

a lower chamber by a trap, and a new supply fed in from the charging hopper. The latter is kept supplied from the grinding mills by a bucket conveyor. A company is being formed to work this process, with a capital of \$300,000, and it has obtained possession of an extensive gypsum bed situated in Algeria, on the banks of the Oued-Harbel.

WILD ANIMALS IN WINTER.

BY CHARLES FREDERICK HOLDER.

The devices of animal life to bridge over the winter season, and their ways and habits during this time, present an interesting, indeed fascinating, page of nature. Why certain forms should defy the elements and roam abroad, seeking a precarious livelihood, while others, much stronger and apparently better equipped by Nature to survive the struggle, enter the strange and remarkable winter sleep with all their functions in abeyance, and sleep away the winter, is one of the problems that is of more or less interest. The fox well illustrates the former with its winter habit of prowling over the snow.

At the approach of winter, animals are affected in various ways. In the North all the reptiles—snakes, lizards, frogs and toads, a vast concourse—disappear in a most miraculous manner. The snakes enter holes and crevices, projecting themselves as far into the earth as possible, and, coiled tightly, assume a condition, a state of coma, in which they remain until the heat of the sun comes to waken them the following spring, when they appear voracious, and eager for prey to rehabilitate them physically after months of fasting. The frogs plunge down into the mud of the ponds where they have made music during the long summer; and the same is true of turtles. Lizards affect the same places as snakes, and when taken out at this time are apparently lifeless. In some marvelous manner the functions of life are arrested. There appears to be a minimum consumption of tissue; Nature apparently making an exact calculation, the functions of life being so almost completely arrested that they are enabled to lie in this quiescent state without food or water, or until the food supply comes again and the conditions are favorable to outdoor life.

This is the case with the reptiles of the Eastern and Middle States, or wherever there is a cold winter, ice and snow; but on the Pacific slope, in Southern California, in the same latitude as the above, a different condition holds. Here—and the San Gabriel Valley may be taken as an example—the lizards are subjected to a winter and summer every twenty-four hours. There is no snow, the days are bright and beautiful, resembling a cool Eastern summer, and insect life does not disappear. All winter I have found lizards basking in the sun on these bright days, but as the winter day wears on and four o'clock approaches, there is a very material change—a strange chill that affects reptilian life at once. It is their winter, and just as the Eastern lizard creeps down into the earth for shelter and enters its winter sleep, so this California lizard crawls out of sight beneath rocks, into crevices or under the bark of trees, and enters what is the equivalent of a state of coma. It seems to shrivel, becomes seemingly intensely cold, often stretches out its entire length, and lies, to all intents and purposes, dead and lifeless, in this way passing the night until nine or ten o'clock in the morning, when the rays of the sun slowly bring it back to life.

This curious night coma is, so far as appearances go, identical with the winter sleep of eastern lizards. The functions are in abeyance for the time and life is at its lowest ebb. In observing these sleepers I have found them by turning over the piles of stones early in the morning, and have often found a row of them, limp, cold and apparently dead, lying in the sun, to watch the gradual return to life. It came very gradually; those lizards placed on their backs first showing signs of life by a quivering of the limbs, which were then drawn up; then the long tail would move, and finally the little sleeper would clumsily roll over into an upright position; and as the direct rays of the sun struck and warmed it into life its eyes would grow brighter, and suddenly, as though touched by some magic wand, its head would be lifted high, the blue breastplate gleamed in the light, and with an air of astonishment and alarm this sleeper awakened would dash over the ground and escape, once more a living creature, a type of activity, a menace to insect life. Every night in the Californian winter this occurs, and the condition can easily be superinduced by subjecting the animals to artificial cold. The bears in Southern California are found abroad at all times, while in the northern part of the State and in the East they enter into a complete state of hibernation, going into their winter sleep well conditioned and fat, evidently living on the latter until spring, when they emerge lean and ugly.

The change in color of animals at the approach of the winter season is one of the remarkable features of life. The ermine as an example and several others assume a white coat, the change being a protective

feature. The ptarmigan has a similar habit, a change which renders it inconspicuous to its various enemies.

At the approach of winter the birds perhaps present the most remarkable spectacle. With some few exceptions they move away from the conditions which threatened them; and in what is popularly called the departure and return of the birds we contemplate a wonderful migration, in which the highest instinct of self-preservation appears to have been developed. The birds of the coast have a definite line of migration; the shore line at this time constitutes a bird highway, over which tens of thousands are passing—in the autumn to the South, where there is a food supply; in the spring to the North, to the fields they know so well, and the nesting places where the young are to be raised. Much of this migration is carried on at night high in air, and during storms myriads of birds are often confused and killed by dashing blindly into the lighthouses that mark the highway. At Heligoland Light the ground in the morning is frequently strewn with birds, from ducks and geese to the smallest songsters. In the interior the birds follow valleys and the mountain ranges.

On the Pacific coast the Coast Range and Sierra Nevada Mountains constitute a well defined line of travel. In Southern California the flight of cranes and geese along this pathway is a remarkable sight. The birds, especially the cranes, cover long distances by soaring, gradually reaching within rifle shot from the ground; then they stop and begin a spiral movement, turning in graceful curves, flashing like silver dollars in the sunlight as they turn and disappear, rising ever higher until they are a mile or more above the valley, or above the summit of the Sierra Madre; then, as though at the command of the leader, they turn, and in long lines soar away with remarkable velocity, literally sliding down hill, covering six or seven miles or more before the maneuver is repeated.

The winter finds the trees, groves and gardens deserted except by the few forms which defy the cold. The birds are in the South—Florida, Cuba and even South America; the reptiles are housed underground; insect life has been destroyed or is hibernating, and will spring into life in the spring. The only animals abroad are the mammals; the deer, elk, caribou, fox, cougar, wild rat, lynx and other forms, which wander over the barren wastes and in the deep snows of the woodlands, finding a precarious living until the spring comes, the wanderers return and all life takes on a new meaning.

NEW TRANS-PACIFIC CABLE.

It has at last been decided to construct the Trans-Pacific telegraph cable connecting Australia direct with England via Canada. The contract has been placed with the Telegraph Construction and Maintenance Company, is to be completed by 1902, and will cost \$8,975,000 to construct, exclusive of preliminary surveys and other incidental expenses which will amount to about another \$900,000. The cable will run from England to Vancouver, thence to Queensland, and New Zealand, via Fanning Island, Fiji, and Norfolk Island. It is impossible to estimate the importance and commercial value of this route, since it will enable the most distant colonies to communicate with England, independently of the lines that pass through or near Europe, while messages will be conveyed at a cheaper tariff, and commercial activity will be considerably stimulated.

The growth of telegraphic business between Australasia and England has developed remarkably during the last twenty-seven years. In 1873 the International line was opened, and during the first year 8,952 messages were transmitted to and from the colonies. In 1884 this total had grown to 48,896 messages, which is equivalent to an annual increase of 40 per cent.

The present scheme has been under consideration for several years, but it was not until 1886 that the enterprise first assumed any tangible shape. In that year the Agents-General for the colonies, in a deputation to Sir Charles Tupper, who was High Commissioner for Canada at that time, declared that after careful investigation they had concluded that such a cable could be laid for a total annual subsidy of \$500,000, extended over twenty-five years. For several years the scheme was then permitted to remain in abeyance, but six years ago an expert estimate was prepared as to what amount of business might be anticipated from such a cable. It was then calculated that the gross earnings at an average tariff of 50 cents per word would amount to \$550,000 for the first year; for the second year, \$632,500; and for the third year, \$715,000; while a surplus of \$772,500 would be yielded during those first three years' working.

Regarding the construction of the cable, it has been apprehended in some quarters that great difficulty would be encountered in laying the cable at certain points of the route, notably at Fanning Island, the approach to which is rather steep. In the opinion of cable engineers, however, this is considered of small moment, since there are several stations of other cable companies which are approached by equally

steep gradients, and yet the cables have never suffered any disturbance of any kind. The cable will be laid in deeper water than has previously been the case, since, whereas the greatest depth for such work has been 2,500 fathoms, in this instance it will be for the most part 3,200 fathoms. It is not anticipated, however, that any trouble will be encountered in this direction, since various types of cables have been designed for varying depths. They will be most carefully made, and in the deepest water the cable will be of small diameter. It is expected that the transmission of a message between London and Australia will occupy twenty minutes.

No decision has yet been made regarding the tariff. The Eastern Telegraph Company at present charges 87 cents per word, which in course of a few years, will be reduced to 62 cents per word. Fourteen years ago the tariff was \$2.70 per word, so that some estimate may be gathered of the development of telegraphic communication between England and Australia to permit of such a large reduction.

SCIENCE NOTES.

Berlin was treated to zero weather during January. The River Spree was frozen over so suddenly that the ice caught thirteen of the city's swans, and the Fire Department was called out to release them.

Cocaine sniffing is on the increase in the South among the negroes. The drug is sniffed up the nose and the results produced are somewhat the same as those obtained by smoking an opium pipe.

A dispatch from Cardiff states that an electrician named Smith has invented two X-ray tubes which he claims do not produce any bad results upon the subject, one of them actually tending to heal burns and wounds, says the New York Sun. It is said that one of them makes bones and not flesh visible on a photographic plate, while the other makes neither visible, the plate only showing foreign substances.

To promote uniformity in results and to secure accuracy and to give legal value to the evidence of X-rays it is necessary to standardize methods of doing the work. To this common benefit all X-ray experts are asked to contribute for the general good of the cause. The Roentgen Society has issued a circular giving a list of standards which it is desired to establish. A copy of this circular can be obtained from S. H. Monnell, M.D., 47 West 27th Street, New York city.

"Synthol" is a chemically pure substitute for absolute alcohol. It may be used for every purpose for which alcohol is used except for internal consumption. Being chemically pure it does not have as much odor as absolute alcohol from grain or wood. It is perfectly free from color, is non-irritant to eyes or skin and has ten to fifteen per cent more solvent power than ordinary alcohol. As a killing, fixing or hardening agent it is in every respect equal to the best absolute alcohol and can be used as a substitute for it in the preparation of stains, reagents, etc. As a preservative it is superior to any alcohol, as alcohol becomes tinged with color on exposure to light, while synthol retains its absolute colorlessness under all conditions.

The Germans have invented a new description of glassware, specimens of which have been on exhibition in England. This cloisonné glass, as it is called, is similar to stained glass, but is claimed to be superior. The design is prepared in double brass wires, and the interstices are filled with small pieces of colored glass. This design is then mounted upon a large sheet of plain glass, to which it is firmly attached by means of a translucent cement. Another similar sheet of glass is then placed upon the top of the design in the same way, so that the colored glass is inserted between two sheets of glass. By this means the cloisonné glass is smooth on either side. It cannot be bent or loosened, and in view of the thinness of the brass wires more light is admitted than is the case with stained glass, owing to the thickness of the leaden framework in the latter.

Sir Harry Johnson, Special Commissioner to Uganda, reports the established existence in the Semliki forests of a peculiar ruminant thought to be long extinct, says the New York Sun. Fossilized remains of this animal have been found plentifully in Greece, and it has been called hitherto helladotherium. A complete skin and two skulls are now on their way to England for the British Museum. The natives call this animal the okapi. It is a giraffe-like creature, and is closely akin to the ox in size. The neck is a little longer, proportionately, than that of a horse; the ears like those of the ass, with silky black fringes; the head taper-like, and the nostrils like those of the giraffe. The forehead is a vivid red, and the neck, shoulders, stomach and back a deep reddish brown. Parts of the animal are almost crimson and others blackish in hue. The hind quarters and legs are boldly striped in purplish black and white. The animal is hornless, although there are traces of three horn-cores.