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THE AUSTRALIAN ANTARCTIC EXPEDITION.

In the SCIENTIFIC AMERICAN SUPPLEMENT of September 21, 1895, we gave an account of the recent voyage of Mr. C. E. Borchgrevink to the Antarctic regions, which he undertook in the interest of science. In his paper, read before the International Geographical Congress, he advocated the sending of an expedition to Victoria Land for exploring purposes, and offered his personal services for such a voyage. A response to his suggestion has come from Australia, where the Premier of New South Wales has sent out an invitation to the other colonies to co-operate in fitting out an Antarctic exploring expedition. The proposition has been favorably received, the latest response coming from Queensland. South Australia has the matter under advisement, and will reply on receipt of the full details of the scheme. Tasmania has voluntarily offered her assistance.

The first efforts of the expedition will be directed to the exact location of the south magnetic pole. If the plan proposed by Mr. Borchgrevink be followed, a landing will be made at Cape Adare and a supply depot formed there. From this point the expedition will attempt to reach the magnetic pole by an overland route. If the calculations prove to be correct, it will be found to lie 160 miles to the southwest from Cape Adare.

EXHAUSTIVE STEAM BOILER EXPERIMENTS.

The issue of Engineering for September 20 contains an account, by Mr. Bryan Donkin, M. I. C. E., of twenty-one steam boiler experiments which have been carried out by Professor Kennedy and himself during the past five years. The paper is accompanied by tables and diagrams showing the results, and it is in every way a valuable contribution to this branch of mechanical engineering.

We note that in the column headed "Pounds of coal burned per square foot of grate per hour," the highest results are credited to a locomotive in active service that was fitted with a copper fire box. This amount, 35.50/100 pounds, is fully double the average results obtained on the grates of the other types that were tested. With the exception of a steam fire engine boiler, which burned 34.30/100 pounds, the other boilers average about 15 pounds per square foot per hour.

This comparison shows to what hard work a locomotive boiler is put. Under the head of "Equivalent water evaporated per pound of coal from and at 212° Fahr.," the Great Eastern locomotive again heads the list with the very fine record of 12.51 pounds.

Mr. Donkin is of the opinion, however, that priming took place on this trial of the locomotive, from the fact that the heat accounted for was 4 to 5 per cent in excess of the heat received. In such a case a certain amount of the 12.51 pounds of water was carried off in the solid form, and cannot justly be credited to the evaporative capacity of the boiler. This would place the Lancashire boiler in the first place with a record of 12.46 pounds.

It is remarkable that the fire engine boiler, with its high consumption of fuel per square foot of grate, shows the relatively small evaporation of 7.95/100 pounds of water; though this is in part accounted for by the fact of the small size of the boiler, and the fact that it was pushed very hard in the trial.

In the table of relative "thermal efficiency" the best result is shown by three Cornish boilers, in which the good average of 11.10/100 pounds of water evaporated per pound of coal was obtained with a consumption of 6.45/100 pounds of coal per square foot of grate. It is surprising to find that the two water tube boilers stand near the bottom of the list, being from fifteen to twenty per cent lower in efficiency than the Cornish and Lancashire boilers, and—if we include them in the comparison with a five per cent reduction—the Great Eastern Railway locomotive boilers. In the Cornish boilers the direction of the gases was through the one center tube, back along each side, and returning underneath the boiler to the chimney. The center tube was furnished with large cross tubes. The whole paper is extremely valuable, and it is of the kind that the mechanical engineer will carefully file away in his scrap-book for future reference.

CHROMATOPHORES, OR THE COLOR-BESTOWING CELLS OF ANIMALS.

The endless variety of coloring which is to be found in the animal kingdom, and which is a distinguishing characteristic of its lower forms, has been made the subject of elaborate and careful investigation. We are told that the published literature bearing on the subject of pigment cells, or chromatophores, is "enormous." Much of this literature is controversial, and the exact means by which nature presents such a rich variety of coloring in the animal world, the origin and functions of the cells to which are assigned the coloring properties, are, even to-day, to some degree a matter of opinion among the specialists who have devoted themselves to this difficult, but very fascinating, study.

The October number of Science Progress contains

an exhaustive article upon the above subject by Walter Garstang, M.A.

According to the writer, although the chromatophore is a cell whose essential function is one of color-giving, it appears that all color-giving cells are not chromatophores. Thus the cells of the sensory, respiratory or excretory tissues are pigmented; but their pigmentation is accidental, or, more strictly speaking, not essential. The cells that give the reddish hue to the tissue of the lips or the nostrils are not chromatophores. Their primary function is not one of coloration, but that of the chromatophore is.

"Chromatophores are pigmented cells specialized for the discharge of the chromatic function."

The only true pigment cells, as explained above, are those of vertebrata, of cephalopod and certain pteropod mollusca, and of crustacea.

The commonly accepted theory regarding the nature and origin of chromatophores is that they consist of connective tissue elements. Mr. Garstang, on the other hand, is of the opinion that they have arisen by the modification of "pre-existing pigmented cells;" and since their very existence involves the idea of visibility, there is here strong presumptive evidence that they originated in the outside layer of the body, or what is known as the ectoderm. This view is borne out by Joubin's description of the development of the chromatophore in the embryo of argonauta. He shows that the pigmented cell is "originally one of the constituent cells of the embryonic ectodermal epithelium. At an early stage it becomes slightly larger than its neighbors, and then sinks beneath the surface of the epithelium at the apex of a pit-like invagination of the ectoderm. It then enlarges greatly, detaches itself from the epithelial pit, and becomes surrounded by mesodermal cells, which transform themselves into the radial muscle cells. The ectodermal invagination closes up."

Very nearly akin to the above process is that of the development of the purple glands of Aplysia, described by Blechmann: "Each of the purple gland cells is at first a part of the ectodermal epithelium; it enlarges and sinks beneath the epithelium, retaining a narrow, neck-like prolongation to the surface; the whole of the cell then sinks deeper within the mesoderm. Each gland cell becomes surrounded by connective tissue cells and muscle cells, by the contraction of which the pigmented secretion of the gland is forced to the exterior."

The chromatophore has an elaborate system of nerve fibers which spring from the nerve system of the skin. In shape it might be described as a disk, sandwiched between two outlying "nerve plates." Referring to the pigment cells of mammals already mentioned, such as those of the respiratory organs, it is probable that they are "degenerate representatives" of the chromatophores of the lower orders of vertebrata. In the process of evolution, as the covering of hair began to develop and the chromatophoric effect was covered up, these cells would become useless and degenerate.

The coating of feathers in birds would presumably beget the same degeneracy of the chromatophores—and it has done so.

Entire degenerate pigment cells are to be found in the epidermis of anthropoid apes. There are no entire pigment cells in the epidermis of the negro, "only processes from sub-epidermal cells."

In the white races of man pigment cells are almost entirely absent.

The above considerations furnish a strong presumption that in the mammals at least the function of the pigment cells is not one of nutrition, as some naturalists have suggested, but merely one of coloration.

As his final conclusion the writer states that there is not "a single indubitable proof of the mesodermal origin of true chromatic cells;" he has been "led to the opinion that chromatophores" "are universally of ectodermal origin." That is to say, that they originated on the outside, and not beneath the skin of the body.

This conclusion is agreeable to the function of the chromatophore, to the exercise of which light is an absolute necessity.

To Reward Conductors and Motormen.

According to the Street Railway Journal, the Brooklyn Heights Company proposes to reduce expenses and obviate damage suits by offering handsome premiums for the faithful discharge of duty. For this purpose the board of directors has authorized the setting aside of the sum of \$10,000 to be divided pro rata among all conductors and motormen who, until May 1, 1896, shall have had no accident causing either injury or damage to either persons or property, or to the company's property, and who have not been suspended for violation of the company's rules.

The management hopes by the payment of this amount to secure more efficient and conscientious service on the part of both conductors and motormen and thus improve the service of the company's lines.

**Van Gestel's Travels Through New Guinea.**

The only white man known to have crossed the island of New Guinea from shore to shore, to have actually traversed the vast unknown interior and seen the aboriginal Papuans face to face in their native forests, is Van Gestel.

"I started in 1874, from the mouth of the Fly River in the Gulf of Papua, on the south coast of New Guinea, to run the frontier line. There was talk at that time of the annexation of New Guinea by the government of Queensland, Australia, and so the Dutch government resolved to define its possessions. I entered Papua with a detachment of a hundred Dutch soldiers, in their tidy uniforms of light blue linen, and a band of as many coolies to carry supplies.

"The interior of New Guinea is one vast mass of upheaved granite, without traces of minerals or metal ores, the strata tilted and piled topsy-turvy. Everywhere the work of volcanic eruptions is to be seen. Such a thinly populated region, considering the fact that it was an absolutely new country and that fruits and small game were so plentiful, I did not suppose could exist. The natives we saw from time to time, at a distance mostly; they never molested us. Their heads were flat on top, with long, curly, black hair; they went entirely naked. Their buttocks extended out eight and even ten inches, this repulsive deformity constituting a fleshy support amply capable of sustaining a child in a sitting position. Nor was this their most marked peculiarity. Some of the nursing mothers threw their breasts back over their shoulders or under their arms, at will, to feed the infant carried in a sling between their shoulders.

"The Papuans are a very unattractive race to look upon. In arms they were primitive to a degree that was astounding. They had neither bows nor spears that I saw, their only weapons being stone hatchets. Of the use of metals they seemed to be entirely ignorant. In the dry season they made their homes in caves, which they found or excavated for themselves. Some of these cave dwellings I visited, discovering fragments of their repasts and occasionally a broken stone ax. In the rainy season they live high in the trees, where they build rude houses of sticks laid around and intertwined with the branches, thatched with dried alang-alang, and reached by shaky looking stick ladders.

"Most startling was the solitude, the destitution of life and motion, in the great central plateaus which we reached in our gradual ascent from the river level. There were plenty of small creatures of the squirrel tribe, some of the peculiar pig-headed deer we have in Java, and an occasional little tiger cat, rather handsome than hurtful looking. That was all. I saw in my whole journey, from the mouth of the Fly River on the southeast coast to Geelvink Bay on the northwest, not a single beast of prey, unless those pretty little spotted tree cats could be dignified by that name. Not a kangaroo of either the tree climbing or grass jumping variety was seen, nor any of the dingos or wild dogs elsewhere reported. I did see a number of specimens of the great bat called by the natives kalong or 'flying dog,' with its curious coat of light brown hair and its wing expanse of six feet—truly a formidable looking creature, but not hurtful as I found it.

"But of birds there is, I verily believe, a vaster profusion of more beautiful tints and delicate plumage in New Guinea than anywhere else in the world. They fairly flamed through those somber forests, which but for their bright hues and sharp cries would have been funereally suggestive. What a paradise the interior of New Guinea would be for a naturalist! From the great cebu, which devours stones, and the cassowary, through all the species of peafowl and the bird of paradise, down to the cockatoos and the wood pigeons, there were birds of beauty in never ceasing variety and numbers.

"At suitable stations along the route I had the soldiers nail up on trees the Dutch flag and iron charts of the Dutch coat of arms, on most of which no white man's eyes have since fallen. When we reached Geelvink Bay, and realized that our task was finished, and that Holland's part of New Guinea was so definitely determined then and thenceforth that no other nation could lay claim to it, we gave a rousing cheer, and it must have been music in the ears of the solitary post holder whom the government had even then for some years maintained on the coast. The poor fellow probably didn't see a friendly face more than half a dozen times a year. He lived in a block house, watching the coaling station for the Dutch war vessels in those waters."—Lippincott's Magazine.

**The Olympic Games.**

The Olympic games really began with horse racing and chariot racing, and the course at Olympia was nothing more than a hippodrome circle, with lines of seats around for the spectators. The horse and chariot racers from Elis flocked to Olympia by thousands. Other contests, such as foot racing, boxing, wrestling, throwing the discus, the dart and the javelin, jumping, etc., were introduced. The Olympic games had now become a great national festival, held every four

years, called Olympiads, and such importance did they soon gain in the general Greek mind that they actually became an almanac or time table for Grecian history.

Athletics had now become more than a passion—a religion—with the Greeks; for at the beginning of every festival a sacrifice of some animal was made to Jupiter Olympus, and every contestant entered the list with his heart anxious for the favor of this supreme god. As fond as we moderns are of athletics, we can never hope to enjoy it with quite the enthusiasm the Greeks did. To do so we would have to carry that inspiration that we get from our Bibles, song books, and family altars to the race track with us. The Greeks were muscle mad, but it was the necessity of the times. The contestants trained long and arduously for these great festivals before leaving their homes, and then, a few weeks before the celebration, they set out with their horses, chariots, tents, etc., for Olympia. When the festivals were at the zenith of their glory, all the civilized world was there represented camping in tents about the sacred mount that overlooks the beautiful river Alpheus. Some historians—Pausanias, for instance—have estimated that there were nearly 200,000 spectators present.

The judges in the Olympic games were all chosen from citizens in Elis by lot. When the games were most popular there were nine judges, all Elisians. This is one of the strongest proofs that the Greeks were religiously honest in the conduct of these games. Modern nations certainly would not consent to let the judges in the games all be taken from one nation. When the judges had taken their seats in the judges' stand of the stadion, in the morning, heralds appeared, announcing the contestants to the vast concourse assembled.

The first contests were on the hippodrome with chariots and horses. The chariot races were contests between two, four, six, and sometimes more on the course at a time. Only wealthy persons could afford to enter chariots, as a chariot was an expensive piece of property. Many of the most distinguished statesmen and warriors, among them Alcibiades, the Blaine of Greece, entered their chariots in those races, and many women had their chariots entered here also. Horses, mules, and colts were raced in pairs, fours, sixes, etc. Often two horses were tied together and their riders raced them, sometimes one pulling the other headlong after him. The jockeys also practiced jumping from the horses at full speed on the course. There were also walking matches between the horses.

The next contests introduced at Olympia were boxing and wrestling, and then a combination of these two exercises. This was called the pancratium, and was the most violent of all the contests. These bouts usually followed the horse racing, the contestants entering the arena under the influence of inspiring flute music, their bodies, nude as at birth, anointed with olive oil and sometimes sprinkled with dust. Men were often killed in this game, but the choking, beating, and hugging had to be concluded according to rules. If a contestant manifested any malice, put heel or toe or knuckles in the abdomen or eyes, it was sufficient to disgrace him, and caused him to be called off.

The pentathlon was a combination of five games: running, jumping, throwing the discus and the javelin, boxing, and wrestling, etc. The Greeks were very fond of foot racing, and hence the track was crowded and the running violent as possible. Their races often amounted to two or three miles, and the racers ran till their tongues lolled out of their mouths, and sometimes they fell dead before reaching the goal. They were undoubtedly very much better long distance runners than the moderns are, though it is very doubtful whether a Greek could beat the record-breaking American or Englishman in a hundred yard dash.

History is not clear on the details of the training, especially the dieting, of a Greek athlete. All the Greeks were very simple in their food. There were epicures, but no gourmets, gluttons, and Luculluses among them. They ate fish, olives, currants, a little beef, barley bread, and they drank wine, but were not drunkards, delirium tremens being unknown among them. Plato denounced the Olympic games on account of the high feeding and overtraining of the youths for weeks and months at a time; but in their diet some of the victors at Olympia lived on bread, lean meat and wine, with a few olives thrown in. The fact is, the Greek did not have to diet himself for a contest as a modern does. He was every day more or less ready for a contest. He took a cold bath, a thorough rubbing of the skin, and a good kneading of olive oil into his hide from the hands of a masseur, and then he was ready. After his exercises he took a hot bath. That was about all his preparation. But there were men then who denounced athletes as there are now. Among them were such immortal minds as Plato and Aristotle, and even Herodotus, the guileless father of history. Pindar has celebrated those games and their victors in a manner to make the contests immortal.

During the contests, we are told, the flutist piped his strains, and the athletes did their best—as much to be celebrated in his song as to receive an ovation from their friends on their return home. Phidias was there, too—that man whose equal with a chisel was never born; whose eye for pure form and its manifold meanings has never been surpassed. Doubtless he got many points for his immortal statues from the nude athletes moving unconsciously before him.

The Greek had a strange idea of woman's position at Olympia. He admitted the maidens to these festivals and excluded the mothers. Why he did so is not understood. But the Greek gave the maiden more liberty than he did the wife and mother, perhaps on the ground that maidenship itself is the strongest protection to a woman. At any rate, the maidens here looked on at their nude brothers in the arena, and there were many of them present.

If Hercules, Alcibiades, Pericles, Phidias, Pindar, and other notables could witness the exercises at Athens next year, they would be as greatly shocked as any of that modern crowd could be to witness there a literal reproduction of all the Olympian games, for most likely next year at Athens the cycle maiden in her bloomers will be seen in full bloom—Illustrated American.

**Cycle Notes.**

In Russia bicycles are not carried in railroad carriages, unless they are entirely stripped of all luggage and tool bags.

The French Association for the Advancement of Science recently held its annual meeting at Bordeaux. At the 1894 meeting a paper was read by Dr. Championnière on the subject of "Cycling," which attracted great attention. As if to put the advice then given into actual practice, a feature of the last meeting was an excursion of a party of the members, mounted on cycles, to Cubzac.

As touring is becoming more general every day, it may be interesting to know what formalities the touring cyclist has to perform in the different countries with regard to his machine. In Germany, Holland, Denmark and Luxemburg the cycle is permitted to enter free; also in France, unless this country is entered from the Belgian frontier, when, after September 1, a security of 35 francs has to be deposited. The following countries demand deposits, which are returnable when the tourist leaves the territory: Austria, £2; Spain, 70 pesetas per 100 kilos; in this country a pass for the machine, available for six months, can be obtained for about a shilling. In Italy the deposit amounts to 84 lire; in Portugal to 17 per cent on the value of the machine. Russia demands about £2 and Switzerland 200 francs per 100 kilos. In the latter country a pass for the cycle for six or twelve months is required, and machines must be provided with a leaden seal, which must remain intact until the cycle is taken out of the country. It is hoped that the endeavors of the touring clubs of France, Belgium and Italy will be successful, and that next year tourists' cycles will be permitted to enter free everywhere.—The Cyclist.

There is no occasion for a rider to be uneasy in his mind because his back wheel will not revolve, when lifted off the ground, as long as somebody else's. This test is a very indifferent guide to the comparative running qualities of two machines. One reason, of course, is that so much depends on the rigidity of the frame. No matter how freely a wheel revolves when no pressure is applied to the pedals, the machine will not run easily in actual use if the pressure on the pedals throws the chain wheel out of line, while any want of rigidity in the cranks, the chain or the spokes will also mean a loss of power. A poor chain, too, may run freely when loose, but not when power is applied. Then, again, the length of time a wheel will revolve when off the ground depends very much upon the weight of the tire and rim, and perhaps partly on the weight of the pedals. A wheel fitted with a light racing tire will not revolve as long as one fitted with a heavy roadster. But there is another reason, namely, that some of the forces which oppose the revolution of the wheel are increased by the weight of the rider in the saddle, while others are not. Suppose there are two machines, and the back wheel of neither of them will revolve freely; but in one case this is due to friction in the hub bearings, while in the other it is due to a leather gearcase touching the spokes. The weight of the rider will make no difference to the pressure of the leather against the spokes, and this slight retarding force will be very little noticed in actual riding; but the friction in the bearings, being enormously increased by the rider's weight, will become a serious matter.—Scottish Cyclist.

**The Katahdin's Trial.**

The new harbor defense ram Katahdin had her official trial over the Long Island course October 31, and, although her actual time did not bring her time within the specified limit, it is confidently expected that allowances for currents will raise her average above the required seventeen knots.