atoned for before Lord Kelvin's 100,000 feet level is reached.

As regards Mr. Bishop's ice-cap hypothesis, would not an ice cap, on account of the low conductivity of ice, have the effect of raising the temperature rate instead of lowering it?

ELLEN HAYES.

WELLESLEY, MASS., March 18th.

THE PREROGATIVES OF A STATE GEOLOGIST.

EDITOR OF SCIENCE: As is well known to many of the readers of SCIENCE, the writer of this note spent the greater part of five summers in Missouri, studying the crystalline rocks and associated formations over an area about seventy miles square in the vicinity of Pilot Knob, and has published a number of papers concerning them. While Winslow was State Geologist I published the first half of Bulletin 5, and sent in manuscripts to accompany the Iron Mountain sheet, the Mine la Motte sheet, and my final report, which was to constitute a monograph, the last manuscript leaving my hands in August, 1893. The Iron Mountain sheet was engraved and proof sent me for my final revision of the geological boundaries, as was also the proof of my part of the accompanying text, before Winslow left the position of State Geologist, while as early as March, 1892, the Mine la Motte sheet was drawn and I marked the geological boundaries on it, although it has not yet been published.

Shortly after assuming control of the State Survey Office Dr. Keyes wrote me that he would soon take up the manuscript of my final report. On September 23, 1894, he wrote me as follows:

"Since looking over your MS. rather carefully I have come to the conclusion that it would be best perhaps for me to write an introductory chapter on the general geology of the region. We have now so much new material on hand in this direction, and the topographical sheets and reports on this have been completed this summer and are now ready for the printer, so that it would greatly enhance the value of the report to incorporate this work. So much more also is known in regard to the Cambrian since I have made a trip into the region. * * * I will revise the I. and II. chapters, if you are willing, *so as the introductory will not cover the same ground*; so you need not give these chapters much attention." (Italics are mine.)

Knowing the facts regarding the preparation of the sheets as above stated, it is difficult to understand how so much 'new material' could have been gathered in so short a time.

I wrote him in substance in reply to his letter of September 23, 1894, that of course he could write any introductory matter he chose, but that I very much hoped he would not borrow too freely from my manuscript in so doing. On January 29, 1895, he again wrote me:

"Regarding the other part of your letter I can assure you that I do not wish to detract one iota from the work or to deprive you of any credit on account of changes which may be made. Before it is printed I will talk or perhaps 'write' the matter over with you."

The manuscript was finally sent me as Dr. Keyes had revised it, but my first two chapters had been so changed and so many positive errors introduced that I wrote the State Geologist it never would do to have it published in that form. The result was he visited me in April, 1895, and we talked the matters over freely, as I thought. He consented to every change I suggested excepting that he wished my original manuscript abridged more than I desired. During this conversation not a word was said or even intimated that the chapter on the general physiography was not mine. I told him certain of the geological discussions which he had introduced were so different from what I had written that I did not care to be responsible for them. But I never thought of this being his introductory chapter, as he said nothing about it, and as his name was not attached to it, although he called this the first proof. No further word on the subject was sent me, and I was given no chance to further read the proof, although only twelve hours from him by mail. On November 1, 1895, I received the publication which appeared as a part of Volume VIII. of the Missouri Geological Survey. Much to my surprise I found that the whole of the physiographic descriptions and much other matter which I thought was entirely mine appeared under his name without any intimation

that I was in any way responsible for it, even though he had previously written, "I do not wish to detract one iota from the work or to deprive you of any credit on account of changes which may be made." He wrote me October 30, 1895, stating that the publication was complete, and saying: "Owing to your objections regarding the introductory section, I thought it best not to impose its authorship on you and consequently I have assumed the responsibility of this section, *as it in no way covers the ground of your first two chapters, except in the case of one or two paragraphs.* You can, of course, publish these elsewhere if you so desire." (Italics are mine.)

Very naturally I felt that this was a bold case of plagiarism, and wrote him on the subject November 14th, in reply to which he wrote me on the 15th: "Altogether there are two and a half or three pages which are taken from you, as I have already stated" (earlier in this letter). How the 'one or two paragraphs of October 30th could grow to 'two and a half or three pages' by November 15th, and this after the publication was complete, is no more mysterious than other incidents which are of no interest to the public. In the same letter of November 15th, he wrote: "More than one-half of that section over which I 'hoisted' my name was written at the request of Mr. Winslow for my chapter on Missouri stratigraphy to accompany the Paleontology report, and this more than three years ago. * * * . At least one-fourth was written for Maryland granites at Baltimore nearly five years ago. * * *. This matter was taken bodily with no changes whatever except several locality names." How this corresponds with his statement of September 23, 1894, regarding 'new material' the reader can judge.

In order to show those interested the relation between my original manuscript and the part with his name to it, the following quotations are made, portions in brackets being my comments.

Extracted from page 84.

GENERAL GEOLOGY OF THE MISSOURI CRYSTALLINE AREA.

(By Charles R. Keyes.)

Geographical Distribution.

The massive crystalline rocks of Missouri are confined to the southeastern part of the State. They occur in irregular masses and isolated hills extending over an area 70 miles square, which is widely known as the Iron Mountain country.

(Then follow ten lines of dissimilar matter.)

Pilot Knob is approximately the center of the crystalline district. For a distance of perhaps a dozen miles in all directions from this point, the massive crystallines form the greater portion of the surface rock; while in an easterly direction they are practically continuous for more than twice as far.

(Which reaches Knob Lick and Fredericktown.)

Beyond the large central field the exposures gradually become less and less frequent. To the north they do not reach much beyond Bismarck. Northeastward they are found in in Ste. Genevieve county, 30 miles from Pilot Knob. On the east, hills of similar rock are abundant as far as Castor Creek. To the south they stretch away in large masses for many miles, with occasional outcrops as far as the boundary line of Butler county. To the southwest, they extend into Shannon county, and perhaps even beyond.

Extracted from Haworth's Manuscript.

GEOGRAPHY OF THE CRYSTALLINE ROCKS.

a. Boundaries.

The crystalline rocks of Missouri are irregularly distributed over an area nearly seventy miles square. The central portion of the area is in the vicinity of Pilot Knob. Here for a distance of from six to ten miles in all directions the Archæan rocks cover the greater portion of the surface, and to the east they are almost continuous for more than twenty miles, reaching as far as Knob Lick and Fredericktown.

Beyond this central area the crystalline exposures continuously become smaller and farther apart. To the north they reach beyond Bismarck, into township 36 N. On the northeast they are found in Ste. Genevieve county nearly thirty miles from Pilot Knob. On the east porphyry and granite hills are abundant as far as range 8 east, or as far as to Castor creek. To the south occasional exposures may be observed as far as township 27 N.

(Which is near the boundary of Butler county.)

To the southwest they extend into Shannon county, and even then it is quite probable the limit is not reached. * * *. To the west the area reaches in almost unbroken outlines to the East Fork of Black River, is quite prevalent to the Middle Fork, and numerous scattered hills have been found beyond; while to the northwest porphyry hills are found as far as Little Pilot Knob, * * in Washington county.

They stretch out to the west almost unbrokenly to the east fork of Black River; while numerous scattered hills continue even beyond the middle fork of the same stream. Toward the northwest similar rocks occur at short intervals as far as Little Pilot Knob, in Washington county.

(Five lines referring the reader to maps.)

The central and most extensive portion of the crystalline is, as just stated, in the vicinity of Pilot Knob and Iron Mountain, and occupies the median parts of townships 33 and 34, north, in ranges III., IV. and V., east of the fifth principal meridian, with occasional extensions much farther in several directions. The crystalline area is almost unbroken for a distance of 30 miles southeast and southwest of Bismarck, which is situated near the northern margin of the great central district. The other masses of similar rock are much smaller and are widely scattered.

(If a knowledge of such boundaries was possessed by anyone other than myself and those who read my manuscript, what a mistake for the State to pay out so many hundred dollars and for me to spend so many months' time in ascertaining them.)

Page 86.

PHYSIOGRAPHY.

Topography.

(A little less than two pages is of a general character which is relatively distinct from the manuscript).

Page 87.

The various types of rocks give such characteristic phases of topography to the different parts of the district, that the true lithological nature of the rock composing a hill may be readily inferred at a distance of several miles.

East of the great central mass of crystallines the country is comparatively level, or rather not so rugged as in the immediate vicinity of the porphyry hills. In passing still farther toward the border of the area, the topography continually changes; the porphyry is less frequently found in the valleys, and more and more of the hills is composed of limestone. The granites in various places form high, steep prominences. To the west the difference in the surface relief of the granite areas is even more marked. No less than four of the most conspicuous elevations here are made up of granite. One of these on the East Fork of Black river, in the vicinity of the 'falls' (plate iii.), connects with the long row of porphyry

(A little farther along five lines refer the reader to maps.)

First: The central and most solid portions of the Archæan is in townships 33 and 34 N, and in ranges III., IV. and V. E, with occasional projections in different directions reaching much farther.

(About a page and a half of manuscript follows here giving more details of boundaries.)

Page 4.

b. Topography.

(About one page of manuscript is passed here containing many facts mentioned in the printed part.)

Page 4.

A little farther to the east, in the big granite area, the country is comparatively level, or at least much less rugged than in the immediate vicinity of the porphyry hills. This is so noticeable that one may well speak of the characteristic topography of the granite areas. The few high hills that occur almost invariably grade into porphyry toward their summits. But as we pass towards the border of our area, in any direction, we find the topography changing. The porphyry is less frequently found in the valleys; an ever increasing proportion of the hills are composed of Cambrian rocks; and, strangest of all, the granites in different places become the constituents of high and steep hills.

(* * * Six lines of manuscript.)

To the west the difference in the topography of the granite is often more marked. No less than four prominent hills here are composed of granite, while the valleys are never covered with it. One of these is on the east bank of East Fork of Black river, in the vicinity of the beautiful and picturesque 'falls' * * *. (Here description is given in detail.)

The granite hill connects with a long row of prominent porphyry hills, but it is higher than any of them. The next most prominent one of the four lies to the north about three miles in the angle between the East Fork and the Imboden Fork. It is locally called 'High Top,' and well it deserves the name, for it stands out prominent above all the hills near it. According to the barometric measurements made by Mr. Kirk it rises 635 feet above the valley at its base, which shows that it compares favorably with Shepherd Mountain, the biggest and highest porphyry hill

hills, but is higher than any of them. Another is three miles north of the one last mentioned, between the East Fork and the Imboden. It is called 'High Top,' for it towers above all the hills surrounding it, rising 635 feet above the valleys at its base, and compares in this respect favorably with Shepherd Mountain, the largest and highest porphyry peak of the central area. The third principal granite hill lies to the south, and its height is about the same as the two mentioned; while the fourth is about a mile east of High Top. Farther west are still other crystalline hills, but they are composed of porphyry. Beyond the Imboden fork is another tributary known as Shut-in fork. The word 'shut-in' is a name usually applied throughout the region to every place in which two hills are close together with a stream flowing between. In this case the two hills forming the 'shut-in' are very high, particularly the westernmost, which rises 610 feet above the stream.

Throughout the Black river country there is unusual regularity in the courses of the streams; from which fact it may be inferred that there is a corresponding symmetry in the arrangement of the elevated portions of the region instead of promiscuous scattered positions of the hills so common elsewhere. There is a series of long rows of elevations between the streams. Generally the southernmost point of each is the highest, as in the case of Hightop and the other granite hills mentioned above. From the summit of any prominent elevation in this region there is visible every crystalline mass within a radius of many miles. Here and there may be noticed a prominence standing out more boldly than the others, and they often, after closer inspection, resolve themselves into rude ranges. The most prominent of these groups is in the vicinity of Annapolis. The row forms a broad curve extending to the southwest a distance of three miles. To the east and southeast there are first a few small porphyry hills in the immediate vicinity of the town, and beyond this a large elevation with three prominent spurs. These hills in turn stretch away to the southeast, almost connecting with the row of mountains on the east bank of Crain Pond creek, and from thence to Gray mountain immediately east of Brunot.

Page 89.

Southward from the point of view just mentioned, across a stretch of six or seven miles of lowland, is a second row of hills extending east and west and reaching from Black river to the St. Francois. On the west is Mann and on the southeast Rubel mountain. Both are large porphyry hills. Beyond the latter are McFadden, Aley and Mud Lick mountains, the latter in the central area. A third one of the four granite hills lies on the south line of the same township and will perhaps equal in height either of the two above mentioned, although its altitude has not been measured. The fourth one lies about a mile west of High Top, but is much less prominent.

(Here follows about one-half page giving geologic reasons for peculiar topography.)

West of the Imboden Fork is another tributary known as the Shut-in Fork. The two hills forming the so-called 'Shut-In'—a common term applied to almost every place where two hills are close together with a stream flowing between, are very high, particularly the west one. It rises to a height, according to Mr. Kirk, of 610 feet. * * * *

By consulting a map one will see that in the Black river country the streams come from the northeast and the northwest, converging to a point a little south of Lesterville, in Reynolds county. There is an unusually great regularity here in the direction of the water courses, which means there is a corresponding regularity in the topography of the country, a topography which may almost be named the Black river type. Instead of the irregular, hatchy arrangement of the hills, so common in other places, we find here at least an approach to regularity in the numerous rows of hills between the streams. Generally also, the southernmost point in each row is the highest, as is the case with High Top and the other granite hills mentioned above.

Standing on a prominent hill almost anywhere south of the north line of township 33, particularly in the Black river or the Taum Sauk country, by looking away to the south, one can readily distinguish almost every Archæan hill, each of which is porphyry, lying between the latitudes of Hogan and Piedmont.

('Many miles.')

The country is broken and hilly, but here and there may be noticed a much greater prominence, a hill which stands out so boldly that it at once attracts attention. These large hills, or mountains, as they are locally called, are so independent of each other in location that there seems to be little, if any, relation between them. But when they are platted it can be seen they constitute three distinct groups of hills.

('Rude ranges.')

The northern group is in the vicinity of Annapolis. The row of hills form a curve convex northward, with Annapolis just south of the curve. To the southwest the curve extends about three miles, including as many hills. To the east and southeast one passes a few small porphyry hills, immediately at the town, then Grassy mountain, a prominent porphyry hill * * *.

two rising 710 and 793 feet above the surrounding valleys. The last one is the larger of the two and consists of two separate peaks. The eastern base is washed by the St. Francois river.

Still farther to the southward from the point of vantage named are other hills which appear as an irregular row trending east and west. The westernmost is Finley mountain, a large peak covering nearly six square miles and reaching from the Iron Mountain Railroad on the east almost to Black river on the west. It rises 725 feet above the valley, and may be regarded as one of the largest prominences of the region. To the east is Clark mountain, the highest and the grandest hill in the whole area. It is conical in form and rises majestically to a height of 843 feet above its base. It may be seen from every prominent peak south of Iron mountain, and appears to rise so high above the surrounding hills that it almost seems higher than any of those to the north. Looking in that direction from Clark mountain, the whole country for a distance of thirty miles is visible, from Black river to Knob Lick. The interval between the two points rises as a wall upon the landscape. High Top and Shut-in mountains appear to the northwest, Shepherd mountain to the north, Black and Blue mountains to the northeast, with numberless intervening hills of almost equal height and nearly equal prominence.

One more district deserves special mention in this connection. It is along the St. Francois river below the Silver mines. The hills close in on each side, but usually allowing a valley wide enough to contain extensive farms, first on one side of the stream and then on the other, while at other places it narrows to a width scarcely sufficient to admit the passage of the river. The hills are very large. On the west bank are Black, King, Gray and Mud Lick mountains, with less prominent ones between. On the east bank are peaks which rise fully as high.

Page 90.

c. Drainage.

(Here follows ten lines quite dissimilar from anything in the manuscript.)

(Exact location given.)

Beyond this there is the large hill with its three southern projections

('Prominent spurs.')

* * *. This hill in turn stretches away to the southeast, almost connecting with a row of similar hills on the east bank of Crain Pond creek, and from thence to Gray's mountain, immediately east of Brunot.

Page 8.

If from the point of view before mentioned, or better, from a prominent point in the row of hills just located, one continues looking southward across a piece of relatively low land occupied by many hatchy chert hills, six miles or more away, one will see a second row of hills trending east and west and reaching from near Black River to the St. Francois. Beginning on the west we find Mann mountain *.

(Exact location given.)

To the southeast in Section 11 is Rubel Mountain, another large porphyry hill. Passing eastward still * * * McFadden's mountain is met with, and beyond it to the southeast Aley mountain and Mud Lick mountain, two large and high porphyry hills which measure respectively 710 and 793 feet above the surrounding valleys. Mud Lick mountain is the larger of the two and consists of two separate peaks.

(Three lines omitted.)

It's eastern base is washed by the St. Francois river.

Looking still farther southward other hills can be seen which, with a little imagination, will appear in an irregular row trending east and west. The westernmost one is Finley mountain, a magnificent hill covering nearly six square miles and reaching from the Iron mountain Railway on the east almost to Black River on the west. It rises 725 feet above the valley, and when compared with the hills in the Pilot Knob region, is one of the largest. Passing eastward from Finley mountain and disregarding the smaller hills, one reaches Clark mountain, the highest and grandest hill in the whole Archæan area. It is circular in form, and * * *. (Exact location given.) Its summit rises in magnificent grandeur to a height of 843 feet above the valley. It can be seen from every prominent peak south of Iron Mountain, and seems to rise so high above the surrounding hills that one thinks surely it is higher than any of those to the north. But, in turn, when standing on the summit of Clark mountain and looking to the north the whole country thirty miles away, from Black river to Knob Lick, seems to rise like a wall, or mountain chain, it is so much higher than the in-

tervening hills. From here one can see High Top and Shut-in mountain to the northwest, Shepherd mountain to the north, and Black mountain, Blue mountain and Knob Lick mountain to the northeast, with so many intervening hills of almost equal height that the prominent ones mentioned can scarcely be distinguished.

(Here follow eleven manuscript lines descriptive of topography south of Clark mountain.)

One more region should be especially mentioned in this connection, that along the St. Francois river below the Silver Mines. The granite area above described reaches down the river a mile below the old mining place bearing this attractive name. Here the hills close in on each side forming a narrow valley through which the river flows. In places the valley is wide enough to contain extensive farms, first on one side of the stream and then on the other, while in other places it decreases to width barely sufficient to admit the passage of the river. The hills are very large. On the west bank there is Black mountain, four miles long, King mountain, Gray's mountain, and Mud Lick mountain, with less noted ones between. On the east bank we have hills almost as extensive whose peaks rise fully as high, but which are not so long, nor so prominent by virtue of their names. The highest of these hills have not been measured, but certainly some of them surpass 700 feet, for two or three will almost equal Mud Lick mountain, which is 793 feet above the valley.

(Here follows a page more on topography.)

Many other instances might be given, particularly in the article on weathering of granite rocks, the fissures in the rocks, etc. Every instance mentioned on page 95, such as that of the St. Francois river, was taken direct from the manuscript without any intimation of its source. The figures illustrating Keyes' chapter were principally taken from photographs which constituted a part of my manuscript as it was sent to Jefferson City in August, 1893. Plates III., VI., VII. and XI. are reproduced photographs taken by myself and Winslow of places I specially chose. Plate IV. was taken by Mr. Ladd years ago at my request, while plate X. was called for by my manuscript, although I did not have a copy of the photograph to send with the manuscript.

In his letter of November 15, in referring to my intimation that he had plagiarized he said: "To say that it is, is most emphatically false, to the very last letter." The reader who has sufficient interest to compare the parallel columns above may judge for himself. No one doubts a State Geologist's privilege of writing as many 'introductions' as he may wish, but others also have the prerogative of questioning the utility of such 'introductions' when the State Geologist is compelled to go to a suppressed manuscript to find something to say.

Dr. Keyes seems to be an adept in borrowing illustrations without proper acknowledgment. In Volume I., Iowa Geological Survey, plate IX. was made from a photograph taken by Prof. C. H. Gordon. He subsequently published it in Volume II. as plate IV., and in his report on paleontology for Missouri in Volume IV., plate IX., all without any acknowledgments, although Prof. Gordon had called his attention to the matter (A. J. Sci. (3), Vol. XLVI., p. 398, 1893). In Vol. 2, Proceedings

Iowa Academy of Science, he published plates III. and IV., without acknowledgments, which were first published by Winslow in the text of the Iron Mountain sheet as plates III. and II. For his introduction to my report from the same place he borrowed plates I. and III., using them as plates II., VIII. and IX., respectively, again without acknowledgments. And yet on November 14 he wrote me: "I have only the simple statement to make that no one holds in higher reverence the giving of all due credit to whom it belongs and no one has tried harder than I to give it on all and every occasion."

ERASMUS HAWORTH.

SCIENTIFIC LITERATURE.

A Review of the Weasels of Eastern North America. By OUTRAM BANGS, Proc. Biol. Soc. of Washington, X., pp. 1–24, pls. I.–III., Feb. 25, 1896.

In clearing up the status of the Weasels of eastern North America, Mr. Bangs has done a piece of work that will be welcomed by all mammalogists. He has had access to practically all the material thus far accumulated by American naturalists on the species treated; his results leave little to be desired.

All three of the species named by Bonaparte in 1838—*richardsoni*, *cicognani* and *longicauda*—are found to be valid, and their geographic ranges are for the first time defined. The weasel which heretofore has been persistently confounded with the European *Putorius erminea* is found to be a very distinct species for which the name *P. noveboracensis* of Dekay and Emmons becomes available. This animal is the common large weasel of the Eastern States, where it ranges from the mountains of North Carolina northward to northern New York and central Maine. It is not known from any point west of Illinois.

The small weasel of the Northern States, which it has been customary to call *P. vulgaris*, is the *P. cicognani* of Bonaparte, as recognized by Baird and Mearns, but overlooked by most mammalogists. *P. cicognani* is a northern animal ranging from New York and New England northward, and extending westward all the way to Alaska. Mr. Bangs believes that it intergrades, in the far North, with the arctic *P. richardsoni*, the type of which came from Great Bear Lake. *P. richardsoni* ranges from Hudson Bay to the coast of Alaska.

The weasel of the northern plains, *P. longicauda* Bonaparte, becomes considerably darker along the edge of the forest belt in Minnesota, and the dark form is named as a subspecies, *spadix*.

But the most interesting novelty is a tiny species from the plains of the Saskatchewan, which Mr. Bangs names *P. rixosus*. It is not only the smallest of the weasels, but it is believed to be the smallest known Carnivorous mammal. It has a very short tail, which lacks the black tip of all other species, and in winter the little animal turns white all over. It ranges from Hudson Bay to the coast of Alaska and is exceedingly rare in collections.

The rarest weasel of all is the Florida species, *P. peninsulæ*, recently described by S. N. Rhoads. Only half a dozen specimens, mostly poor, have as yet found their way into collections.

Mr. Bangs' paper is an excellent example of the kind of work American mammalogists have been doing for the past few years. It is based on a sufficient number of specimens to admit of final conclusions, and the specimens have been studied so thoroughly that no other conclusions are likely to be suggested in future.

The paper is illustrated by 3 excellent plates of skulls, all drawn by Dr. James C. McConnell.

C. H. M.

Report on Field-work in Chenango County [New York]. By J. M. CLARKE. (In Thirteenth An. Rept. State Geologist [N. Y.] for the year 1893, Vol. I., Geology. Pp. 529–557, 1 plate, 10 figures.)

Volume I. of the last annual report of the State Geologist of New York forms a book of nearly 600 pages which is devoted to a description of the geology of certain portions of the state and is profusely illustrated with maps, sections, figures and plates. The greater number of separate papers composing the report are not only filled with interesting facts, but also increase our knowledge of the geology of the State to a considerable extent.