

PETROLEUM AT BAKU.

For years past it has been, not Yankee boasting, but a simple statement of fact, to say that America supplied the world with petroleum. The output from our "Oil Region" has been so enormous and so vastly greater than that of all other countries combined, that we have been able to rule the market completely.

While petroleum is well known to exist very widely, there are but two prominent localities on the Eastern Continent. One of these is on the Irawaddy, and from that well up through Assam; the other on the western shore of the Caspian, around Baku. Both of these have been long known, and the indications have been that their production might be rendered very great; but they remained comparatively undeveloped, the eastern region sending to market only about 50,000 barrels annually, while Baku turned out 500,000.

A great and most remarkable change, however, has taken place within the last few months, and it is worth our while to look at it and study as well as we may briefly the probable and possible results.

Baku has since the close of last summer suddenly sprung into a degree of vitality and a measure of prosperity and importance of which no one had previously any reason to dream, and all because its subterranean wealth is pouring

immense futures to which this may lead, and the Government is taking active and energetic measures to make the most of the new state of things. Means of transportation are provided rapidly to every part of the Caspian and its affluents, notably the Volga. A pipe line is already planned to run the petroleum across to the Black Sea, a stretch of about five hundred miles. Once there, of course it has access to all of eastern Europe, and in fact to the markets of the world.

The Government officers are prosecuting most industriously and untiringly their efforts to make the burning of crude petroleum a practical matter for the generation of steam. They have accomplished much, as noted in our paper of October 13, and they will very possibly work out the problem.

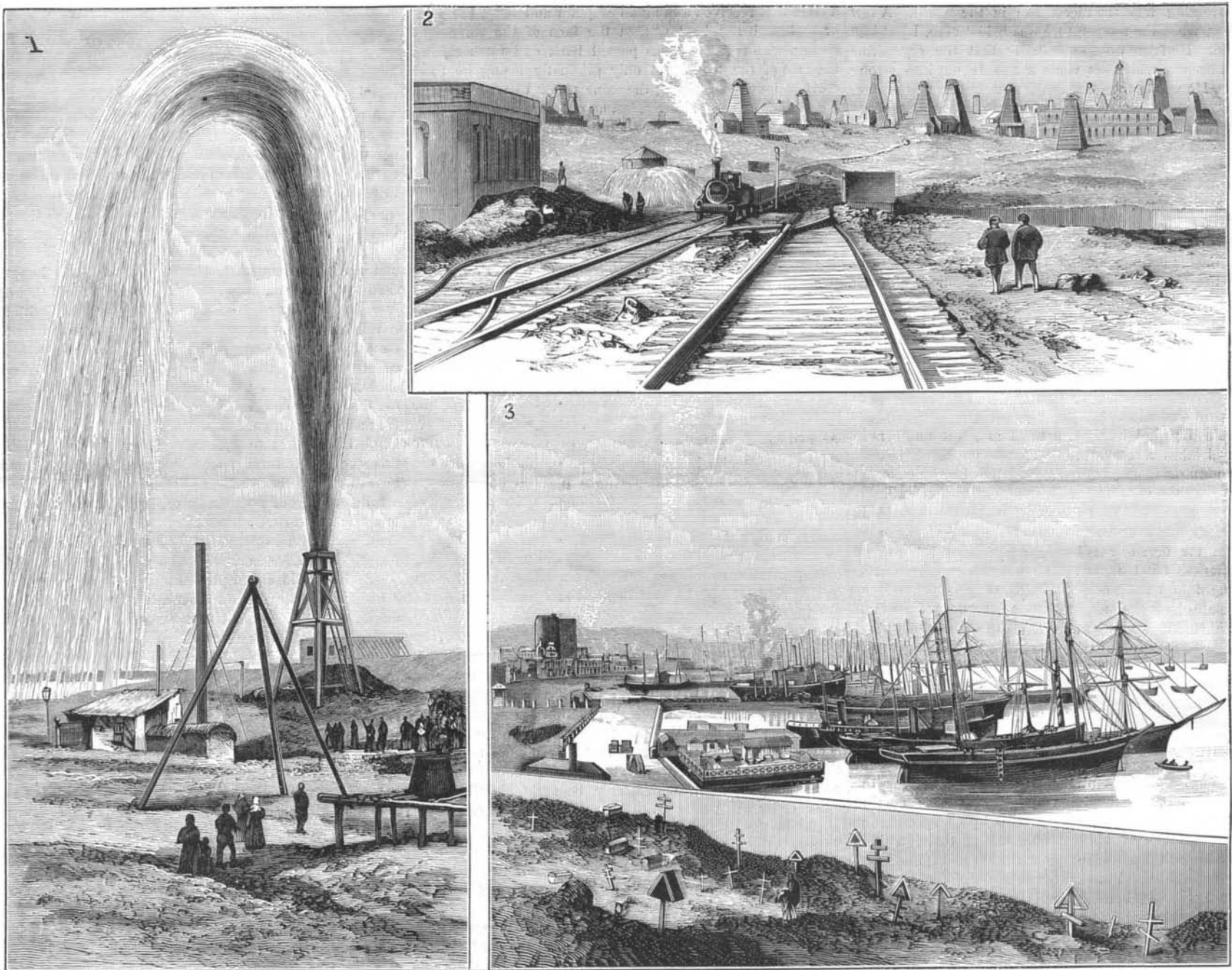
All this is not of so much consequence from what has already been done, as from the probable future to which it looks. No one can say that there is any reason, from the nature of the formation geologically, why the country about Baku should not pour out fully as great floods of oil as our own regions of northwestern Pennsylvania and its surroundings; why it should not add a cipher to its previous 500,000 barrels and double or treble it. If so, American petroleum will no longer have the free swing it has hitherto enjoyed.

of oil vessels on the Caspian could very easily and without warning transport Russian forces to the southeast waters of the Caspian, their progress toward the frontier of Afghanistan need not be known, and they might be within a few days' march of Herat before a suspicion of danger arose. All this may be of no moment, but it is certainly practicable; and who can tell when such a contingency may be turned to a certainty? At all events, it has been mentioned as a thing to be watched. Our engraving is from the London *Graphic*.

Port Jackson Light, Australia.

One of the finest examples of lighthouse construction the world possesses is that at the entrance to Port Jackson, Australia, called the Macquarie Light. It is a first order, sixteen-sided, dioptric, holophotal revolving white light, of the system of Fresnel, showing a flash of eight seconds in every minute, and having a range of twenty-five miles seaward. It was constructed by Messrs. Chance Bros. & Co., of Birmingham, under the supervision of Sir J. N. Douglass, Engineer to the Trinity Board.

The gas and oil burners for use during clear weather have, with flames of 1½ inches diameter, an intensity of about 200 candles instead of 80 candles with the same



1. A Petroleum Fountain During the First Five Days. 2. The Petroleum Wells. 3. The Harbor of Baku.

THE PETROLEUM WELLS OF BAKU, ON THE CASPIAN SEA.

forth its treasures in a most unwonted fashion. We in this country have been familiar with "spouting wells" of petroleum, but there such a thing had never been known. Something over five months ago several "rich strikes," as our people term them, began to attract attention, and new wells were bored in numbers, and yielded astonishingly. At length one of the augers entered a cavity which was really worthy of Oil Creek in its best estate. It was a "spouter," sure enough, and threw its oily jet high into the air with great violence. This was followed by another and another, some throwing their torrent of petroleum to the height of fifty feet or more. Of course, this fierce outpouring, as in all such cases, diminished within a few days, as the extreme tension from beneath was relieved, but the wells continued to yield at a rate new for the entire region. Additional wells were bored in great numbers, and the work is still going on and increasing, and the end is not yet by any manner of means.

The natural results of this have followed. Baku has grown like one of our own Oil Region towns, and being, unlike our own localities, situated directly on a great inland sea, a mercantile navy has begun even within this brief space to grow into existence. It is not to be supposed that men as astute as those ruling the great Russian nation fail to see the

But in relation to this, one very important element must not be overlooked. Russian petroleum is a very different article from the American. They both certainly belong to the same series of hydrocarbons, yielding the same class of products by fractional distillation; but they yield them in very different proportions. The value of our Pennsylvania petroleum is greatly enhanced from the fact that so large a proportion of kerosene can be obtained from it, the kerosene being that part of the product of distillation which comes from the retort after the gravity has reached 65° B., and from that until about 38°; and this in our oil is very near double, and sometimes fully so, that which can be obtained from Baku petroleum. Here we have a great advantage, and it must always remain; and inasmuch as such a great amount of petroleum is demanded solely for the purposes of illumination, this point is of prime importance. It is worth mentioning here, that we have a striking dissimilarity in our petroleum, that of California differing more in its proportions from Pennsylvania oil than does that of Baku.

One feature more is worth noting, but it is in a totally different line—it is the part which this outburst at Baku may possibly have on the political history of Europe. The English papers are already indicating alarm. That crowd

diameter, as with the old type of burner originally intended.

When these flames are at the focus, there is a consumption of about 40 cubic feet per hour of 16 candle gas, and of good paraffin about 1 pint per hour; and it is estimated that the mean intensity of the flashes from the apparatus is about 40,000 candles, or about five times the intensity of the flashes of the old Macquarie Light. With the full power of the electric light (used in conjunction with the gas in hazy weather) at the focus, the mean intensity of the flashes in the direction of the sea horizon is not less than five or six million candles.

By a simple arrangement the change from gas light to electric light at the focus, or the reverse, can be effected in ten seconds, and the flames of the oil lamp can be substituted for the gas or electric light in nearly the same space of time. The Macquarie Light is intended only to illumine half the horizon. It is, therefore, possible to make use of the landward rays by means of a dioptric mirror. This is probably the first instance of the use of a dioptric mirror for an electric light. Arrangements are made to burn either gas or paraffin oil, or to exhibit the electric light at full power or half power. When the electric light is in use there is always a second lamp in readiness for action.

Teaching Animals to Converse.

H. Stuart Wortley writes as follows to *Nature*: A dog of mine knows instantly whether he may go out with my housekeeper or not, according to whether she wears her hat or her bonnet. In the first instance he knows she is going where he may go, and he is on his feet barking with joy as soon as she appears. If she has the bonnet on, he knows it to be church, or a visit to friends in the country, where he cannot go, and, like the "eldest oyster" (I quote from memory), he "winks his eye, and shakes his hoary head." If drawings of hat and bonnet were made, he would know them at once.

Some years since I had a remarkably clever Skye terrier, whose wisdom was at the time shown in a letter to the *Times*. This dog I taught as follows: When I went out it was quite sufficient to say "Yes" or "No" in an ordinary tone; but wanting to take him beyond that, I taught him very quickly to know the two words when printed on cards, YES or NO, and after a few weeks' teaching he never mistook them. I have no time now for much teaching; if I had, I am sure it could be done with the dog I now have.

The intelligence of cats is greatly underrated. My wife's favorite cat follows her everywhere, and comes when called wherever she may be. Cats, too, are very grateful for kindness. When I went into the Malakhoff, I found a cat on whose paw a bayonet had fallen and pinned it to the ground. I released it and took it home, and it always followed me all over camp till the end of the war. And this cat did as follows: I took her to a doctor of the nearest regiment for two mornings to have her foot dressed. The third morning I was away on duty before daylight, and the cat went herself to the doctor's tent, scratched the canvas to be let in, and then held up her paw to be doctored. The intelligence that can be developed in almost any animal depends in most cases on our treatment of it.

The Duty on Works of Art.

The tariff act of 1883 advanced the rate of duty on paintings in oil or water colors, and on statuary, to 30 per cent *ad valorem*, instead of 10 per cent, as it had theretofore been. The imports under this head for the fiscal year 1882 were \$2,550,000, and the late tariff commission recommended a duty of 40 per cent. Representative Perry Belmont, of New York, has now introduced a bill wholly exempting from duty works of art, ancient or modern, the term to be construed as including all paintings, drawings, and photographs, and statues of marble or other stone.

The argument favoring a high duty on this class of imports can have no other foundation than that such goods are brought here only by the rich, as luxuries, and for that reason should pay as high a revenue to the Government as possible. But there is another side to the question. Works of art are educators of the people, and, in public galleries or private collections, they exert a far-reaching influence in elevating the taste and exalting the ideals which touch the mainsprings of human life.

No question of protection or of free trade can enter into any consideration of placing a duty on such products, for the American artists are strenuous supporters of the Belmont bill, and the most of them, also, feel it a necessity of their education that their opportunities for studying European work, modern as well as ancient, shall be as free and unrestricted as possible. This, therefore, seems to be a case where we should adopt Goethe's saying, "Encourage the beautiful; the useful will take care of itself," to the extent, at least, of allowing artists' work to be imported duty free.

Sagacity of the Horse.

On my farm, one Sunday, the house was left in charge of one man, who sat on the porch reading. A mare, with her young foal, was grazing in the orchard near by. At length he saw the mare coming from a distant part of the orchard at full speed, making a loud outcry—a sort of unnatural whinny, but, as he says, more like a scream of distress than the natural voice of the horse. She came as near to the man as the fence would allow, and then turned back for a few rods, and then returned, all the while keeping up the unnatural outcry. So soon as he started to follow her she ran back in the direction of a morass or miry place which had been left unguarded, and only stopped on its very brink. The man hastened to the spot with all speed, and found the colt mired in the soft mud and water. It was already dead. —J. D. Caton, in *American Naturalist*.

Beauties of the Cable System.

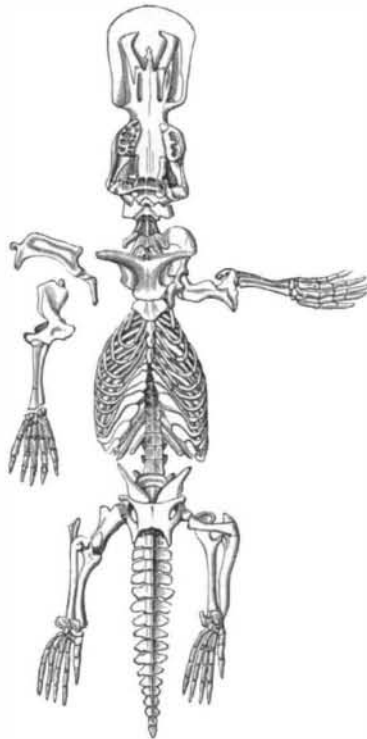
The Chicago street cable cars came to a sudden stop the other day by the breakage of a cog on one of the main driving wheels. Horses had to be substituted on the entire line for a day or two.

THE ORNITHORHYNCHUS.

(*Ornithorhynchus paradoxus*.)

BY L. P. GRATACAP.

This interesting animal has proved both a perplexity and a delight to naturalists. Its little body is so curiously constructed as to remind the student of structural affinities in animals of three types of life—the mammals, birds, and reptiles. It undoubtedly belongs to the former, but it enters that class at its lowest point, and brings along with it features and reminiscences of more degraded forms than itself. It is a welcome gift to the evolutionist, and he has not been loth to emphasize every indication it gives of its intermediate and connective character. In spite of these suggestive



SKELETON OF THE ORNITHORHYNCHUS.

resemblances the ornithorhynchus is essentially *mammalian*, though holding the humblest position in this group. With its singular ally, the *Echidna*—the porcupine anteater—it forms the division of *Ornithodelphia*, and is especially characterized by a strange provision in its economy, by which the feces and young are extruded through the same passage, as the spacious cloaca is common to the rectum, genital, and urinary organs. Hence, the technical appellation of *Monotremata*.

The features which ally it to the amphibia or reptiles are chiefly found in the skeleton, and are the following, among others less obvious: A projection of the second neck verte-

mammals alone there is a T-shaped bone supporting the shoulder blades or clavicles. The *acetabulum*, or cavity, into which the head of the femur is thrust as in a socket, remains unossified at its center, thus resembling birds and crocodiles. Other points in its anatomy and physiology strongly suggest its indeterminate and dependent character, but its nature and functions place it beyond appeal among the mammals as a class.

The ornithorhynchus, by its grotesque union of the externals of a duck, beaver, and mole, its restricted range geographically, and the singular and unwarranted tales told of its habits by natives of Australia, has always formed a natural curiosity, and been regarded with mingled feelings of amusement and astonishment. The first skin of this animal sent to England presented such anomalous features that it was regarded as the playful hoax of some ingenious collector. A duck's bill and a mole's body presented a zoological complication which at first could not be considered seriously.

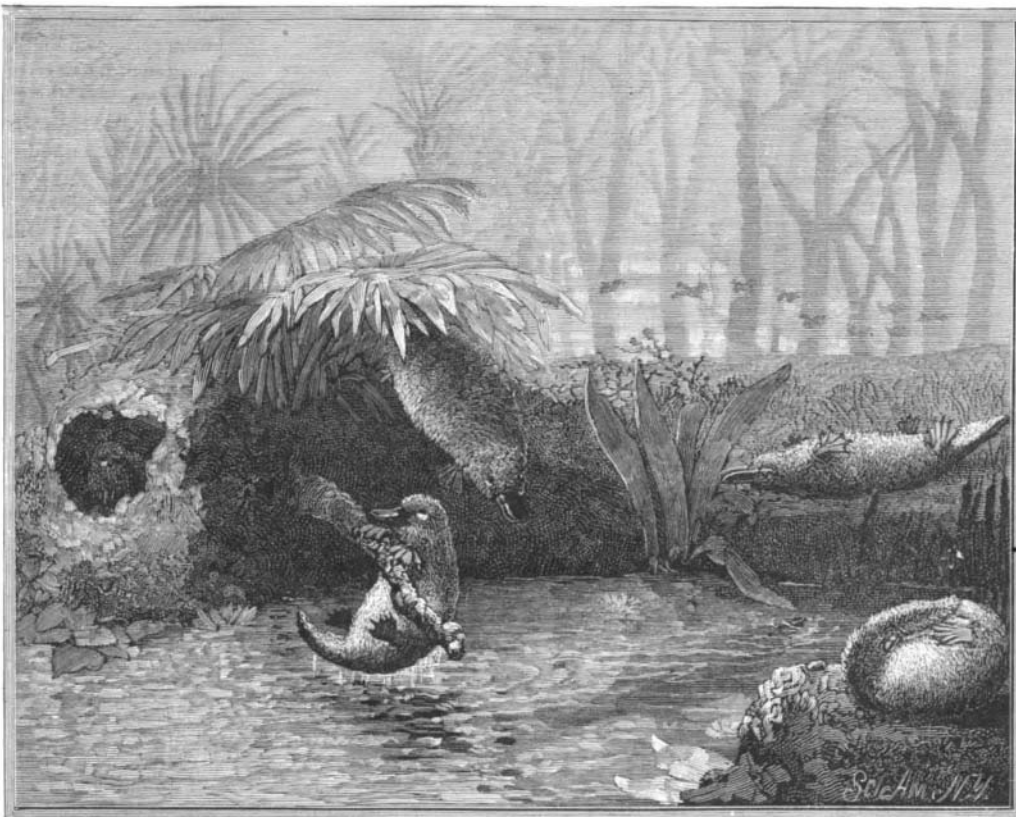
The ornithorhynchus is about the size of its congener the echidna, having an average length of 50 cm. (1 ft. 7.6 in.), 12 of which measure the normal length of its tail. The males are larger than the females. The flattened body is not dissimilar in some aspects to that of the beaver or fish otter. The bones are short, each foot or paw is provided with five claws, which are webbed, and this integument on the front feet is developed to such a degree as to extend beyond the extremities of the claws; it folds or draws back at the will of the creature, permitting it to use its serviceable talons or nails for digging and excavating. The short hinder feet are turned backward, and are usually placed in that position, and the nails, which are longer and sharper than those of the front feet, are similarly bent backward. In the males, above the toes of the hinder feet, there is a spur which admits of considerable movement. The tail is flat, broad, abruptly terminated, and in the younger specimens provided plentifully with hair, which disappears with age.

The head is quite flat, and forms the most distinguishing feature in its appearance. It is small and furnished with a duck bill, at the base of which a leathery apron-like expansion is developed, which acts as a shield, protecting the eyes when the animal burrows in the ground, and guarding the fine fur behind it from the slime of the muddy bottoms where it searches for its food. The jaws are prolonged forward and carry no teeth; the margins of the duck-like bill are sheathed with horn and crossed with horny plates. The tongue is fleshy, armed with horny carunculations and terminated at its base by a ball-like swelling which closes the throat. The eyes are small, and the barely noticeable ears, sunk in the head near the outer angle of the eyes, are closed at will. The fur on the upper surface of the animal is dark brown, sometimes reddish; it is composed of one set of long hairs which are somewhat stiff, and of another shorter growth of fine gray hairs, similar to the woolly coating of the seal. The fur on the breast and neck is silken and yellowish. The bill is black, spotted with light points, and is red at its extremity. The fur of the tail varies in color, which has given rise to suspicions of different species, and in the younger individuals it is coated with fine and silver white hairs, an almost unmistakable indication of immaturity.

The ornithorhynchus inhabits the still pools of streams where water plants abound, and over whose serene expanse trees bend their shadowing branches. Here it pursues its amphibious existence, bunting the insects which haunt the water, grubbing around the esculent roots of plants, building its home, and eluding pursuit when the natives, who regard it as a delectable morsel, watch patiently for its appearance, spear in hand, upon the banks of the pond. The traveler who is fortunate enough to surprise these animals when actively engaged in their pursuit of food, must remain preternaturally still, if he wishes to enjoy the novel spectacle. If the water is clear and the light favorable, he will see them moving rapidly beneath the water, avidly inspecting the soft banks for beetles; they will rise to the surface every two or more minutes, again disappear to emerge later at a distant point. The slightest movement or noise is instantly detected,

and the shy, strange animal is put to flight, and the charmed spectator must endure a prolonged watch before it reappears.

The nest of the ornithorhynchus is located under ground, and is placed at the end of a long, underground, devious passageway, which may be, in exceptional cases, 45 feet long, although more usually 10 feet. This avenue of approach is strewn with dry leaves, as is also the kettle-like hole in which it ends. These homes of the ornithorhynchus are entered by two passages, one above and the other below the surface of the water. Almost invariably the nest is



THE ORNITHORHYNCHUS.

bra, called the "odontoid process," remains for a long time disconnected from the vertebra itself, upon which it is normally soldered by a long growth between the surfaces. Some of the cervical ribs in a similar way remain free.

The coracoid bone, which in man is a process only of the scapular or shoulder blade, but in birds is a separate bone, as also in reptiles, and which is a large bone in this animal, articulates with the sternum or breast bone directly. This is a positive amphibian and avian feature. There is an ossification in front of this bone, called the *epicoracoid*, which resembles a similar portion of the reptilian frame. In these