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## PENNSYLVANIA COAL MINING.

The accompanying illustrations, from photographs representing the work at the Bast colliery, near Pottsville, Pa., give a good idea of the great amount of handling and the very extensive plant necessary in connection with the operating of a large coal mine. Although the production of coal in the United States now amounts to about two hundred million tons annually, only about fifty million tons of this aggregate is anthracite, and comes almost exclusively from Pennsylvania, while mines yielding bituminous coal are pretty well scattered over the country. But few people, however, realize the great amount of labor re-

quired to properly make the coal ready for market in the several sizes of lump, broken, egg or furnace, stove, nut, chestnut, pea, buckwheat, and the final culm, and to free the good coal from slate and stone. The total number of employes in and about the anthracite mines of Pennsylvania, according to the completed government statistics for 1893, was 132,944 men and boys, and their average working time for the year was 197 days. The mine furnishing the subject of our illustrations is in the West Mahanoy district, Schuylkill County, and is one of the mines of the system of the Philadelphia and Reading Coal and Iron Company.

In Fig. 1 is illustrated the clearing of the lump coal

from the hoisting shute and the breaking up of the large masses by hand by means of picks directing the lumps into the breaker shutes with forked spades. In Figs. 2 and 3 nimble fingers are seen picking out slate or other stone from the cross boxes or slides. The slate being cast into small shutes in front of each pair of boys, descends into a longitudinal shute which carries it to the waste heap. When each charge of coal in the cross box has been cleared of slate it is dumped into a discharge shute on the opposite side of the picking trough by lifting a shutter, when a new charge is taken into the picking box from the feed shute on the other side.

(Continued on page 201.)



Fig. 1.—CLEARING THE LUMP COAL FROM THE HOISTING SHUTE.

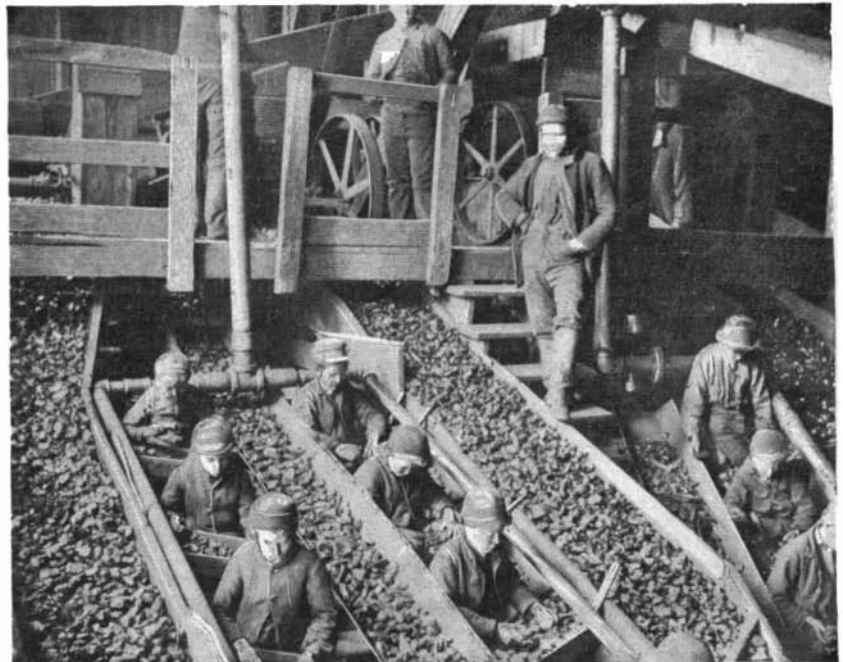


Fig. 3.—ASSORTING COAL—PICKING OUT SLATE.



PENNSYLVANIA COAL MINING—BOYS PICKING COAL AT THE BAST COLLIERY.—Fig. 2.



**PENNSYLVANIA COAL MINING.**

(Continued from first page.)

In Fig. 3 the plan is somewhat different. The coal, sliding from gates in the two main shutes into short cross shutes, is picked and discharged into a shute beneath the central or slate shute, the boys having to toss the slate into the central shute, which discharges into a carrier to the waste heap. The constant watch of the gang bosses keeps the boys steadily at work, for a moment's let-up means so much slate or stone carried into the marketable coal, or, if the feed shutter is closed, the feed shute soon banks up and the screens must stop running. Fig. 4 is a general view of the Bast colliery, showing the hoisting shaft housing, shutes, and the breaker house on the left. In front is the timber yard, a large stock at ready hand being necessary for the props and other timbering of coal mines, which requires frequent renewing.

**The Camera in the Rockies.**

BY H. H. BUCKWALTER.

Colorado and the Rocky Mountain region is visited annually by thousands of amateur photographers, the great majority of whom get very ordinary results, mainly on account of over-exposure. As the number of "tourists" during this summer will probably be larger than ever before, a few suggestions may not be out of place. In the first place, don't leave your camera at home, for the very scenery which attracts the eye the most is not to be found in the regular

where the bottom of the canon is occupied by the foaming, rushing waters, fringed with grass. The wall rocks are colored from a light yellow or sometimes slate at the bottom to a dark red at the top; broken, jagged and a thousand feet or more above. In the most inaccessible places on these cliffs, trees seem to be growing out of the very face of the rock, though in reality in crevices where a few clods of dirt have lodged. Above all this mass of color and form is the bluest of skies. In the afternoon magnificent cloud effects are generally obtainable. With all these in the picture as seen by the eye, the best orthochromatic gives little idea of the natural.

Very few visitors to the West miss trips through the mountains, and it is surprising how much can be seen in an extremely limited time, and likewise with very little outlay financially. It is possible to make several trips of a day each into the mountains, and on each to get into a different class of scenery, though any will give a general idea of the Rocky Mountains.

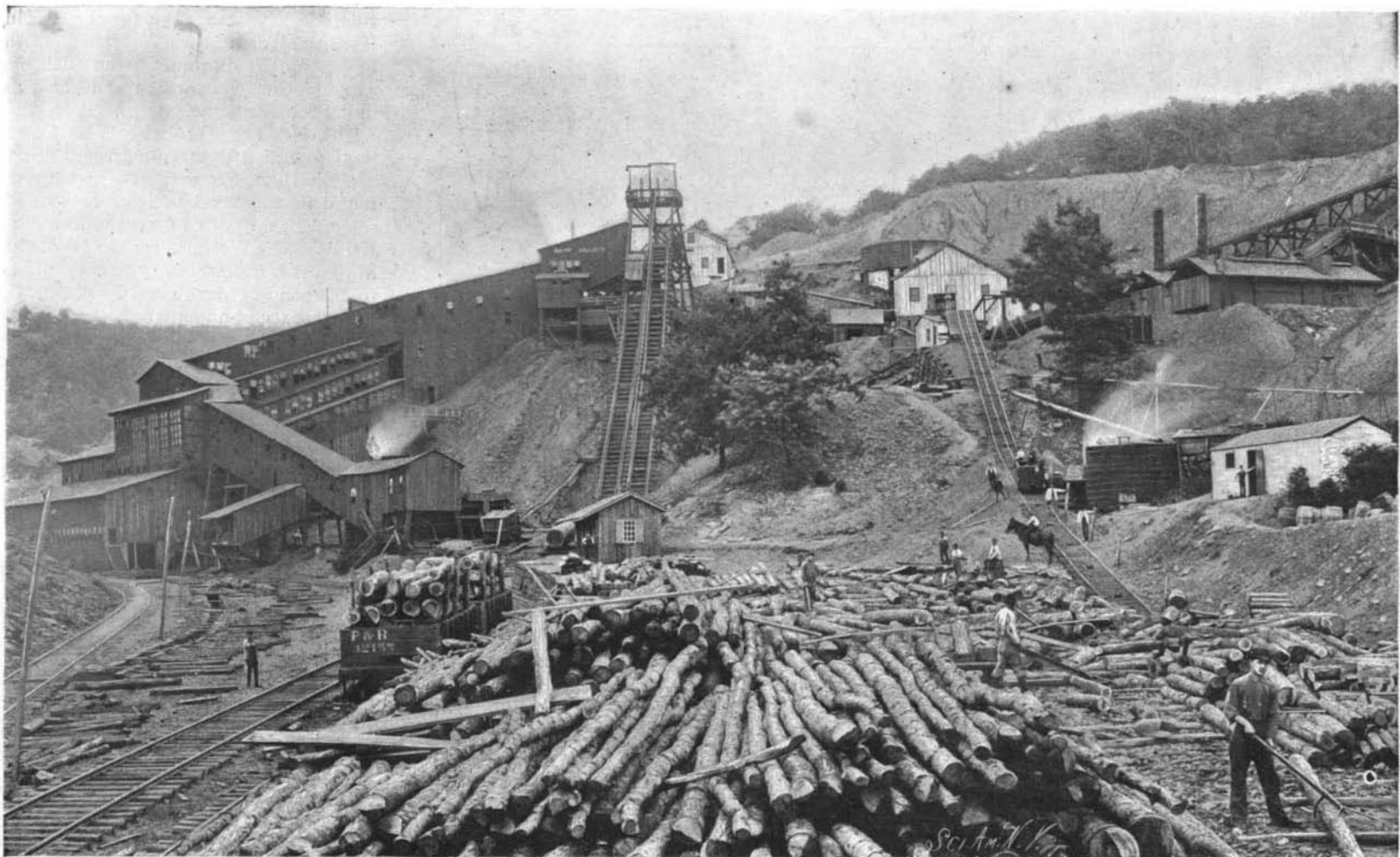
Just west of Denver there are two canons, either of which may be gone through in a day. Clear Creek Canon is sixty miles long, and every mile gives a change in the general scenery. For the first twenty miles the name does not seem to be very appropriate, for the creek is muddy with the waste of dozens of gold and silver concentrating mills along its course. At the western end of the canon is situated a remarkable piece of railroad engineering known as "The Loop," only one of similar nature existing elsewhere in the

underground photography, though too much in the line of results should not be expected without having some experience in regular flash light work, as it is somewhat difficult work.

Platte Canon is also a few miles west of the city. The canon is the source of the river made famous by frontier stories, the South Platte. Through this canon, also, Leadville is reached, requiring at least three days to visit and get pictures. A very pleasant day's trip can be made, however, by running up through the canon to where a magnificent view can be obtained of South Park. It may be explained that these parks in the Rockies are immense level areas, lying between the mountain ranges, and in summer they are veritable garden spots and truly named parks.

On the trip to Leadville, two "passes" are crossed, though several small mountains are gone over which appear to be quite elevated. Just before reaching the town of Breckenridge, Argentine Pass is crossed at an elevation of 10,000 feet. Then the train winds down the mountain side and through a number of frontier mining camps, until the trip is begun over "Fremont Pass." At an altitude of 11,800 feet Climax is reached—the crest of the continent. Water from a little spring flows both to the Atlantic and the Pacific. From Climax the road winds around the sides of the mountains thousands of feet above a perfect gem of a valley, until it suddenly turns and enters Leadville through a side gulch.

Dozens of other trips can be made, but most of



**PENNSYLVANIA COAL MINING—THE BAST COLLIERY.—Fig. 4.**

stocks of photographs, for the reason that only the places which have been well advertised are greatest in demand.

Regarding the greatest cause of failures, it should be remembered that a clear day in the Rocky Mountain region is considerably clearer than in or near the large cities of the East, where the atmosphere is not only laden with smoke, but fog and haze cut off the light and give it a yellow tint. Besides, at an altitude of a mile or more above the sea level the air is considerably less dense. Therefore, when in the mountains it is well to either increase the speed of the shutter or use a smaller stop in the lens, holding down the light which reaches the plate. For ordinary landscapes the latter method is probably to be preferred, on account of the increase in the definition.

On account of the rarity and clearness of the air, distance in landscapes must be taken into consideration. A landscape with a background of mountains one or two hundred miles away is by no means unusual. If possible orthochromatic plates should be used. In these a substantial advantage will be noticed. On account of the actinic light a slower plate than usual may be employed, and a greater amount of color sensitiveness obtained. There seems to be no question as to the increase in color sensitiveness in the medium speeds of plates. In addition to the distance, there is another feature which renders the use of these plates desirable. In nearly all the canons and gorges, the rocky walls are highly colored; in fact, the whole general features of the mountain regions are highly colored. In Platte Canon, for instance, there are several points

world. The distance between the last two stations of the road, Georgetown and Silver Plume, is about a mile and a quarter in a direct line, but the road winds around the sides of the narrow gulch, passing over itself at an elevation of over 100 feet at one point and making the railroad distance between the two towns about five miles. At the same time a rise of 1,000 feet is made. The canon being so narrow, the builders were compelled to adopt this surprising method in order to avoid impossible grades.

The town of Silver Plume furnishes a number of interesting subjects. It is a silver mining community, and is quite a novelty to many. The immense building at the mines and the wire rope tramway bringing ore from mines thousands of feet above, are generally interesting. Occasionally a burro train is seen on the winding trails running up the mountain side. These little animals, about twice the size of large dogs, are loaded with boxes and sacks of ore which make a pile about as tall as themselves. An ancient, gray whiskered animal generally leads the procession, which marches in single file. Sometimes they are loaded with boxes having painted on the outside the single word "Dynamite," indicating that should one of the little beasts fall over "the grade," it would be useless to look for remains.

A branch of Clear Creek Canon leads to the double towns of Black Hawk and Central City, gold mining communities and containing in their vicinity some very large and deep gold mines. Access to these is very easy, permission being readily granted by the persons in charge. A few flash cartridges will enable a trial at

them are familiar to readers of guide books. Among them may be mentioned Manitou and the Garden of the Gods, with hundreds of other points of interest in the immediate vicinity of these. A very pleasant way to visit these points from Denver is to take a morning train to Colorado Springs, and then electric cars to Manitou, returning to Colorado Springs through the Garden of the Gods by carriage or on foot.

In conclusion the writer strongly urges upon all who visit the Rockies to take a camera of some sort. The additional trouble will more than be well paid by the magnificent additions to private photo collections which may be obtained.—Photo-American.

**A Drift Wood Jam.**

We are indebted to Prof. A. L. Russell, of the Chillocothe Normal and Business College, of that city, for a photograph of the drift wood jam which within the short space of thirty-six hours formed at the C., M. & St. P. RR. bridge over Grand River, about three miles from the above city.

The jam covers a space estimated at over nine acres, and the drift lies from twelve to twenty feet deep, completely bridging the river. It is a tangled mass of logs, sticks and tree branches. The bridge was moved eight inches out of plumb by the pressure of the mass, and one of the section hands was drowned while endeavoring to keep the channel clear.

Our correspondent says the railroad company offer \$1,500 to any one who will clear out the drift and free the channel, for a rise in the river means certain destruction to the bridge.

### Perils of the Matterhorn.

About thirty years ago the Matterhorn was for the first time successfully ascended by man, so far as is known. A dreadful accident attended that ascent. The party consisted of seven men, led by the famous Alpine climber, Edward Whymper, four of whom were lost. This was Mr. Whymper's ninth attempt to ascend. The thrilling description which Mr. Garrett P. Serviss gives of this occurrence, in McClure's Magazine for September, works one up to the proper mood for hearing the narrative of his own hazardous climb, about a year ago. Passing over the preliminary obstacles, we launch the reader, says the Literary Digest, from which we copy, at once upon the dangerous trail of the adventurous climber:

"Higher, we left the face of the mountain and got upon the crest of the arête. Here were places where one had to balance himself carefully, while the fatigue resulting from the constant use of every limb did not, to say the least, increase one's control over his muscles. It is a simple matter to stand on a ledge only a few inches broad, when it is near the ground; but put your ledge above cloud level, get up upon it out of breath, let void space yawn round your feet, and recollect that it is only the friction of your fingers against the projecting rocks beside you and above your head that retains you where you are, and you will find that a very entertaining metaphysical element has entered into the problem of how to keep the center of gravity within the base. 'Where is the worst place?' I inquired several times. 'Not yet, not yet,' was the reply; 'the Shoulder is the worst.'

"Every visitor to Zermatt will remember seeing a curious knob near the middle of the upper part of the Matterhorn, which appears to project from the side of the mountain, being dark underneath and white with snow on top. The guides call this the 'Shoulder.' It is a fearful spot. We approached it by ascending a steep slope of snow resting upon ice which, in turn, lay upon rock that seemed too smooth to hold it. Having clambered upon the end of the Shoulder overhanging the tremendous precipice seen from Zermatt, we were compelled to turn to the left, for ahead of us everything dropped out of sight. This maneuver brought us upon something that I can only describe as a great knife edge of the mountain, rising sheer out of precipitous depths, and connecting the arête we had just quitted with the main mass of the upper part of the peak. This marvelous ridge, which is also a portion of the Shoulder, is composed of broken rock cemented with ice, and tipped with scallops of snow as translucent as porcelain and beautifully moulded by the wind. The rock on the top was in some places but a few inches wide, and the hard snow capping it ran to a sharp edge, and had frequently to be broken off in order to make room for the hands and feet. Sometimes on my feet, sometimes on hands and knees, and sometimes astride, I got across."

One of the perils of the Matterhorn comes from falling rocks. This danger is spoken of by Mr. Serviss in his account of nearing the summit. Of the falling rocks he says:

"Starting high aloft, they can find no stopping place. Their first touch is like the crack of a gun; the second is an explosion. In great parabolic curves they leap and soar until they burst into shivers. There is nowhere so magnificent an object lesson in the law of gravitation as that presented by these falling stones of the Matterhorn. Above the Shoulder we came upon one of the most perilous localities for falling rocks, and hurried over it, yet none fell while we were there. More than once, when, completely out of breath with the unaccustomed exertions I had put forth, I begged for a moment's respite to recover my wind, the guides would not allow a pause, saying that a shower of stones might assail us at any instant. . . .

"The arrival on the summit was as sensational an experience as any one could wish for. We had got upon another spindling ridge as narrow as that at the Shoulder, and pieces of its frostwork cornice fell at a touch and shot downward in a manner that made one exceedingly careful of his footsteps. The precipice under this ridge, on the left hand side, was not merely vertical, it absolutely overhung; and the necessity of caution kept my attention fixed upon the work immediately in hand, so that before I was fully aware how near we were to the end I suddenly heard Taugwalder shout, 'The top!' 'Yes, monsieur; the top!' called out Garven behind me. I took three steps, and another would have sent me whirling six thousand feet down into Italy!"

Mr. Serviss says that even the most experienced guide cannot enter lightly upon a descent from the Matterhorn, and that for a beginner the mere idea of going down some of the places ascended is a thing to be banished from the mind as quickly as possible. The cheerfulness of the situation was not enhanced for

him by the fact that during the latter half of the climb he had been suffering from "mountain sickness," which he says is as hard an ill to bear as seasickness, but luckily it does not affect the head, or did not in his case. He thinks if it had done so he should have been unable to proceed, "for on the Matterhorn vertigo is entirely inadmissible. If you cannot stand unmoved with your toes over the margin of a precipice, you have no business there." And now for the descent:

"Carefully treading once more the snow-topped ridge, we began the descent. Its worst feature immediately became manifest; the eyes could no longer avoid the vacuity that gaped beneath us. Taugwalder, in virtue of his greater experience, now assumed the last place, where he could lend the most effective aid if a slip occurred; I remained in the middle and Garven led. Constant vigilance was the price of life. Theoretically, and I believe practically as well, the rope by which one is fastened to his guides is an assurance of comparative safety for all three; yet there were many points where I could not help wondering whether, if I should slip, Taugwalder, man of iron though he was, would not come tumbling after me, and where I was morally certain that if one of the others fell, I should go along with him into the depths. Fortunately there was no test case; I did not make a misstep or a slip at any critical point. In the most dangerous places only one person moved at a time. The leading guide went on until he was so

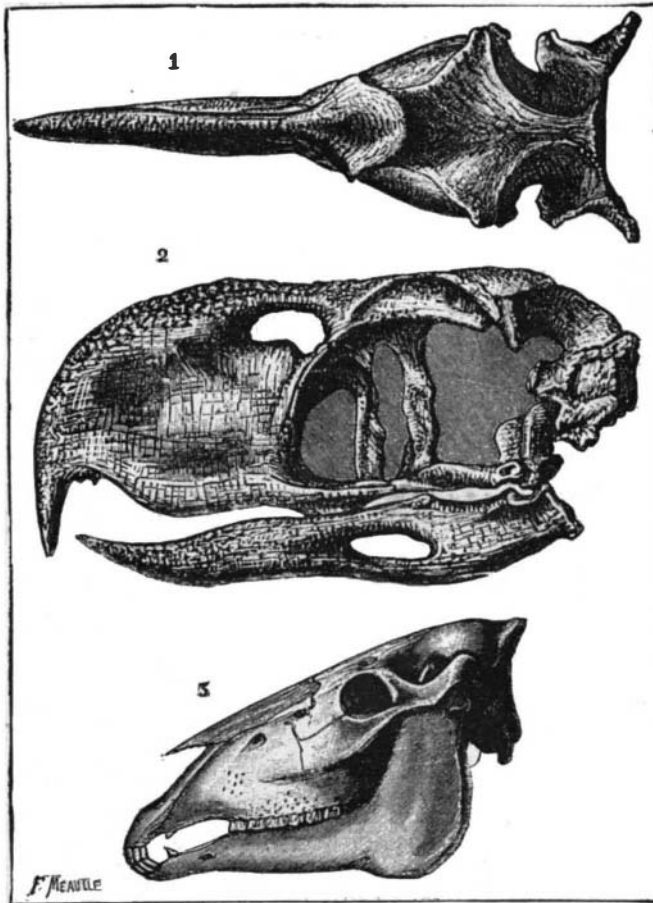


FIG. 1.—Skull of the *Phororhacos longissimus* seen from above (1) and laterally (2), and reduced to one-eighth natural size. 3. Skull of a horse on the same scale.

placed that he could get a good grip on the rocks, or a safe hold with his ice ax. Then I followed and took his place, while he pushed on to another holding, and then the last man joined me, and it became my turn to move again.

"It was with a peculiar sensation that one approached the verge of a precipice and, turning on his face, began to let himself down backward, feeling with his toes for ledges that he could not see, and that might not exceed a fraction of an inch in width, but to which he must entrust as much of his weight as his fingers, clutching similar projections above, were unable to support, while with one leg dangling he reached down for another precarious foothold. And whenever he glanced between his body and the rock to see what his feet were about he caught a thrilling glimpse of precipice below precipice and crag under crag, whose plaything he would become if his head dizzied, his eyes swam or his muscles refused instantly to perform their whole duty. Such are some of the joys of the Matterhorn! I do not say it mockingly; I am giving a record of psychological impressions, and these things, like any mastering of human weakness, are a joy in recollection. Burke proved that terror is a source of the sublime, and sublimity is certainly a source of joy."

Mr. Serviss states that the work of descent was not as exhausting to the physical forces as that of ascent, but it was a heavier tax on the nerves.

OF seventy deaths from lightning in France last year, sixty occurred in the mountains of the department of Puy de Dome.

### THE GIGANTIC BIRDS OF SOUTHERN PATAGONIA.

Our readers have perhaps not forgotten the restoration of the *Myornis* by Mr. Oustalet which we published not long ago. We now propose to discuss some other extinct birds, more monstrous still, whose fossil remains have recently been discovered in the tertiary strata of Southern Patagonia.

These great birds, like those of Madagascar and New Zealand, were incapable of flying, but they differed much in their organization from the *Myornis* and *Myornis*. The latter, like the ostriches and cassowaries, had a head and bill relatively small for their size. The gigantic birds of Patagonia had, on the contrary, a huge and strongly hooked bill (a true vulture's bill), so much so that they might lay better claim than the *Myornis* to be identified with the celebrated roc of the Arabian Nights, if it could be admitted for an instant that the authors of those legends had seen anything of this fabulous bird but the eggs, which are undoubtedly those of the *Myornis*.

The geological strata from which Messrs. Carlos and Florentino Ameghino obtained these curious debris are the most ancient of the tertiary series in Patagonia. This region is now a desert, devoid of arborescent vegetation, and so destitute of water that explorers are forced to go to seek this precious liquid at a distance of twenty leagues and to carry it upon muleback. The landscape, as in all Southern Patagonia, is, despite the absence of forests, very picturesque by reason of its broken aspect, which makes it resemble a country in ruins. Everything indicates that this country was, at a former epoch, deeply furrowed by water that flowed toward the sea, in consequence of an uplifting of the land that exposed the strata which contained the fossils under consideration.

These strata are probably of the Eocene epoch and are called Pytherium, from the name of a large herbivorous mammal whose remains are found in abundance in the sandy and friable soil of this now dried up region. As in the Bad Lands of the Western Territories of the United States, it is not necessary to excavate the earth to a depth in order to find fossils, for the bones of large extinct animals are often found exposed upon the side of the declivities that border the road followed by travelers, and offer an easy booty to the paleontologist who may know their value and who for the first time travels over this wild country.

It was thus that Mr. Ameghino was enabled to collect the valuable remains that permitted of reconstructing a fauna that long ago disappeared. Some crania, some broken bills, some wing bones and some legs, often almost intact, give us an idea of the strength and proportions of these great birds. More than fifteen species of various sizes have been described.

The *Phororhacos inflatus* is the best known species. Of this we have an entire skull, with its lower mandible, the bones of the legs and wings, the pelvis and some of the vertebræ of the neck and tail. Although it is not the largest species, it merits a few words, since a study of its characters gives us quite a clear idea of its organization and habits.

The bill is remarkably thick vertically and very much compressed laterally, like that of the rapacious birds. The hollow that precedes this hook presents two small teeth. If we compare this bill with that of our present birds, we shall have to set aside the vultures and other rapacious birds, all of which have well developed wings, and also the *Balæiceps* and the *Caneroma*, whose wide and depressed bill resembles that of the *Phororhacos* only in the terminal hook. But there is one bird not long extinct that exhibits undoubted affinities with the latter, at least by the form of its bill; we refer to the *Didus ineptus*, a large bird incapable of flight, which was still living on Mauritius Island during the course of the seventeenth century. This bird attained the size of a swan, but was of much heavier build. It is said that it fed upon vegetable substances, such as fruits and roots. It was a stupid animal and a poor runner, and this explains its rapid destruction, beginning from the time at which the Mascarene Islands were occupied by the Dutch in 1598. Less than a century afterward the species was completely extinct.

Although the *Phororhacos* resembled the *Didus* in its bill, it differed from the latter in the form of the pelvis, which was much narrower than that of the *Didus*, and which indicates a lighter bird. In this respect the *Phororhacos* more closely resembled the *Aphanapteryx* or "snipe-billed red hen," which lived on Mauritius Island at the same epoch as the *Didus*, and which, like it, is extinct. The *Aphanapteryx* belonged to the group of rails and had an affinity especially with the *Ocydromes* of New Zealand. Its bill resembled that of the *Courli* and the *Ibis*, and its size was less than that of the *Didus*.

The skull of the *Phororhacos* is 14 inches in length, while that of the *Didus* is but 10. A comparison of the