over areas exhibiting distinct features in their vegetation, which remind us more and more of the flora of high northern latitudes. The Alps of Europe have furnished a field for extensive investigations into these interesting phenomena, and their sides have been mapped out into distinct zones or regions, called successively, on an ascending scale, the mountain, the subalpine, and the alpine regions; these regions, with their specific appellations, have been recognized and applied to similar phenomena elsewhere, and are in general use. It has also been noticed, that similar characters are assumed by the animals of the mountain summits, and that these also have their distinct regions, corresponding in all respects with those by which the plants were previously limited.

NOVEMBER, 1863.

Very little attention appears to have been directed to this subject in our country, other than in a most general way. The White Mountains of New Hampshire would naturally attract earliest attention by their high elevation, and by the facilities offered to travellers in their vicinity; but even concerning these, little that is definite has been recorded. Dr. Asa Gray, in his statistics of the Flora of the northern United States,* gives, it is true, separate and very complete lists of alpine and subalpine species of plants; but the distinction between the two is stated to be, that the former are found only in "our small alpine region," (in which are included *all* the barren summits of the White Mountains,) and the latter "occur mainly in our alpine region, but are also found decidedly out of it;" so that the lists do not pretend to group together those plants which are found each in a distinct alpine or a subalpine region. Prof. E. Tuckerman, in an article upon the Vegetation of the White Hills,† after speaking of the wooded region, says: "Botanists designate the highest, bald district, with the heads of ravines descending from it, as the alpine region, and have sometimes spoken of a small tract intermediate between the two, but still imperfectly characterized, as the subalpine region;" and this is the most definite mention of a subalpine, as distinct from an alpine, region which seems to have been made.

A summer passed at the base of Mount Washington, for the special purpose of collecting the insects of the White Mountains, has given me the opportunity of making many ascents of this highest peak, and of passing over nearly the whole of the barren summits of this easterly range; and this frequent passage from one elevation to another, has afforded the surest means of having the attention repeatedly drawn to whatever distinctions exist

* American Journal of Science and Arts, XXII. 231; XXIII. 62-3.

† The White Hills, their Scenes, Legends, and History, by T. S. King, p. 232.

between the fauna of the upper and that of the lower regions, and considerable collections have been made for the sake of illustrating such distinctions; on the present occasion, however, I propose to limit myself to a few instances drawn almost exclusively from the Diurnal Lepidoptera.

One feature in the vegetation of the White Mountains strikes the most casual observer in an instant,—the abrupt limits of the forest growth upon the sides of the mountains, marking a very natural division into a wooded and a woodless district. This latter district, on a nearer approach, will, to the observant eye, disclose a further separation into two regions: a lower, where the dwarfed spruce, struggling upwards, conceals the gray rocks in a covering of uniform green, save upon the unstable surfaces of the steeper slopes, or where the land-slips have scarred the declivities with their lengthened furrows; and an upper, more restricted area, in which the barren blocks of stones lie piled in inextricable confusion upon one another, exposed to full view, unrelieved by any grateful coat of green, except by an occasional patch of sedge upon some more favored level spot. These three areas—the forest district, the district of the dwarfed spruce, and the rocky district—exhibit, in a general way, as I believe, the proper limits of the mountain, the subalpine, and the alpine regions; the separation of the mountain from the subalpine region is well marked by the limit of the trees, which is not wholly dependent upon the elevation of the slope upon which they grow, being influenced in part by the ravines which vary the uniformity of their lines, and by the exposure of the sides of the mountain, causing a variation of from one to two hundred feet in perpendicular height. Upon Madison, and the northern slope of Washington, the forest line, as shown by the measurements of Prof. Guyot, reaches to the height of 4150 feet; and upon

the face of Mount Clinton, which has a westerly exposure, it attains an elevation of 4250 feet; while again, at the "Ledge," the extreme northern termination of the north-eastwardly ridge of Mount Washington, its limit is fixed at about 3900 feet. The alpine region seems to occupy the summits of only the three highest mountains; being limited to from one to two hundred feet of the cones of Mts. Adams and Jefferson, and some seven to eight hundred feet of Mt. Washington.

In the accompanying chart of the mountains, (Plate XV.*) I have attempted to show, by the irregular dotted lines, the general lower limits of the subalpine region, and by the regular dotted lines those of the alpine region. Taking our stand upon the summit of Mount Washington, the main peak, and looking at the mountains which lie to the north of it, it will be seen, that, while the subalpine region follows along the main chain, it extends, also, a short distance along the spur which forms the ridge running south-eastwardly from the peak of Mount Madison, and to a much longer distance northeastwardly from Mount Washington, following the general direction of the carriage road, and terminating at a lower limit than ordinarily at the "Ledge," around which the road abruptly turns immediately before it is lost in the forest. Southwardly from Mount Washington there are three ranges of elevations; a more prominent one, whose peaks bear the names of distinguished statesmen of America, trending towards the southwest; another which continues in the direction of the main chain lying to the north of Mount Washington, whose northernmost peak has received the name of Davis's Spur; and a third, much less significant, dividing the angle between the two former, but approximating much more closely to the last mentioned. By the union of these three,

* Mainly taken from the Map of the White Mountains published by Harvey Boardman, but enlarged and corrected from observations of my own.

at their junction with Mount Washington, there is formed a broad, far-reaching plateau, sloping gradually away to the south, where the subalpine region enjoys its widest boundaries, whose southern limits I have not fully traced, and the representation of which on the map may be faulty. Within this subalpine region, which includes also the head of ravines, there are several ponds or tarns of small extent: one in Kine's Ravine, the deep gap between Mounts Madison and Adams,* at the height of 4912 feet; several small ones between Adams and Jefferson; two deeper ones, known as the Lakes of the Clouds, the sources of the Ammonoosuc, lying at the base of Mount Monroe on the side toward Mount Washington, at an elevation of 5009 feet; and other small ones at the southerly base of Monroe. The alpine region of Mounts Adams and Jefferson merely encircles their summits, while that of Mount Washington pushes northeastwardly along the ridge which extends in that direction, occupying one or two successively lower plateaus, and is carried also southwardly, upon the opposite side of the mountain, over the upper portions of the widely extended plateau to the south, known as Bigelow's Lawn, but scarcely reaching so far as the Lakes of the Clouds upon the one side, or the head of Tuckerman's Ravine on the other.

Some thirty-five years ago, Say, in the third volume of his American Entomology, described and figured a species of *Chionobas* under the name of *Hipparchia semidea*, from specimens sent to him by Mr. Nuttall and Dr. Pickering.

* There is a slight confusion in the names applied to the mountains by Prof. Guyot in different parts of his table of their heights, (Silliman's Journal, XXXI., 182,) the names of Adams and Jefferson being interchanged; in his Map, he has followed Prof. Bond's very common error in calling Adams, Jefferson, and *vice versa*. The name of Adams was originally applied to the northernmost and higher peak of the two. See Prof. Tuckerman's article in Rev. Mr. King's book on "The White Hills."

“It inhabits,” says he, “the bald summits of the White Mountains of New Hampshire, and appears to be limited to that inhospitable region.” This species is confined exclusively to the strictly alpine region of the mountain, and is extremely abundant. Under descriptions of this insect, in its various stages, in this paper I shall speak of its habits and stations, and will only say here, that its presence in the alpine region is a very prominent feature in the fauna of the White Mountains;—doubtless an occasional individual will be found far within the limits of the subalpine region, for the fierce blasts of wind, which sweep around these lofty elevations must sometimes hurl these feeble flutterers far down toward the wooded valleys, as, indeed, I have once or twice witnessed, but the contrast between the occasional and unwilling visitor and the swarms which crowd the upper plateaus is very marked and significant. The genus is quite peculiar to the arctic regions. On this continent, it has been recorded as yet only in Greenland and Labrador, and at Albany River, Hudson’s Bay, about latitude 53° ; and I presume all Eastern Labrador specimens have been obtained from that portion of it lying to the north of the Straits of Belle Isle, since none were brought home by an expedition which spent the summer just south of that point, notwithstanding special search was made for them; neither did I meet with them in a summer’s trip in the centre of the continent, across Lake Winnipeg and up the Saskatchewan River, nearly to Cumberland House, in latitude 54° . So here we have, upon the highest altitudes of the mountains, a butterfly belonging to a genus found elsewhere only in high northern latitudes. According to Mr. Edwards, it is specifically distinct from that found at Albany River, but whether or not it is distinct from those of Greenland and Labrador, or the numerous, but most closely allied species which

have been described and figured from northern Europe, I cannot, from the confusion in which the species of this genus appear to be, and from the want of any specimens from other quarters, at present determine, — but satisfy myself, on this occasion, with a more detailed description of the species than has yet been given; only suggesting, that should it ultimately prove to be distinct, it will only be a case analogous to what we find in the species next to be mentioned.*

I have found at three localities so separated as the summit of Mount Madison, the head of Tuckerman's Ravine, and a short distance above the Ledge, (all, it will be noticed, within the subalpine region,) a species of *Argynnis*, described below in honor of the god of the mountains, belonging to that group of the genus to which *A. Amathusia* Ochs. pertains. Without a critical examination, it would not be distinguished from *A. Boisduvalii* Sommer, which I do not consider, as Boisduval does, to be synonymous with *A. chariclea* Ochs. The character of the relationship of *A. Boisduvalii* and *A. Montinus* is such that they would come under the denomination of representative species in the limited sense to which I have attempted to restrict it in my paper on the Genus *Colias*.† To the points of distinction between them I shall not, however, here allude, reserving such remarks for a future occasion, when I shall speak at length of the boreal species of this genus; but we

* In a letter written by Dr. Harris to Mr. E. Doubleday, of England, dated March 24, 1849, occurs this remark: "Boisduval, in his *Icones Historiques des Lépidoptères nouveaux*, &c., Vol. I. p. 197, under *Chionobas Also*, makes the following blundering remark, 'J'ai reçu de M. John Le Conte, sous le non d'*eritiosa* [!] de Harris, [!] un individu pris dans les montagnes calcaires [!] de New Hampshire, qui me paraît appartenir à cette espèce.' Boisduval's *Also*, published in 1832, is very possibly identical with Say's *semidea*, published in 1828; and if so, the latter name alone can stand. The specimens which Le Conte sent to Boisduval he received from me, with Say's *Egyria exilis*; whence, probably, the blunder of the specific name. My specimen of *Hipparchia semidea* was taken on the summit of Mount Washington, one of the loftiest peaks of the White Mountains, which, by the way, are not "montagnes calcaires."

† Proc. Bost. Soc. Nat. Hist., IX. 106.

have, I will say, two species belonging to this section of the genus, ranging from South Labrador to Great Slave Lake, and occupying (so far as my actual observations extend) a region of country lying south of that wherein the genus *Chionobas* flourishes. This section of the genus is, then, characteristic of the boreal and subalpine regions, just as *Chionobas* is of the arctic and alpine.

Within the limits of the subalpine region there is also found an Orthopteron belonging to the Genus *Pezotettix*, to which, in the descriptions which follow, I have given the name of *P. glacialis*. In Europe, the different species of this genus have been found only in elevated situations or high northern latitudes. M. de Saussure has, however, described species on this continent from Labrador to Mexico, but I can with difficulty believe that they should be generically associated. The only species on this continent I have myself seen, is the one here mentioned, and that formerly described by me from Lake Winnipeg and Anticosti, and until more complete descriptions are furnished by M. de Saussure, I shall still consider it a boreal and subalpine genus.

Passing lower, we find the mountain or wooded region corresponding altogether with the Canadian Fauna; and since the boundary line of the Canadian and Alleghanian Faunæ upon either side of the mountains is at just about this latitude, we may consider this a promontory of the Canadian Fauna stretching southwardly along the mountain chain, into the Alleghanian; while the Alleghanian, in its turn, creeps into the region of the Canadian Fauna along the warmer banks of the rivers flowing southeastwardly. One has but to pass eight miles to the northeastward of Mount Washington to have recalled to him, in the valley of the Androscoggin, the Entomological Fauna of the central portions of the New England States. In this mountain region we have such phenomena as the re-

placement of *Grapta Comma* Doubl., of the Alleghanian Fauna, by *G. Faunus* Edw., and of *Argyannis Aphrodite* Fabr. by *A. Atlantis* Edw. Here, then, we have three distinct faunæ upon the slopes of the White Mountains, each with its characteristic forms; and however much one may be prepared to expect some difference between the animals of the extreme barren summits and those of the sheltered valleys, these distinct faunæ, so clearly marked, each harboring their peculiar forms of life, which live, as it were, within a stone's throw of one another, and yet do not overleap their imperceptible barriers, which are capable, it would seem, of interchanging their stations in the freest way, and yet prefer their own homes, cannot fail alike to astonish and to interest. Many of the butterflies of the valley occasionally struggle to the extremest summits, and one or two, such as *Grapta Faunus* Edw., and *Vanessa Milberti* Godt., are found, not infrequently, within the subalpine region; with them all the capabilities of flight are unlimited, yet I have but once or twice taken *Chionobas semidea* more than a mile and a quarter from the summit; and the very limited appearance of the others upon the mountain summits (which may be easily accounted for by the fact that all insects, which are not essentially ground-insects, seem to delight in flying to the most elevated situations) is in marked contrast with their amazing abundance within their proper and assigned limits; for there is no species of butterfly in the valleys, at all characteristic of the Canadian Fauna, which I have not found at its season in the most wonderful profusion.

The results to which we are brought, by an examination into the character of the faunæ on the mountain slopes of New Hampshire, are what we should have expected on a comparison of the elevation to which they have been raised with that of the Alps of Europe, provided we take into consideration the difference in climate between the

two countries ; upon the Alps, the lower limit of the sub-alpine district is placed, by different botanists, at from 4000 to 4500 feet, and that of the alpine, at from 6000 to 6500 feet. Now, although Mont Blanc is in a latitude north of Mount Washington by a degree and a half, yet the isothermal and isochimeneal lines which pass respectively through these two points, would, when compared together, show, that a mountain elevation in Europe, to have similar climatic conditions to those of the White Mountains, ought to be placed to the northward of the Alps, and would be found in just such a relative position between the mountains of Switzerland and Norway, as the limits of the alpine and subalpine districts of the White Mountains are found to be related respectively to those of the Alps and Scandinavian mountains. And by these same comparisons we may judge, that if the summit of Mount Washington were somewhat less than 2000 feet higher, it would reach the upper limits of the alpine district, or the region of perpetual snow.

CHIONOBAS SEMIDEA Edwards in Morris' Synopsis Lepid.
N. Amer. p. 351.

Chionobas semidea Seudd. Proc. Essex Inst. III. 169.

Hipparchia semidea Say, Amer. Entom. Pl. 50.

“ “ Say, Entom. N. Amer. edit. Le
Conte I. 113, Pl. 50.

“ “ Harris, Ins. Inj. to Veg. 3d ed.
304, Fig. 126.

Wings dull brownish fuscous tinged with ochraceous ; fringe blackish brown interrupted between the nervure tips with ochraceous, dark brown along inner edge of secondaries. Above : *Primaries* nearly uniform in tint ; basal half of costal edge with minute alternate black and whitish bars, the markings of the under surface indicated faintly

above by the transparency of the wing. *Secondaries*, with the basal half to a little beyond extremity of cell, a little darker, and the markings of under surface appearing above, as in primaries. Beneath: *Primaries*. marbled with small narrow transverse bars, darkest toward the apex, formed of blackish-brown scales, not very closely connected; the interspaces, at the extreme tip, white or grayish white; whole costal edge with short alternate black and white bars. *Secondaries* marbled, as in the primaries, but much more heavily, and with the scales of the transverse bars black and confluent; a narrow band of white scales crosses the wing in the middle, subparallel to the outer border, occasionally somewhat regularly curved, but most generally rather abruptly bent just beyond the tip of the cell, where its inner border is as far beyond the tip of the cell as the width between the nervures at this point; its inner border is well defined, crenate, its outer merging into the marbling beyond; crossing the wing half way between its base and the extremity of the cell is another similar, generally less distinct, whitish band, subparallel to the first; the basal half of the wing is the darkest, and against the inside of the first band and the outside of the second, the black bars are clustered so closely as to be confluent, and form bands bordering the white bands, and of nearly the same width; beyond the outer band, the interspaces between the black bars are more or less occupied by white scales; at the extremity of the nervures are situated broader black bars, which sometimes form a continuous hind margin to the wing.

Body black, covered with blackish and yellowish brown hairs, the latter especially on the abdomen and beneath; back of head and front of thorax with many grayish scales; palpi with long black hairs outside, shorter whitish ones inside and above; antennæ brownish yellow, with a line of black scales continued to the tip above, and of

white scales on the basal half below. Expanse of wings $1\frac{2}{3}$ -2 inches.

The males and females do not differ, as Harris states; the primaries of the male are perhaps a little more pointed at the tip than those of the female, but there is no difference in the markings, unless it be that there is usually more marbling on the disk of the under surface of the primaries in the females than in the males.

EGG. Taken from body of living female; pale yellowish-green, nearly colorless; spherico-ovoid, largest at base; with about 25 ribs, which are rather broad, prominent, transversely wrinkled, slightly sinuous in direction, most of them extending to the apex, and below nearly to the centre of the base, and where they vanish, the surface is well punctured and rugulose; height, $\frac{1}{20}$ inch; diameter, $\frac{1}{30}$ inch.

LARVA. Head brownish yellow, with three bands of black spots on either side, which are little raised points, giving rise, each, to a hair, the space between them being brown; the first is broadest, and follows the middle suture, and half way down the side of the triangular suture; the second is separated from the first by the width of the latter, is parallel to it, of equal length, and slightly narrower; the third is narrow, nearly linear, short, consisting of only ten or twelve black dots, placed upon the middle of the sides, directed horizontally, not parallel with the others; there is also a fourth, as short as the third and still smaller, beneath, arising from in front of the first pair of legs, and running at right angles to the third; the triangular suture is dark brown; a dark dot just behind the antennæ; first joint of antennæ mammiform, dusky; second very short, scarcely perceptible except by black color; third cylindrical, twice as long as broad, squarely docked, reddish brown; labrum black; mandibles reddish, black at tip; maxillæ 3-jointed, each successive joint smaller, dusky, the last

darkest; labium dark-brown; ocelli five in number, four in a rather open curve, convex in front, one below, separated considerably from the upper three, which are crowded, and are directly behind it at a little greater distance; all black, except the uppermost, which is reddish brown; the lowest of the upper three larger than any of the others, which are equal. The segments behind the abdomen have five longitudinal bands, a dorsal, subdorsal, and lateral; a narrow black dorsal band, enclosing little longitudinal rather pale green spots or dashes on the apical half of each segment, those of the thoracic segments uniting to form a narrow line; this band tapers at each end, and is about .015 inch in extreme breadth; the subdorsal is a very narrow interrupted black band, narrower than the dorsal, the dashes of which it is composed being situated principally upon the anterior portions of segments, and arranged a little obliquely, the anterior extremities being directed downwards; the dorsal and subdorsal are separated by a space which is .035 inch in breadth, pale yellowish green, tinged with faint reddish brown at the apical half of each segment; the lateral band is separated from the subdorsal by a similar distance, and is itself of the same width; it is dark green, edged at its upper border with black, which is diffused downwards slightly at the base and apex of each segment, especially on the abdominal ones; the space between subdorsal and lateral bands is like that between dorsal and subdorsal, except in being considerably tinged with reddish brown; below the lateral band the body is grass-green, with a flush of roseate in it, the spiracles being black; the under surface and prop-legs are uniform grass-green; legs dusky. The whole body is covered with very short delicate reddish hairs arising from minute pale warts; the body is cylindrical, thickest at the apodal segments, narrowed gradually behind, a little more rapidly in front; head rather small;

each half of anal segment conical, not very bluntly pointed. Length .94 in.; greatest breadth .22 in.; breadth of head. 1 in.

PUPA uniform reddish brown, compact, well rounded; the dorsal curve of the abdomen full and regular, that of the thorax rather high, slightly depressed above; the dorsal elevation of the thorax laterally compressed, terminating in a furrow which is in continuation of the hind edge of wings; the shoulders at base of wings are rather prominent, the head obtuse and regularly rounded; abdomen cylindrical, tapering very regularly and rather rapidly to the apex, which is blunt, and has an oval depression on the under surface, with broad heavy border; the ventral surface is somewhat flattened; dorsum of thorax with very slight transverse wrinkles, and a few oblique heavier ones; abdomen smooth. Length .56 in.; breadth across abdomen .24 in.; breadth at base of wings .21 in.

This butterfly begins to appear by the first of July, and perhaps earlier, and continues until about the 10th of August; they are laying their eggs at least until the 22d of July, and probably a little later; caterpillars were taken nearly, if not quite, full grown on August 21, and others fully grown on August 19th; only one was taken alive, upon a rock, apparently feeding upon lichen;* an attempt to raise it in the valley below proved unsuccessful, although it lived for a long period. The other specimens were obtained drowned in pools of water, a very satisfactory mode of collecting upon Mount Washington; the description of the colors was taken from the living insect. Of the pupa I have only obtained fragments and injured specimens under rocks, where they can doubtless be found in some abundance when searched for at the proper time. The most favorable localities for collecting the butterfly that I

* Since this was written, in company with Mr. Horace Mann, I have again taken specimens of the living caterpillar, feeding upon the same lichen, which has been determined by Mr. Mann to be *Peltigera canina* Hoffm.

have found is on the sedgy plateaus either on the northern or southern side of Mount Washington, from one quarter to three quarters of a mile from the summit; other insects of the alpine region may be found most abundantly upon the stones which have been piled up by enthusiastic pedestrians upon the various isolated elevations, forming pillars of three or four feet in height; those upon the summits of Mount Adams have furnished me the richest harvests.

ARGYNNIS MONTINUS SCUDD., Proc. Essex Inst. III. 166.

Above, deep fulvous, marked with black, with black nervures. *Primaries*. A rather narrow, interrupted, zigzag mesial band, consists of five dashes: the first starts from the upper branch of subcostal nervure at three fifths the distance from the base of the wing, and crosses the spaces between the subcostal nervules in a direction at right angles to the uppermost, and is sometimes connected above with the costal border by a small spot; the second crosses the space between the adjacent nervules of the subcostal and median nervures in the same direction, but removed outwards from the first by its own width; the third crosses the space between the uppermost branches of the median in the same direction, but removed inwards from the second by double its own width; the fourth, with its inner border scarcely removed from the divarication of the uppermost branches of the median, crosses the next space at right angles to the nervules; the fifth crosses the space between the median and submedian, at right angles to the nervules, removed outward from the fourth by its own width; the inner border, up to this part, is dusky, as is the base of the wing; within the mesial band there are three short transverse bands crossing the cell, the outermost bordering it, and the innermost only not reaching the median nervure, and frequently having a fulvous central streak; another spot is frequently seen within these when not ob-

scured by the duskiuess of the base of the wing; a short patch, starting from the divarication of the median, crosses half way to the submedian, turns abruptly inwards a short distance towards the base, terminating in a point; the outer margin of the wing is rather broadly bordered with black, inclosing, between it and a row of triangular black spots, a series of fulvous transverse streaks, sometimes continuous, usually largest towards the inner angle; midway between the row of triangular spots and the mesial band is a row of rather large black spots, slightly curving, usually larger toward the inner angle, the lowermost thrown a little outside of the curve; on the costal border, midway between this row and the mesial band, a triangular dusky patch, extending just over the penultimate branch of the subcostal nervure.

Secondaries. The markings are entirely as in *A. Boisduvalii* Somm., except that the duskiuess of the base extends farther, frequently obscuring the markings within the mesial band, and the roundish spots are, in general, larger; fringe of wings pale, at base fulvous, interrupted with black.

Beneath: *Primaries*, fulvous, with the markings of the basal portion of the upper surface repeated, but the mesial band more interrupted; the row of roundish spots is only partially repeated, generally only in the middle of the wing, that between the ultimate branches of the subcostal nervure being bordered with ochraceous; the apical portion of the tip of the wing is cinnamon-red, extending from a little outside the mesial band to the termination of the lowest median nervule; the nervules within this patch are ochraceous from the border to a point corresponding to the triangular spots of the upper surface, which are generally only indicated as dusky arrow-head spots; there is a short ochraceous streak extending from the tip inwards and downwards, and another, smaller and less distinct, parallel to it, within, on costal border.

Secondaries deep cinnamon-red. Two broken black lines traverse the wing: the first starting from the costal, crosses the space between it and the subcostal at an angle of 45° to the latter, and striking a little within its bifurcation, starts again from the bifurcation, and following generally the outer limit of the cell, sweeps round to the bifurcation of the median, whence, with a succession of regular sweeps, it reaches the inner border; the second is composed very distinctly of three parts; the first of those starting from the costal and reaching the subcostal, takes a direction nearly parallel to, but turned inward a little more than, the previously mentioned line, so that, if continued, it would strike the last bifurcation of the subcostal; the second part starting a little beyond a point on subcostal opposite the origin of the line upon the costal, traverses the next two spaces at right angles to the nervules, with a shallow curve opening outward; the third part originating on the last nervule of the subcostal, at a point as far removed from the second part of the line, as the second is from the first, crosses to the inner border, taking a general direction parallel to the first line, by a series of irregular broken lines or shallow curves, the first opening inwards, the other outwards. These two black lines are narrowly bordered on the sides toward one another with ochraceous scales, generally more prominent upon that portion of the first which crosses the spaces between the costal and subcostal and between the subcostal and median nervures, frequently forming conspicuous patches, occasionally more or less interspersed with whitish scales; generally the main space between the two black lines, which in *A. Boisduvalii* forms the broad mesial band, is of the same cinnamon-red as the immediate base; at the base there is a white spot between each of the principal nervures, and a small black spot, faintly bordered with white, in the middle of the cell; apical half

of wing nearly or quite of the same cinnamon-red as the base; next to the outer border a row of transverse white spots, very indistinct or almost wanting at the middle, larger and more conspicuous at the outer angle; these are surmounted by triangular cinnamon-red spots, bordered faintly with ochraceous scales, especially that between the last branches of the median and the inner border of the one between subcostal and median; adjoining the tips of the triangular spots is a faint row of narrow circles of ochraceous scales enclosing cinnamon-red spots, generally a little deeper in color than the base of the wing; between these and the outermost black band is a very narrow faint band of rosy-white scales, barely seen to be formed of lunules opening outwards.

Body covered above with olivaceous hairs, mixed with fulvous on head, shoulder-covers, and towards extremity of abdomen; below greenish yellow mixed with fulvous on thorax; palpi fulvous above and at the tip, ochraceous below, with intermingled black hairs; stalk of antennæ fulvous below, bordered finely with white, black above, with narrow white annulations; club of antennæ black, tip below fulvous. Expanse of wings 1.66-1.8 in. The males and females do not differ.

This species was first seen by me on July 21st, 1862, at the "Ledge," and again August 2d, at same place; at the head of "Tuckerman's Ravine" August 11th, several specimens were taken in good condition, and many more seen on the summit of Mount Madison August 18th; a single specimen, labelled New England, is in the Museum of Comparative Zoölogy. I have never seen the caterpillar or pupa; specimens of the imago taken August 2d were full of eggs, some of which, flattened by accidental pressure, were secured; they were longitudinally and rather closely ribbed, and transversely wrinkled, the ribs being only moderately prominent, extending to the apex, but

apparently not turning the angle of the base. Diameter very nearly .04 in., height fully .04 in.

PEZOTETTIX GLACIALIS, nov. sp.

Allied to *P. salamandra* Fisch. Head not large; occiput swollen; vertex with a broad shallow sulcation (♀) or narrow, but not deep (♂), slightly depressed transversely between the eyes; frontal ridge with a deep sulcation, and a depression at the central ocellus; eyes not so prominent as usual in the genus, not elongated, docked anteriorly, and very slightly above; antennæ slender, equal in both sexes, as long as head and thorax; pronotum a little widest posteriorly, margin straight both in front and behind, with a minute central emargination anteriorly; lateral carinæ scarcely apparent, median very slight; sternal spine prominent, laterally compressed, blunt (♂), rather short, blunt, conical (♀); meso- and metanotum wingless, similar altogether to abdominal segments; hind femora above, with square lateral carinæ and a sharp median carina; abdomen laterally compressed, with a distinct median carina extending faintly on to meso- and metathorax; centre of subgenital plate tuberculated.

♀; vertex of head, dorsum of thorax and abdomen olivaceous green; a broad black band behind the eye, reaching the posterior margin of prothorax, continued posteriorly over half the length of abdomen as an interrupted band by a series of dark transverse streaks at base of segments; below this, on sides of thorax, bright greenish yellow, with a black spot on middle of lower border of prothorax; beneath, greenish yellow, prosternum dusky, tubercle tipped with brown; front and sides of head yellowish green, with a greenish streak down the middle of frontal ridge; labium, maxillæ, tip of labrum and of clypeus pale bluish white; both pair of palpi yellow, terminal joint rimmed with brown; tip and extreme base of mandibles black; anten-

næ yellowish brown, paler below, darkest at tip, towards base greenish; fore and middle legs olivaceous green, tinged with yellowish beneath, last joint of tarsi darker, especially at tip, claws tipped with black, arolium reddish brown, margined broadly with black; under surface and lower half of inner surface of hind femora coral-red, remainder yellowish grass-green, with two broad bands of dark-green across the outside, apex black; tibiæ green, tarsi paler, terminal joint and arolium as in the others; anal appendages dirty yellow, tipped and edged with black.

♂ differs from ♀ in having the pronotum and front of head more yellowish, the prosternum black, its spine uniformly pale green, and the parts behind the prothorax as follows: meso- and metasternum bright green; sternum of abdomen yellowish green, slightly paler than sternum of thorax, with the apical border of the segments bordered narrowly with dusky, and the basal rather broadly with black; basal half of terminal segment black, apical yellowish green; whole dorsal surface black, with a dorsal row of yellowish-green spots, and a triangular spot of same color between the coxæ of middle and hind legs; a lateral row of greenish yellow spots on 1-8 abdominal segments, each with a dark arcuate streak above, its concave side toward the brownish spiracles; anal appendages black.

Length ♂ .65 in.; ♀ .82 in.

EXPLANATION OF PLATE XIV.

- Fig. 1. *Argynnis Montinus* Scudd.
 Fig. 2, 3. *Chionobas semidea* Edw. Chrysalis.
 Fig. 4. " " Imago.
 Fig. 5, 6. " " Larva.
 Fig. 7. " " Head of Larva.
 Fig. 8. " " Terminal segment of Larva.
 Fig. 9. *Pezotettix glacialis* Scudd. ♀ side view.
 Fig. 10. " " " ♂ dorsal view.