The following is the time of appearance of our species of Anura, as observed about Cambridge during the present season: —

Hyla versicolor Le C., Tree-toad, about the middle of April.

Hylodes Pickeringii Holbr., Piping-frog. April 6.

Bufo americanus Le C., Toad. April 7.

Scaphiopus solitarius Holbr. April 19.

Rana sylvatica Le C., Wood-frog. April 11.

Rana palustris Le C., Spotted-frog, Marsh-frog, or Pickerel-frog. April 18.

Rana halecina Kalm., Spotted-frog or Marsh-frog. April 6.

Rana fontinalis Le C., Green-frog. April 11.

Rana Catesbiana Shaw, (*R. pipiens of authors*,) Bull-frog. About the middle of April.

The following letters were read, which had been recently received, namely: —

From the Smithsonian Institution, July 22d, and Aug. 19th, 1862; K. K. Geologische Reichsanstalt, Wien, September 29th, 1862; K. K. Central Anstalt, Wien, October 7th, 1862; K. Akademie der Wissenschaften, Wien, November 1st, 1862; Institut Imperial de France, Paris, October 20th, 1862; K. U. Bibliothek zü Göttingen, December 16th, 1862; Leeds Philosophical and Literary Society, December 3d, 1862; Verwaltungsrath der Zoologischen Gartens, Frankfurt, January 8th, 1863; acknowledging the receipt of the Society's publications. From the K. Hof-und-Staats-Bibliothek, München, November 6th, 1862, acknowledging the same, and asking that missing numbers may be supplied. From the K. Bayerische Akademie der Wissenschaften, München, November 6th, 1862, acknowledging the same, and presenting various publications.

May 20, 1863.

The President in the chair.

Prof. Wyman, in exhibiting the stomach and heart of the "white whale," offered some additional remarks to his former communication on the same subject.

Mr. S. H. Scudder gave an account of the distinct zones of life on high mountains, as illustrated in the entomology of the White Mountains of New Hampshire.

He recognized, as had been done in the Alps of Europe, three re-

gions, — the first a mountain region, corresponding with the Canadian fauna, which includes the whole of the White Mountain district below the limit of forest growth; and above this a subalpine region, corresponding generally with the range of the dwarf spruce; while the extreme summits of Mts. Adams and Jefferson, and a considerable portion of Mt. Washington, including the northern part of the plateau lying south of the highest peak, nearly down to the level of the Lake of the Clouds, belongs to an alpine region, the insects of which show a remarkable correspondence with those of the extreme north of our continent. Peculiar to the alpine region, and not trespassing at all upon the subalpine, is found a species of *Chionobas*, a genus peculiar to the very highest latitudes of the continent. Within the subalpine region, and not found outside of it, he discovered a new species of *Argynnis* (*A. montanus* Scudd.) belonging to a section of the genus which is peculiar to the subarctic regions, being found neither north nor south of it, and also a new species of grasshopper belonging to the genus *Pezotettix* (*P. glacialis* Scudd.), likewise a subarctic genus, though not so strictly limited in its range. As neither of these species of the subalpine region had been discovered to the north, but were represented there by other species of the same genera, he was inclined to think that the facts militated against the theories which had been put forth by others to explain the correspondence of the plants of these alpine summits with those of Greenland and Labrador.

Prof. Wyman inquired whether all the facts might not be accounted for on the theory of migration northward after a glacial epoch.

Mr. Scudder thought they could not, if the species found upon the barren summits of the mountain were, as he believed them to be, distinct from those of the same genus found to the northward. He believed also that we were sufficiently acquainted already with the insects from the north to hazard such a statement; there was, for instance, a species of *Argynnis* found from Eastern Labrador to Great Slave Lake, so closely resembling the one found upon the White Mountains as to be readily mistaken for it at first sight, and yet occupying the area where, if anywhere to the northward, this White Mountain species would be found; he believed that we could not expect to find these so closely allied species occupying the same area.

Prof. W. B. Rogers suggested that the facts might be accounted for on the migration theory, if we added thereto the supposition of subsequent variation induced by isolation.

Mr. A. Agassiz remarked that such an explanation would not satisfy us in parallel cases of resemblance, as where, for instance, upon the coast of Washington Territory, at the seashore, we had recalled

to us so strongly the entomology of the mountain region of the Alps of Europe. The genus *Parnassius*, otherwise quite peculiar to the mountain region of Europe, was found here, and no less than twenty-four species, representing at least twelve genera and ten families of European butterflies, had their representatives in closely allied species found upon our west coast.

Mr. C. J. Sprague asked whether this distinction of faunæ held equally well upon our continent from east to west as from north to south.

Mr. Scudder replied that it did, as he had already pointed out in a paper read to the Society upon the genus Colias some months previously, and remarked that in the comparisons referred to between Western America and Europe it was not simply the intimate connection of one and another species taken at random that we had to account for, but also the much more significant fact of the close relationship of the faunæ of the two distant countries as a whole, oftentimes in direct antagonism to the character of the faunæ of the intervening areas. He alluded to the case just mentioned by Mr. Agassiz, of the association of Parnassius with large numbers of Lycenidæ, and no Teriades, which characterizes Western America and Europe alike, quite the opposite of which is seen in Eastern America.

Prof. Rogers thought we ought not to lose sight of the fact that there was a similar coincidence in the physical characteristics of the countries.

Mr. A. E. Verrill mentioned that the similarity between the animals of the two regions referred to was not confined to the land animals only, but was exhibited also in their Polyps. He also stated that an undescribed species of frog, found by himself on the Mingan Islands, in the Gulf of St. Lawrence, had been found by Mr. Scudder in Hermit Lake, at the upper portion of the mountain region of the White Mountains, and had not as yet been discovered elsewhere. The Rocky Mountain Swallow (*Hirundo lunifrons* Say), which had been instanced as a case of recent migration, being now found in considerable abundance on the Atlantic coast, had been found in Maine, as he had recently learned, so long ago as 1810.

Prof. Rogers suggested that by a subsidence of a portion of the western continent, and an elevation of the land now lying submerged between America and Europe, we might have once had a physical continuity of coast, with all these species, or their common progenitors, extending alike along its whole area, and that with the elevation and subsidence of the land to its present condition the contrasted or similar physical conditions gradually developed would cause the de-

struction or propagation of the different species, so that they should at last assume their present character and limits.

Mr. F. W. Putnam alluded to the distribution of some of our fresh-water fishes in Lake Superior, Lake Champlain, and the lakes of Maine, where, out of many that were common to all, some few, found in the others, were wanting in one. If we were to account for the presence of those found in all of them by the supposition of a previously existing great inland sea including all these lakes in one, why are a few forms absent in some, and present in others? It could not be through their destruction by the others, for the two largest and most fierce, Lepidosteus and Amia, were wanting in the lakes of Maine, though present in Lakes Superior and Champlain.

Prof. Wyman referred to the occurrence of certain forms, generally considered specific, within areas of exceedingly narrow limits, such as that of the *Bufo*, found hitherto only in the town of Danvers, Mass., and indeed, so far as known, confined to the limits of a single garden; and of *Scaphiopus*, for which there are only a few localities. The theory of local creation would seem to be carried to excess in supposing this species to have always remained the same in character and localization. He further suggested, in view of the fact that these animals inhabit very limited localities, whether it was not quite possible that those species detected on Mount Washington might yet be discovered to the northward, when a more complete survey of the arctic regions should be made. Our knowledge of these is not yet sufficiently complete to enable us to say that the species in question are entirely absent from them.

Mr. Verrill presented a paper entitled

ADDITIONS TO THE CATALOGUE OF THE BIRDS FOUND IN THE VICINITY OF CALAIS, ME., AND ABOUT THE BAY OF FUNDY. BY A. E. VERRILL.

Since the publication of the list of birds presented to the Society last June,* which was compiled mainly from manuscript notes furnished to me by Mr. G. A. Boardman, some additional species of considerable interest have been found by him, which I take this opportunity briefly to notice.

Picoides hirsutus Gray. Banded Three-toed Woodpecker. Several specimens of this species have been obtained during the past severe winter by Mr. Boardman, yet they must be considered as rare winter visitors.

Contopus borealis Baird. Olive-sided Flycatcher. Summer visitant. Not common. Only one specimen yet obtained.

* These Proceedings, page 122.

Empidonax minimus Baird. Least Flycatcher. Summer visitant.

Empidonax flaviventris Baird. Yellow-bellied Flycatcher. This species, already indicated from Grand Menan, has since been found by Mr. Boardman.

Parula americana Bon. Blue Yellow-backed Warbler. Summer visitant. Two specimens obtained.

Protonotaria citrea Baird. Prothonotary Warbler. Of this species, hitherto probably unknown in New England, Mr. Boardman obtained a single male specimen the last day of October. It was shot near his house on a tree in the edge of a swamp.

Dendræca maculosa Baird. Magnolia Warbler. Specimens of this species, collected by myself at Grand Menan, August 1859, are in the Museum of Comparative Zoölogy. Mr. Boardman also informs me that he found it breeding last season, and that it is not uncommon.

Vireo gilvus Bon. Warbling Vireo. Summer visitant. Not uncommon.

Phalaropus hyperboreus Temm. Northern Phalarope. This species, before mentioned without specific name, is very abundant in flocks in the Bay of Fundy, as early, at least, as August, and possibly breeds about some of the islands.

Phalaropus fulicarius Bon. Red Phalarope. One specimen obtained.

Thalassidroma pelagica Bon. Least Petrel. One specimen.

Larus glaucus Brünn. Burgomaster Gull. Specimens of this species were obtained by Mr. Boardman during the past winter.

The Golden-Crested Wren (*Regulus satrapa* Licht.) was resident during the whole of the past winter at Calais, as well as in other parts of Maine.

A specimen of native antimony was presented by Dr. A. A. Hayes, with the following communication in regard to it: —

Some months since I described the sulphuret of antimony as occurring near Fredericton, New Brunswick, in a regular vein, promising to become of economical value. On the 6th of May I identified the present rare mineral in specimens sent to me from Quebec, Canada. It occurs in a talcose slate with gray quartz, near Quebec; the exact location will be given in a future communication. The metal is connected with oxides of antimony; no sulphur is present, and I hope to find the whole series of oxidized compounds of antimony in the same locality. The last accounts from the mine are favorable to the conclusion that a regular vein will be found; many masses of the native metal have already been obtained.

Prof. Rogers announced that the sections of the act of the Legislature granting lands on the Back Bay to the Society, in common with the Institute of Technology, which necessitated a payment of money to the State upon certain conditions relative to the sale of the surrounding land, had been repealed by the present Legislature. Prof. Rogers was appointed a committee to act in behalf of the Society in any formalities which might be necessary for the ratification of the act repealing said conditions.

The following gentlemen were elected Corresponding Members : —

Dr. Wm. O. Ayres, of San Francisco, Cal.; Capt. N. E. Atwood, of Provincetown, Mass.; Prof. Edward Tuckerman, of Amherst, Mass.; Prof. Daniel Wilson, LL. D., of Toronto, C. W.

June 3, 1863.

The President in the chair.

The following paper was presented : —

THE PENOKIE MINERAL RANGE, WISCONSIN. BY CHARLES WHITTLESY, OF CLEVELAND, OHIO.

The copper-bearing strata of Pt. Kewenaw (Lake Superior) extend south-westerly across the boundary of the State of Michigan into Wisconsin. These strata constitute a long, narrow and bold mountain range from Copper Harbor to Long Lake, a distance of one hundred and sixty miles. There are no stratigraphical breaks along this line, the order of the rock being everywhere the same. The dip of the beds is always northerly or northwest, and the strike to the northeast or east, the general line of outcrop being northeast by east. On Point Kewenaw, and as far southwest as the Akogebe Lake, on the west fork of the Ontonagon River, the copper veins have been found valuable.

Beyond the waters of the Ontonagon, in the same direction, veins have been discovered, but after limited workings have been abandoned. The Montreal River forms the boundary between *Michigan and Wisconsin ;* and as early as the year 1845 mining locations were made on its waters where they pass the range. Locations were also

made upon the waters of the Bad or Mauvaise River, a stream with numerous branches, draining the country from the Montreal to the headwaters of the Chippeway and St. Croix Rivers.

Historically considered, the exploration of this region commenced in the year 1840, when Dr. Houghton, as a commissioner of the State of Michigan, accompanied Capt. Cram of the United States Topographical Engineers, who was then surveying the Menominee and Montreal Rivers.

In 1840 and 1841 Dr. Houghton examined the rocks on both these streams, and the country between their sources. I am in possession of a transcript of his field notes during these explorations. In 1845–6 I made examinations along the range across the Montreal to the westward, as far as the main branch of Bad River.

Up to this time the public lands in this part of Wisconsin had not been surveyed. The fourth principal meridian was extended northward through Wisconsin to Lake Superior in 1848. Dr. A. Randall, one of the assistants of Dr. Owen upon the survey of the Chippeway Land District, in reference to mines and minerals, accompanied the linear surveyors along this line. In Town 44 north Dr. R. discovered an outcrop of magnetic iron ore, and brought in a specimen. The next season, as a member of Dr. Owen's corps, I made an exploration on the western branches of Bad River, crossing southerly to the head waters of the Chippeway. Near Lac des Anglais, and thence easterly across the middle or main fork of the Bad River, I found cliffs and bluffs of silicious magnetite. The results of this examination may be seen in the final Report of Dr. Owen, published at Washington in the year 1850.

In the Chippeway language the name for iron is *pewabik;* and I thought it proper to designate the mountains, where this metal exists in quantities that surprise all observers, as the "Pewabik Range." The compositor, however, transformed it to *Penokie*, a word which belongs to no language, but which is now too well fastened upon the range by usage to be changed.

Soon after the publication of Dr. Owen's Report, the excitement of 1845–6 in reference to copper was repeated in reference to iron. The government was at last induced to make surveys of the region. Preemptors followed the surveyors, erecting their rude cabins on each quarter section between the meridian and Lac des Anglais, a distance of eighteen or twenty miles. The iron belt is generally less than one-fourth of a mile in width, regularly stratified, dipping to the northwest conformable to the formations, and having its outcrop along the summit of the second or southerly range. Viewing this mountain region from La Pointe, or from the open lake, it has the appearance of a single crest. Its outline against the sky in a clear day is very dis-

for present use the profile will be taken along an ancient Indian trail, that leads from the mouth of Montreal River to Lac Flambeau, and the formations will be numbered 1, 2, 3, etc.

The provisional arrangement, which it is always necessary to make in the early stages of the examination of a new region, must of course be based upon the external characters of the rocks. In this case it is not only convenient, but proves to be a correct arrangement.

The following is a general view of the structure of the formations in the descending order: —

Formation No. 1. — *Potsdam Sandstone.*

On the Montreal River, *strike* northeast by east, in places N. 60° E.; *dip* northwest by north, 75° to 90°. It embraces four members, *a*, *b*, *c*, and *d*.

a.	*Sandstone Proper*, corrected for bevel, thickness,	8,500 feet.
b.	Alternations of sandstone and black-slate, thickness,	750 "
c.	Conglomerate, thickness,	1,800 "
d.	Alternations of trap and sandstone, thickness,	800 "
	Total	11,850 "

This is not the entire thickness of the Potsdam at the mouth of the Montreal. The synclinal line lies an unknown distance out in the lake, perhaps one-fourth of a mile, and whatever this distance may be should be added to the above statement. At the Apostle Islands and in Chegoimegon Bay the dip is reversed, having a direction towards the southeast; but the line along which the change occurs is covered either by the waters of Lake Superior or by drift. On the northerly side of the synclinal the plunge of strata is much less in amount. It presents the case of nearly horizontal beds on one side, and of nearly vertical ones on the other. Following the outcrop along the southerly shore to the west end of the lake, and thence along its northwesterly coast, the dip is everywhere conformable, and to the southeast. By estimates and measurements on that shore, combined with those at the Montreal, I regard its total thickness to be not less that fifteen thousand feet. No fossils have yet been found in the sandstone of the west end of Lake Superior. Its color is generally red, owing to the presence of oxide of iron. Where this is wanting, it is gray or a dull white, and in places mottled gray and red.

Formation, No. 2. — *Trappose, in two members.*

a.	Brown amygdaloid; dip and strike conformable to formation 1; thickness along Lac Flambeau trail,	$3\frac{1}{2}$ miles.
b.	Compact red and blue	$2\frac{1}{2}$ "
	Total	6 "

Formation No. 3. — Hornblendic.

Compact, sub-crystalline and slaty; black or dark colored; strike N. 60° E.; thickness on trail . . . . $2\frac{1}{4}$ miles.

Formation No. 4. — Silicious, two members.

a. Quartz, slaty and in layers; dark colored, but less than *F.* 3; thickness variable; separated from *b* by a bed of magnetic iron and iron slate.

b. Quartz, slaty, in layers and beds; more compact and lighter color (gray and straw color) than *a;* novaculite; strike N. 60° to 65° E.; dip variable, 30°, 45°, 60°, 75° to the northwest; breadth across the edges on trail, $3\frac{1}{2}$ miles.

Formation No. 5.

Granites and sienites of Central Wisconsin.

Fifteen miles to the westward of the trail, on a parallel line from the mouth of Tyler's Fork to the Dalles, the total thickness of formations 2, 3 and 4, is reduced nearly one-half. The diminution, however, comes principally from the upper member, *a*, of formation 2, which tapers out in that direction very rapidly. Formation 3 is also somewhat diminished; yet formation 5 is not materially changed in thickness.

Further westward, beyond the middle or main fork of Bad River, the rocks undergo such changes in external characters, that until the test of analysis was applied, the separate formations could not be disentangled. In the midst of black slates that appeared to be trachytic, were large patches of red and blue crystalline rocks, having clearly the aspect of sienites. I will notice them hereafter.

Formation 1 is nearly pure silex, and is evidently of sedimentary origin. Some foreign geologists have essayed to place it nearly at the summit of the geological system, not only without evidence, but against the most conclusive proof. Dr. Houghton, Dr. Jackson and Dr. Owen at first lent color to such a classification, but on examination both the first and the last named gentlemen placed it in its true position, at the base of the paleozoic rocks. It has been traced stratigraphically beneath the Trenton and calciferous strata of the New York Survey; on the St. Mary's River at the Pictured Rocks; on the Escanawba, the Menominee, Oconto, Wolf, Wisconsin and St. Croix Rivers.

At the falls of the St. Croix abundance of fossils are found in it, such as characterize the Potsdam in New York. To persist in denying the effect of such observations is to rob all proof of its value, when it comes in contact with theory and assumption.

The black slate intercalated with the sandstone differs little externally from the slaty portions of formation 3. This member is very