the Mesozoic. Now the submergence of any mass of land will disturb the climatic equilibrium of that region, and the disappearance of an Antarctic continent would prove extremely potent in varying the climate of this hemisphere. For to-day the sun's rays fall on the South Polar regions to small purpose. The unstable sea absorbs the heat, and in wide and comparatively warm streams it carries off the caloric to the northern hemisphere, to raise its temperature at the expense of ours. But when extensive land received those same heat rays, its rigid surfaces, so to speak, tethered their caloric in this hemisphere, and thus when there was no mobile current to steer northward with it, warmth could accumulate and modify the climate.

Under the influence of such changes the icy mantle would be slowly rolled back toward the South Pole, and thus many plants and animals were able to live and multiply in latitudes that to-day are barren. What has undoubtedly occurred in the extreme north is equally possible in the extreme south. But if it did occur—if south polar lands, now ice bound, were then as prolific of life as Disco and Spitzbergen once were—then, like Spitzbergen and Disco, the unsubmerged remnants of this continent may still retain organic evidences of the fact in the shape of fossil-bearing beds, and the discovery of such deposits would confirm or confute such speculations as these. The key to the geological problem lies within the Antarctic circle, and to find it would be to recover some of the past history of the southern hemisphere. There is no reason to despair of discovering such evidence, as Dr. M'Cormack, in his account of Ross' voyage, records that portions of Victoria Land were free from snow, and therefore available for investigation; besides which their surface may still support some living forms, for they cannot be colder or bleaker than the peaks which rise out of the continental ice of north Greenland, and these, long held to be sterile, have recently disclosed the existence upon them of a rich though humble flora.

We have now to consider some important meteorological questions. If we look at the distribution of the atmosphere around the globe, we shall see that it is spread unequally.

It forms a stratum which is deeper within the tropics than about the poles and over the northern than over the southern hemisphere, so that the barometer normals fall more as we approach the Antarctic than they do when we near the Arctic. Maury, taking the known isobars as his guide, has calculated that the mean pressure at the North Pole is 29.1, but that it is only 28 at the south (Maury's "Meteorology," 259). In other words, the Antarctic circle is permanently much barer of atmosphere than any other part of the globe.

Again, if we consult a wind chart we shall see that both poles are marked as calm areas. Each is the dead center of a perpetual wind vortex, but the South Polar indraught is the stronger. Polarward winds blow across the 45th degree of north latitude for 189 days in the year, but across the 45th degree of south latitude for 209 days. And while they are drawn into the North Pole from over a disk-shaped area 5,500 miles in diameter, the South Polar indraught is felt throughout an area of 7,000 miles across. Lastly, the winds which circulate about the South Pole are more heavily charged with moisture than are the winds of corresponding parts of the other hemisphere. Now the extreme degree in which these three conditions—of a perpetual grand cyclone, a moist atmosphere, and a low barometer—co-operate without the Antarctic ought to produce, within it, an exceptional meteorological state, and the point to be determined is what that condition may be. Maury maintained that the conjunction will make the climate of the South Polar area milder than that of the north. His theory is that the saturated winds being drawn up to great heights within the Antarctic must then be eased of their moisture, and that simultaneously they must disengage vast quantities of latent heat; and it is because more heat must be liberated in this manner in the South Polar regions than in the north that he infers a less severe climate for the Antarctic. He estimates that the resultant relative differences between the two polar climates will be greater than that between a Canadian and an English winter (Maury's "Meteorology," p. 466). Ross reports that the South Polar summer is rather colder than that of the north, but still the southern winter may be less extreme, and so the mean temperature may be higher. If we examine the weather reports logged by Antarctic voyagers, instead of the temperature merely, the advantage still seems to rest with the south. In the first place, when the voyager enters the Antarctic, he sails out of a tempestuous zone into one of calms. To demonstrate the truth of this statement, I have made an abstract of Ross's log for the two months of January and February, 1841, which he spent within the Antarctic circle. To enable every one to understand it, it may be well to explain that the wind force is registered in figures from 0, which stands for a dead calm, up to 12, which represents a hurricane. I find that during these 60 days it never once blew with the force 8—that is, a fresh gale; only twice did it blow force 7, and then for only a half a day each time. Force 5 to 6—fresh to strong breezes—is logged on 21 days. Force 1 to 3—that is, gentle breezes—prevailed on 34 days. The mean wind force registered under the entire 60 days was 3.43—that is, only a four to five knot breeze. On 38 days, blue sky was logged. They never had a single fog, and on 11 days only was it even misty. On the other hand, snow fell almost every second day. We find such entries as these—"beautifully clear weather," and "atmosphere so extraordinarily clear that Mount Herschel, distant 90 miles, looked only 30 miles distant." And again, "land seen 120 miles distant, sky beautifully clear." Nor was this season exceptional, so far as we can tell, for Dr. M'Cormack, of the Erebus, in the third year of the voyage, and after they had left the Antarctic for the third and last time, enters in his diary the following remark. He says: "It is a curious thing that we have always met with the finest weather within the Antarctic circle; clear, cloudless sky, bright sun, light wind, and a long swell" (M'Cormack's "Antarctic Voyage," vol. i., p. 345). It would seem as if the stormy westerlies so familiar to all Australian visitors had given to the whole southern hemisphere a name for bad weather, which, as yet at least, has not been earned by the south polar regions. It is probable, too, that the almost continuous gloom and fog of the Arctic (Scoresby's

"Arctic Regions," pp. 97 and 137) July and August have prejudiced seamen against the Antarctic summer. The true character of the climate of this region is one of the problems awaiting solution. Whatever its nature may be, the area is so large and so near to us that its meteorology must have a dominant influence on the climate of Australia, and on this fact the value of a knowledge of the weather of these parts must rest.

To turn to another branch of science, there are several questions relating to the earth's magnetism which require for their solution long-maintained and continuous observations within the Antarctic circle. The mean or permanent distribution of the world's magnetism is believed to depend upon causes acting in the interior of the earth, while the periodic variations of the needle probably arise from the superficial and subordinate currents produced by the daily and yearly variations in the temperature of the earth's surface. Other variations occur at irregular intervals, and these are supposed to be due to atmospheric electricity. All these different currents are excessively frequent and powerful about the poles, and a sufficient series of observations might enable physicists to differentiate the various kinds of currents, and to trace them to their several sources, whether internal, superficial, or meteoric. To do this properly at least one land observatory should be established for a period. In it the variation, dip, and intensity of the magnetic currents, as well as the momentary fluctuations of these elements, would all be recorded. Fixed term days would be agreed on with the observatories of Australia, of the Cape, America, and Europe, and during these terms a concerted continuous watch would be kept up all round the globe to determine which vibrations were local and which general.

The present exact position of the principal south magnetic pole has also to be fixed, and data to be obtained from which to calculate the rate of changes in the future, and the same may be said of the foci of magnetic intensity and their movements. In relation to this part of the subject, Captain Creak recently reported to the British Association his conclusions in the following terms. He says: "Great advantage to the science of terrestrial magnetism would be derived from a new magnetic survey of the southern hemisphere extending from the parallel of 40° S. as far toward the geographical pole as possible."

Intimately connected with terrestrial magnetism are the phenomena of auroras. Their nature is very obscure, but quite recently a distinct advance has been made toward discovering some of the laws which regulate them. Thanks to the labors of Dr. Sophus Tromholt, who has spent a year within the Arctic circle studying them, we now know that these movements are not as eccentric as they have hitherto appeared to be. He tells us that the Aurora Borealis, with its crown of many lights, encircles the pole obliquely, and that it has its lower edge suspended above the earth at a height of from 50 to 100 miles, the mean of 18 trigonometrical measurements, taken with a base line of 50 miles, being 75 miles. The aurora forms a ring round the pole which changes its latitude four times a year. At the equinoxes it attains its greatest distance from the pole, and at midsummer and midwinter it approaches it most closely, and it has a zone of maximum intensity which is placed obliquely between the parallels of 60° and 70° N. The length of its meridional excursion varies from year to year, decreasing and increasing through tolerably regular periods, and reaching a maximum about every eleven years, when, also, its appearance simultaneously attains to its greatest brilliancy. Again, it has its regular yearly and daily movements or periods. At the winter solstice it reaches its maximum annual intensity, and it has its daily maximum at from 8 p. m. and 2 a. m., according to the latitude. Thus at Prague, in lat. 50° N., the lights appear at about 8.45 p. m.; at Upsala, lat. 60° N., at 9.30 p. m.; at Bossekop, 70° N., at 1.30 a. m. Now, while these data may be true for the northern hemisphere, it remains to be proved how far they apply to the southern. Indeed, seeing that the atmosphere of the latter region is moister and shallower than that of the former, it is probable that the phenomena would be modified. A systematic observation of the Aurora Australis at a number of stations in high latitudes is therefore desirable.

Whether or not there is any connection between auroral exhibitions and the weather is a disputed point. Tromholt believes that such a relationship is probable ("Under the Rays," 1283). He says that, "however clear the sky, it always became overcast immediately after a vivid exhibition, and it generally cleared again as quickly" ("Under the Rays," 1235). Payer declares that brilliant auroras were generally succeeded by bad weather ("Voyage of Tegelhoff," 1324), but that those which had a low altitude and little mobility appeared to precede calms. Ross remarks of a particular display that "it was followed by a fall of snow, as usual" ("Ross's Voyage," 1312). Scoresby appears to have formed the opinion that there is a relationship indicated by his experience. It is, therefore, allowable to regard the ultimate establishment of some connection between these two phenomena as a possible contingency. If, then, we look at the eleven-year cycle of auroral intensity from the meteorological point of view, it assumes a new interest, for these periods may coincide with the cycles of wet and dry seasons, which some meteorologists have deduced from the records of our Australian climate, and the culmination of the one might be related to some equivalent change in the other. For if a solitary auroral display be followed by a lowered sky, surely a period of continuous auroras might give rise to a period of continuous cloudy weather, with rain and snow. Fritz considers that he has established this eleven-year cycle upon the strength of auroral records extending from 1583 to 1874, and his deductions have been verified by others.

In January, 1886, we had a wide-spread and heavy rainfall, and also an auroral display seen only at Hobart, but which was sufficiently powerful to totally suspend communication over all the telegraph lines situated between Tasmania and the China coast. This sensitiveness upon the part of the electric currents to auroral excitation is not novel, for long experience on the telegraph wires of Scandinavia has shown that there is such a delicate sympathy between them that the electric wires there manifest the same daily and yearly periods of activity as those that mark the auroras. The current that reveals itself in fire in the higher regions of the atmosphere is precisely the same

current that plagues the operator in his office. Therefore, in the records of these troublesome earth-currents now being accumulated at the observatory by Mr. Ellery we are collecting valuable data, which may possibly enable the physicist to count the unseen auroras of the Antarctic, to calculate their periods of activity and lethargy, and, again, to check these with our seasons. But it need hardly be said that the observations which may be made in the higher latitudes and directly under the rays of the Aurora Australis will have the greater value, because it is only near the zone of maximum auroral intensity that the phenomena are manifested in all their aspects. In this periodicity of the southern aurora I have named the last scientific problem to which I had to direct your attention, and I would point out that if its determination should give to us any new to the changes in the Australian seasons which would enable us to forecast their mutations in any degree, it would give to us, in conducting those great interests of the country which depend for their success upon the annual rainfall, an advantage which would be worth, many times over, all the cost of the expeditions necessary to establish it.

Finally, there is a commercial object to be served by Antarctic exploration, and it is to be found in the establishment of a whaling trade between this region and Australia. The price of whalebone has now risen to the large sum of £2,000 a ton, which adds greatly to the possibilities of securing to the whalers a profitable return. Sir James Ross and his officers have left it on record that the whale of commerce was seen by them in these seas, beyond the possibility of a mistake.

They have stated that the animals were large, and very tame, and that they could have been caught in large numbers. Within the last few years whales have been getting very scarce in the Arctic, and in consequence of this two of the most successful of the whaling masters of the present day, Captains David and John Gray, of Peterhead, Scotland, have devoted some labor to collecting all the data relating to this question, and they have consulted such survivors of Ross' expedition as are still available. They have published the results of their investigations in a pamphlet, in which they urge the establishment of the fishery strongly, and they state their conclusions in the following words. They say:

"We think it is established beyond doubt that whales of a species similar to the right or Greenland whale, found in high northern latitudes, exist in great numbers in the Antarctic seas, and that the establishment of a whale fishery within that area would be attended with successful and profitable results."

It is not necessary for me to add anything to the opinion of such experts in the business. All I desire to say is that if such a fishery were created, with its headquarters in Melbourne, it would probably be a material addition to our prosperity, and it would soon increase our population by causing the families of the hardy seamen who would man the fleet to remove from their homes in Shetland and Orkney and the Scotch coasts, and settle here.

In conclusion, I venture to submit that I have been able to point to good and substantial objects, both scientific and commercial, to justify a renewal of Antarctic research, and I feel assured that nothing could bring to us greater distinction in the eyes of the whole civilized world than such an expedition, judiciously planned and skillfully carried out.

THE COAL FIELDS OF ALABAMA.*

By HENRY MCCALLEY, Assistant State Geologist.

THE coal measures of Alabama are of the expanded and flattened southwest end of the great coal basin of the Ohio or of the great Appalachian coal field.

They were once connected throughout and then formed almost one-fourth the entire area of the State, or some 10,000 square miles. Things were thus at the time of the great Appalachian revolution, when there was pushed up across them, in a general northeast and southwest direction, a series of long parallel anticlinal ridges or mountains, that have since been washed out into the present well known anticlinal valleys which now separate the measures into several distinct parts.

These parts are all made up of a succession of sandstones, conglomerates, shales, clays, coals, and a little impure limestone, locally at least, at several horizons.

These different parts were named by Prof. Tuomy in 1849, from the rivers which drain them, the *Warrior*, the *Cahaba* and the *Coosa* coal fields.

These coal fields, though once but parts of one and the same field, are now quite different as to their geological structure and topographical features. They have many advantages, the most important of which are their richness in good workable seams of coal, the ease and cheapness with which these coals can be mined and gotten to market, their nearness to the vast deposits of iron ores and limestones in the narrow anticlinal valleys that separate them, and their most favorable location, for, as has been said, they are surrounded on three sides by coalless areas, and are the nearest coal fields to the Gulf of Mexico and the Atlantic ports south of Charleston. Their most productive areas have also the great advantages of being, not on the tops of high mountains, but of comparatively low areas, with rivers winding through them, that can be made navigable the year round for steam tugs and coal barges.

The Warrior Coal Field.—This field embraces all the coal measures in Alabama that are drained by the Warrior and Tennessee Rivers. It also includes the Lookout Mountain coal field, which is drained by tributaries to the Coosa River. Its area, as thus defined, is some 7,800 square miles, and is over ten times larger than the other two fields combined. It is the most northwestern of the Alabama coal fields, and for the sake of convenience has been divided into a *plateau or table land area* and a *basin area* without any distinct line of demarcation between the two, the one gradually merging into the other.

The plateau or table land area is the northeast half of the field, and embraces what is locally known as the Cumberland Plateau (north of the Tennessee River), Sand Mountain, Raccoon Mountain, Blount Mountain, and Lookout Mountain (south of that river). Its area is some 4,500 square miles. It is most elevated in the

* A paper read before the American Geological Society, Washington, Dec. 20-31, 1890.

northeast corner of the State, where it is from 1,350 to 1,850 feet above tide water level, and from 350 to 850 above the adjacent valleys. Its coal measures vary in thickness from 50 to 2,500 feet, and its coal seams from one to eleven.

The *basin area* is the southwest half of the field, and embraces some 3,300 square miles. Its strata have a slight general dip to the southwest, and so its coal measures thicken in that direction to the southwest end of the basin or field at Tuscaloosa, where they become entirely covered up or hid by the cretaceous formation. Its most southwestern strata or, in fact, the most southwestern strata of the great Appalachian coal field, so far as they can be seen, are in the Warrior River, just below the bridge at Tuscaloosa. Provided the strata retain the thickness of their outcrops, the coal measures at and near Tuscaloosa must be near 5,000 ft. in thickness. These thickest measures have in them some 50 seams of coal, ranging in thickness from a few inches to 14 ft. and having a combined thickness of coal of about 125 ft.

These coals can be mined just as easily and just as cheaply as the coals of any other coal field, because the physical features of the country, the small angle of dip of the coals and the structure of the coals are all conducive to easy and cheap mining.

The transportation facilities for a considerable portion of this field are now good. It has seven railroad connections. It has also a river length within its basin of 100 miles that can be made navigable the year round for steam tugs and coal barges.

Cahaba Coal Field.—This is the central coal field of Alabama. It is a long narrow field, with a length from northeast to southwest of some 60 miles and a maximum width from northwest to southeast of about 15 miles. It gradually widens toward the southwest and has an area of about 435 square miles. It is bounded on the northwest by a high bluff and vein of Millstone Grit and on the southeast by a big fault that brings in contact with its uppermost measures Cambrian strata. It has, according to Mr. Joseph Squire, M.E., a maximum thickness of coal measures of over 5,000 ft. and 49 seams of coal that have an average combined thickness of about 100 ft. of coal. These coals as a class appear to be harder and cleaner than those of the Warrior field, but then they have the great disadvantage of being much more highly inclined, much more faulty, and in a much more broken country. They have a bright and shining luster and are remarkable for their purity and dryness.

Much of this field has now good transportation facilities. It has railway connections with four great railway lines. It also has through its most productive areas a river that can be made navigable for steam tugs and coal barges.

The Coosa Coal Field.—This is the most southeastern, the smallest and the least known of the three coal fields of Alabama. It is a long, narrow field of some 60 miles in length and a maximum width of only about 6 miles. Its widest portion is near the northeast end, because there is cut off from the southwest end by a monoclinical valley and a fault a strip some 25 miles long by from 2 to 4 miles in width. The area of the entire field is about 250 square miles.

The maximum thickness of the coal measures of this field is something like 2,500 ft., though over much the greater part of the field these measures are considerably less than 500 ft. in thickness.

There are known in this field four seams of coal that, in places, range from 3 to 10 ft. in thickness and have a combined thickness of about 19 ft. of coal. These seams, however, over the greater part of the field are believed to be much too thin to be of any commercial value. These coals appear to be rather soft and friable for stocking, but well suited for coking.

This field is touched by only one railroad. Its northeast end, however, is cut through by the Coosa River which is navigable from Rome, Ga., down through its intersection of this field.

The identity of the coal seams of the different fields have not as yet been fully made out, though doubtless this can be done. It is believed that the Warrior and Cahaba fields have each a maximum thickness of coal measures of about 5,000 ft., and there is but little doubt but that each of them has about 50 separate seams of coal, with a combined thickness of at least 100 ft. of coal.

There is no estimating with any degree of nearness the amount of workable coal in these fields. Let it be sufficient to say that there is no danger of its giving out in many years to come.

The thicker seams have nearly always interstratified with their coals thin pastings of shale. These coals are all free-burning bituminous coals, though of almost every variety. Though some of them are highly bituminous or gas-making coals, while others, though free-burning coals, are very dry and almost like semi-anthracite coals, some of them are reported to be especially well fitted for coking and blacksmithing purposes, while others are better suited for heating and steaming purposes. Some of them are hard and bright and are well adapted to handling and stocking, while others are of a duller color and of a softer or more friable nature. Some of them are very pure and give but a very small amount of ash and clinker, while others are bony and slaty. They all, however, as a class give on chemical analyses as good compositions as the average bituminous coals of any other State. Many of them have interstratified in them thin sheets of mineral charcoal.

Some of these coals have a vertical, flaggy structure or a regular *face and butt structure*, while others are divided up by joints into cubical and rhomboidal blocks, and others still are solid and compact throughout.

Though it may be said that coal mining in Alabama, on a scientific basis, dates back to only 1872, there is now within the State some of the largest bituminous coal plants on the face of the globe. The coal output in Alabama for 1872 was only about 11,000 tons and for 1889 it was about 4,000,000 tons of 2,000 lb. each.

The coals of Alabama are rendered especially valuable from their proximity to the vast deposits of red and brown iron ores, and of limestones, of the narrow anticlinal valleys that separate the different coal fields.

Coke.—Coke made from Alabama coals was shown only as recently as 1876 to be good for iron ore smelting, and now the coke industry of Alabama is the third largest of its kind in the United States. The number of coke ovens in operation in the State in August, 1890,

was 4,607. Of these, 74 were of the "Thomas patent," which are equivalent to 105 of the *beehive* basis. So there was then in operation an equivalent of 4,662 beehive ovens. There were at that time, in August, 1890, in course of construction in the State 340 ovens.

The coke output in the State for 1880 was about 60,871 tons, and for 1889 it was about 1,000,000 tons. This coke is used principally for iron ore smelting within the State.

The coal fields of Alabama have in them some *black band iron ore*, some *clay iron stone*, the greatest abundance of *fire clay*, and good *building and paving stones* and good *grindstone* and *millstone materials*. They are also still for the most part covered by their *virgin forests* of hard and soft woods.

ON THE OCCURRENCE OF MEGALONYX JEFFERSONII (HARLAN) IN CENTRAL OHIO.*

By EDWARD ORTON.

DURING the present month a discovery of unusual interest has been made in the post-glacial deposits of Central Ohio. In digging a county ditch in Berlin Township, Holmes County, a number of bones of *Megalonyx Jeffersonii* have been found in an excellent state of preservation. I wish to put on record a preliminary account of the facts of their occurrence. The greater number of the bones was exhumed on Friday, Dec. 19. I saw them for the first time on Saturday last and I have thus far only had an hour or two to study them.

Situation.—The bones were found near the northern line of the township, about six miles east and a little north of Millersburg, the county seat. The location can be further described as approximately 40 miles north of Columbus and 60 miles east of the same place: its latitude is about 40 degrees and 35 minutes. The altitude of the swampy tract from which they were taken is approximately 1,050 ft. above tide, the surrounding hills rising to a height of 200 to 250 ft. above the swamp. The swamp above named is locally known as the "Berlin Plains." It belongs to the extreme southern border of the drift formations for this portion of the State, and thus lies distinctly within the limits of the terminal moraine; in fact, it is wholly due to topographical features imposed by the moraine. The till in the valley is not less than 200 ft. deep, as has been proved by recent borings. But the drift sheets on the hills in the immediate neighborhood are very thin, and in fact are mainly wanting, a few granite boulders being the main representatives on the high grounds. In the valleys, however, the moraine assumes its typical features, ridges of sand and gravel being pushed out to the southward in crescentic form, leaving numerous undrained basins, from some of which the water still sinks away as fast as it is received, and others of which have become shallow ponds, or swamps, from which the water finds its way out by means of the common drainage system of the country, and generally by very sluggish outflows. The beavers took possession of these outlets at many points and built their dams across them, raising the level of the water temporarily in this way.

The particular "plains" with which we are here concerned comprise about 300 acres in extent, forming parts of two or three farms. The surface of the swamp is a black muck of a vegetable origin, containing besides many twigs and roots of the plants that formerly occupied the swamp. The thickness of the muck in the edge of the swamp, which is the only portion yet traversed by the ditch, ranges from 4 to 5 ft. The muck is underlaid by a bed of marl, made up of clay, vegetable remains and numerous fresh water and land shells belonging to living species, among which *Planorbis*, *Succinea*, and other common varieties are to be recognized.

The ditch which is to drain the plains was begun some months ago and the digging was kept up until about the 20th of the present month, when the snow fell in such quantity as to interrupt the work for the winter. About three weeks since several bones were thrown out in the excavation that immediately attracted the attention of the workmen; a claw of unusual character was the most marked of this first find. The bones were taken by the county engineer to Millersburg, the county seat, and attracted a good deal of interest and attention there. They were referred with considerable sagacity by the local representatives of science in the village of Millersburg to *Megalonyx*. W. S. Hanna, Esq., ex-county surveyor, who had laid out the ditch in question and who had been in charge of the work until recently, took from the first a deep and intelligent interest in the discovery. Under his pilotage, a half day's work was undertaken on Friday, the 19th Dec., by the force of laborers employed on the ditch, in making further excavation near the point where the first bones were found. The search was successful to a high degree and almost from the beginning. One of the first bones found in this new work was the massive femur. Presently the other femur was unearthed and soon after that a tibia and two fibulas were added to the list. The last named bones have not before been found, so far as my information goes; at least they are not represented in Leidy's classic memoir. To this list there were added before nightfall of our shortest day five dorsal or lumbar vertebrae, one radius, one clavicle, the two calcaneum or heel bones, eleven claws, three teeth, the hyoid bone, many of the tarsal and carpal series and many fragments besides, the total number of bones and fragments making 100 up to the present time. Among the fragments, there is no doubt much interesting material for the study of the anatomist.

The bones are mainly found in the marl, and none of them at a greater depth than 10 inches in this deposit. A few projected into the overlying muck, and in this case they were invariably found in defective state as compared with the latter, having lost something of their substance and even of their form.

Condition.—As to the condition of the bones found in the marls, superlatives would be in place in describing them. After their long interment, they would seem to have scarcely passed even yet beyond the condition of soap bones. This excellent state of preservation seems common to the entire family to which this specimen belongs. I have not had time, as the account above given will show, to have had a chemical analysis

* A paper read before the Geological Society of America, at its Washington meeting, December, 1890.

made of the bones as yet, but I am sure that the phosphates have been replaced to but a small extent at the most.

Identification.—As to the identification of the bones as those of *Megalonyx Jeffersonii*, made first by the village geologists of Millersburg, there can, I presume, be no question. They agree closely with Leidy's descriptions, as far as these descriptions go. It is to be regretted that the bones of the head and anterior extremities have not yet been brought to light. There is good reason to expect that the pelvis will be disinterred in the search that is presently to be resumed. As for the head and the bones of the shoulder girdle, there is perhaps less ground for a hopeful view. There seems some reason to fear that they were left projecting into the muck, and thus became decomposed. The bones that have been found thus far were not in contact, but occupied a space of something more than a square rod.

The *Megalonyx* makes an important addition to the post-glacial fauna of Ohio. We have found before the mastodon, the elephant, and giant beaver, the two former in considerable numbers, but this is the first occurrence of the great sloth, so far as my information goes, that has been reported in the valley of Ohio and its tributaries, north of the river itself. Big Bone Lick, in Kentucky, has furnished the most northerly specimens of the genus up to the present time. On the Atlantic slope *Megalonyx* has been proved to have reached about the same latitude that I have here reported, namely, 30 degrees and 40 minutes, but in the Ohio valley it has been carried northward by the recent find fully one and one-half degrees of latitude.

These bones bring vividly before us one of the most surprising chapters of the paleontological revelation; a revelation which is made up of surprises. In 1789 a truly gigantic skeleton was found in the pampas of the La Plata district of South America, and was presently sent across the Atlantic. It is now safely housed in the Royal Museum of Madrid. The bones were the most massive known in the animal kingdom at that time. The teeth fell into the hands of the founder of this branch of geological science, viz, paleontology, Baron Cuvier, and he declared them to be the teeth of a herbivorous and probably a leaf-eating mammal, nearly allied to the sloth of the South American forests. By what possible reference of this monstrous skeleton could a greater surprise have been given to the naturalists of that day? From the insignificant arboreal animal that passes its life among the branches of the tropical forests, almost helpless and destitute of the power of locomotion when upon the ground, an animal that Buffon was accustomed to ridicule as a mal-creation, from this insignificant creature to a monster whose thigh bones had three times the volume of the same bones in the largest elephant, it taxed the faith of even the naturalists to make the transition; but every detail of the structure has confirmed and established the sagacious interpretation, and a new family was thus entered into the records of the recent past.

The first addition to the *Megatherium* family came from an unexpected source and in a way interesting for us to note. In 1798, President Thomas Jefferson obtained possession of some animal remains of unusual character that were discovered in a limestone cave in Greenbrier county, Virginia. A claw that was included among the remains attracted his particular attention and was made the basis of a paper presented in the year above named to the American Philosophical Society of Philadelphia, in which the bones were described, and to the animal to which they belonged a name was given. The name was based on the claw above referred to.

The "small Latin and less Greek" of the president were still adequate to the production of the generic name *Megalonyx*, "Great Claw." It would make the bones of the founder of American democracy turn in the grave that holds them to say that this animal had a royal christening, but certainly the royal christening was illustrious.

We are happy to mark in this city, given over largely to politics and statesmanship, one of the few connections between science and statesmen, certainly between paleontology and statesmen. Of all the tribes of life that have been preserved in the rocks of the continent during its long history, there is certainly but one that has been described and named by a president of the United States, and that one I am happy to bring anew to the attention of the geologists of America, at the Washington meeting. It is doubly honored by securing the name of the great statesman in its specific designation, *Megalonyx Jeffersonii*. It is a small matter that the illustrious author mistook the character of the claw that he discovered and referred it to a carnivorous animal. We would condone greater mistakes than this in our statesmen and presidents if they would turn their attention to paleontology. Indeed, are we not all obliged to confess as unfortunate or even worse mistakes of our own? The description of this fossil comes, as we are well aware, from the pen of the veteran paleontologist of the United States in the department of vertebrate geology, Dr. Joseph Leidy, "*nomen clarum et venerabile*." It may be truly said of him, "*non tetigit quod non adornavit*."

A find like this awakens strange questions as to origin and disappearance. Here was apparently full development. There is no hint in these bones that the eye had become dim or the natural force abated. The climate was growing somewhat milder in its *habitat* presumably; but there were colder lands still to the northward for the animal demanding such a climate.

Why should *Megalonyx* drop so abruptly from the ranks of life? Its probable slow rate of increase comes into the account. Not "one but a lion," but "one and a sloth." The questions remain unanswered. I will simply assure the society, in conclusion, that I shall take all possible pains to render this interesting find available to science, as far as may be, in every particular.

HOME LIFE ON AN OSTRICH FARM.*

MRS. MARTIN and her husband started for South Africa in 1881, Mr. Martin having already served a long apprenticeship to ostrich farming. After a rest of a few months they took up a farm on the Karoo, about a day's journey from Port Elizabeth. The farm extended over 12,000 acres. We give here a few extracts:

* "Home Life on an Ostrich Farm." By Annie Martin. George Philip & Son, 32 Fleet Street.