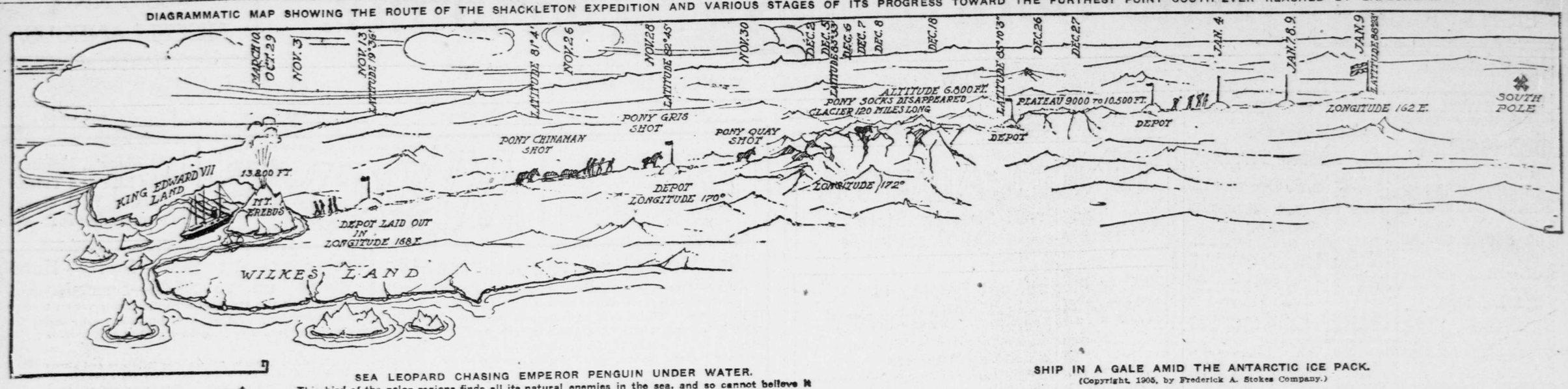
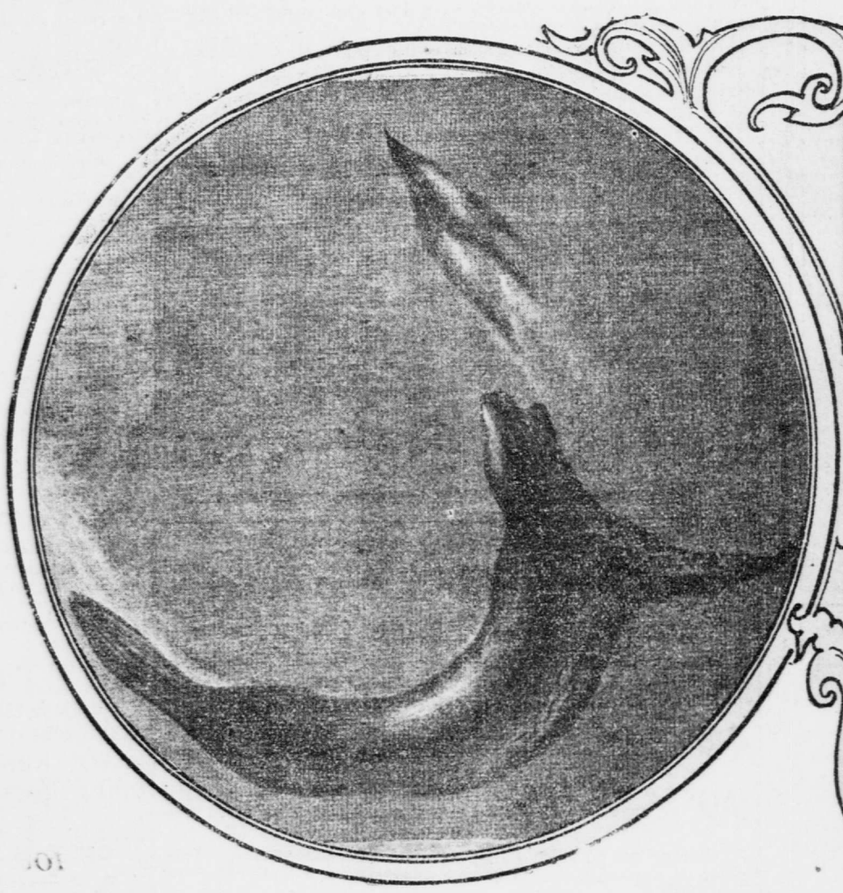
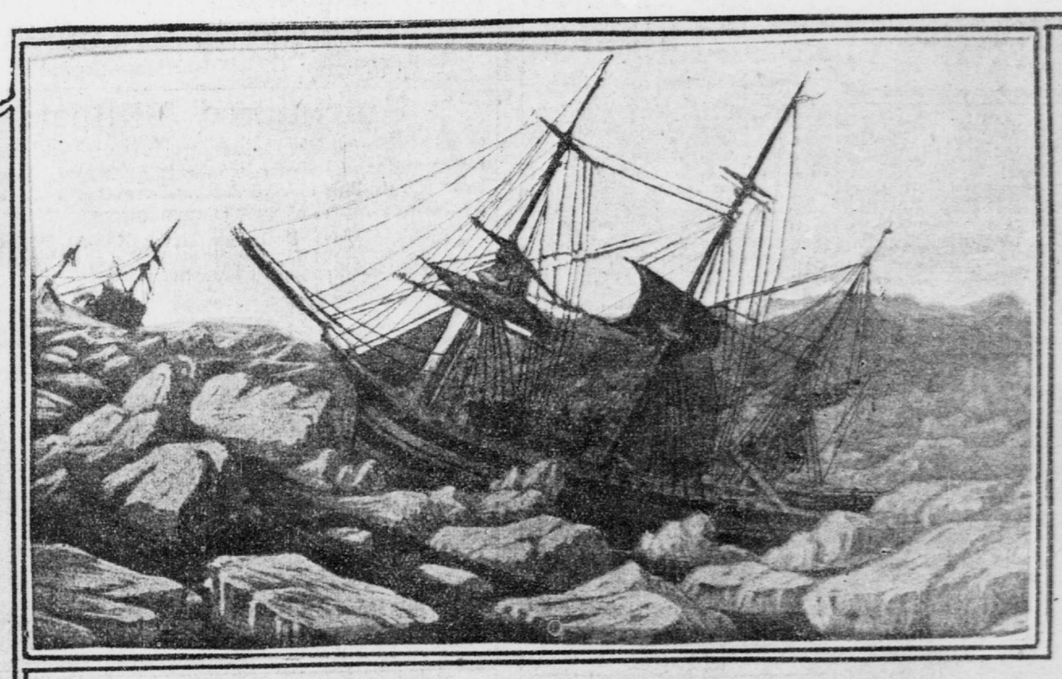
DIAGRAMMATIC MAP SHOWING THE ROUTE OF THE SHACKLETON EXPEDITION AND VARIOUS STAGES OF ITS PROGRESS TOWARD THE FURTHEST POINT SOUTH EVER REACHED BY EXPLORERS.

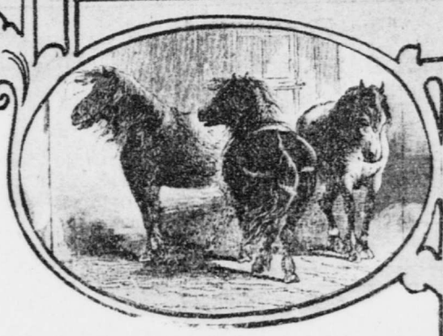



SEA LEOPARD CHASING EMPEROR PENGUIN UNDER WATER.
This bird of the polar regions finds all its natural enemies in the sea, and so cannot believe it has anything to fear from man when he approaches it on land.

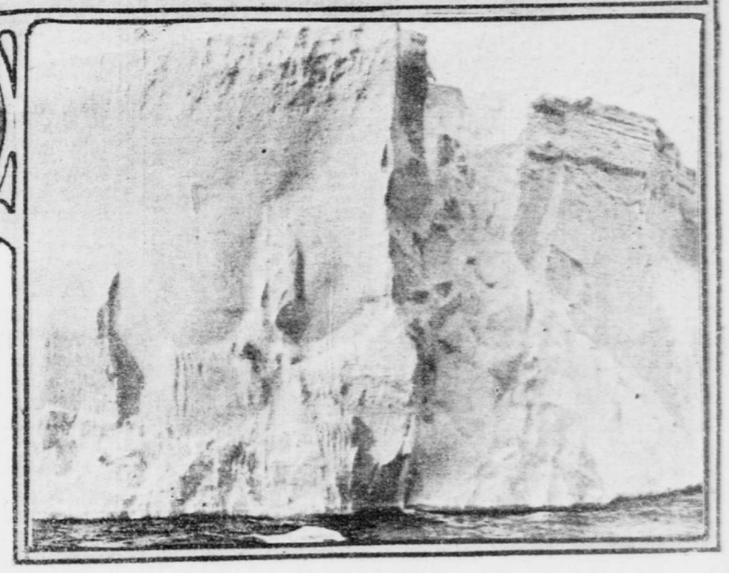


SHIP IN A GALE AMID THE ANTARCTIC ICE PACK.
(Copyright, 1905, by Frederick A. Stokes Company.)





SIBERIAN, OR MANCHURIAN, PONIES.
They become fat in summer, when grass is lush, but very thin in winter, when they are accustomed to forage for themselves.



SMALL SECTION OF THE GREAT ICE BARRIER.
It attains a height of about two hundred and fifty feet in some places, and extends for hundreds of miles along the coast of the South Polar continent.

# ANTARCTIC AND ARCTIC TRAVEL

## *LATTER OFFERS FEWER DIFFICULTIES.*

### *Easier to Cache and Preserve Food—Ice Surface Smoother—No Game, However.*

The achievements of the Antarctic expedition headed by Lieutenant Ernest H. Shackleton, of the British navy, which last week returned to New Zealand are bound to add to the interest in polar exploration in general and in the Antarctic region in particular. Having reached a point within 111 miles of the South Pole, it gives the explorers of the south a lead over those who have sought the location of the other terminus of the earth's axis. Unless Dr. Cook has succeeded in his attempt furthest north is still the point, 293 miles distant from the long sought goal, where Peary's expedition of 1906 turned back.

In some respects, doubtless, the reason more has been accomplished in the south than in the north has been due to the different conditions in the two regions. The more striking differences were well illustrated by several of the achievements and discoveries reported by Lieutenant Shackleton. These were the finding of eight mountain chains, more than one hundred mountain peaks and the ascent of Mount Erebus, an active volcano, 13,120 feet high. All the indications were that the site of the South Pole is a plateau 10,000 or 11,000 feet above sea level. The mountains discovered ranged from 8,000 to 12,000 feet in height, and demonstrated that Alpine climbing and scenery could be found in other places on the globe than Switzerland and British Columbia. Mount Markham, also in this region, is more than 15,000 feet high.

Apparently "there is all the difference in the world" between the two poles, speaking figuratively, in respect to physical conditions. All the indications are that the North Pole is covered with frozen spray dashed up against it by the waves of a polar sea. Or, if the spray freezes before it dashes up, then the pole may be buried beneath grinding icebergs. However that may be, the fact apparently is that the North Pole is surrounded by a sea about as large as the continent which seems to surround the South Pole.

Commander Peary, in seeking his goal, therefore must make his way over field ice, which may shift with the currents of the Polar Sea. This sea, being largely surrounded by land and having comparatively narrow outlets to the warmer oceans, the ice upon it is under immense pressure and is forced up into ridges difficult for the explorer's sledge to negotiate. The ice of the Antarctic region does not offer so great obstacles of this nature, for it flows from the land of the Antarctic Continent into a sea open on all sides to the warm currents from the tropics. To this fact is attributed by some explorers the smoother surface of the ice of the southern polar region. In traversing this southern continent a body of land believed to exceed the United States in area, apparently; the immense glaciers, with their cavernous crevasses; the mountain slopes and the consequent rarefied air are the chief impediments.

### THE GREAT ICE BARRIER.

One of the most interesting physical features of the Antarctic region is the so-called great ice barrier. This is a cliff of ice stretching eastward from Queen Victoria Land for a distance of approximately 450 miles and terminating at the land discovered by Captain Scott in 1902, and named by him King Edward VII's Land. This remarkable barrier ranges in height from three or four feet to upward of 250 feet, most of it towering above the masts of a vessel. It is one of the chief conundrums of the Antarctic. Is it the front of a giant glacier? Or does it mark a strait or gulf 450 miles wide which has been frozen? These are questions asked by the explorers. This remarkable ice cliff was discovered by the Ross expedition nearly seventy years ago. It was demonstrated to the Scott expedition, with which Lieutenant Shackleton made his first visit to the Antarctic, that the barrier had movement, for a supply of provisions was carried on the ice a distance of 1,824 feet in the course of thirteen and one-half months. It was Captain Scott's opinion that it was a floating mass.

The presence of a volcano belching forth steam, well within the circle of eternal ice, is as much of an anomaly as the presence of an extinct volcano covered with a snow cap at the equator. Mount Kilimanjaro, in Africa, and Mount Erebus, which Lieutenant Shackleton's expedition conquered, exhibit this marked antithesis. Mount Erebus, which was named for one of the vessels of the Ross expedition, is one of a group of mountains, of which Mount Lister rises more than 2,000 feet higher than the volcano.

One of the great problems of the polar explorer is that of food transportation. This is made especially difficult in the north by the roughness of the ice. Storing food supplies along the route is one of the ways in which an excess of weight is avoided. In the north, however, this method has its drawbacks, for polar bears enjoy nothing more than the edibles transported to their dwelling place from the white man's land. There is a possibility that the explorer will not find his provisions when he is in desperate need of them, not only from this cause, but through submersion of the ice. With a good gun, however, the Arctic traveller may make the bears pay for their meals by themselves becoming food.

In the Antarctic regions there is more certainty of finding one's cached food supplies, for the continent is practically barren of animal life and free from floating ice. The musk ox, the bear and the walrus offer the Arctic explorer opportunities for sport and for the renewal of his larder, but the penguin and the seal are the only forms of life ever found upon land within the Antarctic Circle. As these obtain their food from the water and spend most of their time upon it, they are not found at any distance in the interior.

### PONIES GAVE ALL THEY COULD.

Usually dogs are employed to drag the sledges, with their burden of food, camp equipment and instruments. The smoother surface of the barrier in the Antarctic suggested to Lieutenant Shackleton that a motor on runners could be used to advantage in moving the sledges. His report, however, indicates that the motor sledge was serviceable on the sea ice, but not on the barrier ice of the interior. The experience gained on the Scott expedition also suggested that Siberian ponies would do better than dogs, because they can resist the severe cold, can drag a heavier load in proportion to the amount of food they require and are more palatable in case of need than dogs. These animals, in their native habitat, generally are left night and day without shelter, even at a temperature where mercury freezes. They manage to maintain life on the dried grass they find under the snow. Their native Siberian and Manchurian owners make fish nets from the animal's long winter hair, clothes from its skin and kumyss from the milk of the mares. Boiled horse meat is one of their favorite dishes.

Lieutenant Shackleton took eight of these ponies with him. Unfortunately, four of them died through feeding on sand before they had an opportunity to perform the service expected of them. The other ponies did all that was expected of them, even to giving up their lives to furnish food for their drivers. Their names will go down in the history of Antarctic exploration, however, for the names of two of them were given to the depots which they helped to establish in more senses than one.

The conditions under which poles are sought are illustrated in the following abbreviated itinerary of Lieutenant Shackleton's remarkable "dash":

October 29, 1908—Left Cape Royd.

November 3—Left Hut Point with provisions for ninety-one days.

November 5-9—Held up on White Island by a blizzard.

November 26—Reached Captain Scott's southernmost latitude. Before reaching this point pony Chinaman was shot and a depot of pony meat, oil and biscuit made.

November 28—Pony Grisi shot.

November 30—Pony Quai shot. Approaching a high range of unknown mountains.

December 5—Started to ascend a glacier forty miles wide and one hundred and twenty miles long. It was badly crevassed.

December 6—Glacier so badly crevassed occupied entire day covering six hundred yards.

December 7—Pony Socks broke through snow lid and disappeared in a crevasse. Mr. Wild and the sledge were saved by the breaking of swingle tree.

December 18—Reached altitude of 6,800 feet on glacier.

December 26—Reached a plateau after crossing ice falls at an altitude of 9,000 feet. Had left everything but food, instruments and camp equipage at a depot in latitude 85 degrees 10 minutes 3 seconds and reduced rations to twenty ounces a man a day. Men dragging the sledges.

January 4, 1909—Made another depot on the plateau and proceeded with one tent, utilizing the poles of the second tent for guiding marks for the return trip.

January 7—Blizzard, with 72 degrees of frost and wind blowing at seventy miles an hour.

### THE FURTHEST SOUTH REACHED.

January 9—Left camp and reached latitude 88 degrees 23 minutes, longitude 162 east, the furthest point south. Hoisted Union Jack.

January 19—Reached upper glacier on return journey.

January 26—At 9 a. m. food supply was exhausted.

January 27—After marching twenty-two hours through two feet of snow reached lower glacier depot.

February 2—Reached Grisi depot (named for the dead pony), with no food remaining. Wild was suffering from dysentery, due to the horse meat.

February 13—Reached Chinaman depot, after an eight days' fight against dysentery. The food had again become exhausted.

February 20—Having abandoned everything except the camp outfit and geological specimens, reached next depot, with all food finished.

March 4—After many experiences all are back on the ship. The total distance of the journey, including relays, was 1,708 miles, and the time consumed 126 days.

There are other differences between the north and south polar regions which add to or detract from the pleasure of exploring them. The summer season in the northern zone is much warmer than that in the south, the average temperature being higher and the weather finer. In the north the hillsides facing the south are draped with verdure in varied tints, while the rocks are covered with beautiful mosses. The Antarctic Continent, on the contrary, is almost devoid of vegetable life. The aurora borealis in the north is also more brilliant than in the south. It is believed by explorers who have visited both polar regions that the coldest spot on the globe is somewhere on the Antarctic Continent. That its temperature will be recorded they doubt.

### GERMAN HOTELS.

A wonderful transformation has taken place during the last few years in the elegance and comfort of German hotels, more especially so in Berlin, which now vies with Paris and London in this respect. Beautifully located, overlooking a quiet and parklike square, stands the fine Hotel Kaiserhof, with the comforts and luxuries of which so many Americans are familiar, and which has this season opened the Atlantic Hotel, at Hamburg, for the accommodation of American visitors, thus insuring them equal comfort both in Berlin and Hamburg. A choicely illustrated booklet, issued by the Kaiserhof, may be had free from the uptown offices of the Tribune.

# CITY'S COAL BILL

## *Some of the Things This Yearly Expenditure Would Do.*

To provide for the illumination and for the heating and for the maintenance of its industries, New York City consumes in twelve months in the manufacture of gas enough coal to build a new set of pyramids in Egypt and to supply the entire transatlantic fleet that plies between its noble harbor and the foreign ports of the world, and then have enough left over to run the biggest steel plant in the United States. The consumption of coal for this purpose is so stupendous as to stagger the imagination, but the dryness of statistics is transformed almost into an Aladdin-like dream when it is considered that in one year the coal used in supplying gas for all purposes in New York would:

Build an obelisk eight times as high as the tower of the Metropolitan Life Building at 24th street and Madison avenue, which rises 700 feet from foundation stone to its apex.

Load a train of the largest freight cars ever built, extending, closely coupled, in one solid line from Brooklyn to Montauk Point, Long Island, a distance of more than 120 miles.

Furnish a carpet of coal nearly one foot thick covering the entire area of Central Park, and including the water reservoirs contained within its 846 acres.

Provide a fuel supply for a family that began using coal a thousand years before the year 1, and continuing through its descendants for two thousand years to come.

Require for storage a cavern larger than the Mammoth Cave of Kentucky and the gorge of Niagara combined.

The most familiar comparison, and one which brings to the mind's eye a quick conception of the vastness of the gas coal supply demanded each year by New York, is gained by the picture of the white marble tower that pierces the sky line on Madison avenue. Fancy, if you can, how this mighty structure would be dwarfed were a black shaft formed of the coal consumed for gas-making purposes alone erected alongside of it! The main building of the Metropolitan Life occupies a rectangle 200 by 425 feet and is 164 feet high. The tower is 75 by 85 feet in the ground space it occupies, and its fiftieth story is 700 feet above the foundation line. The total weight of the building is 85,000 tons and of the tower about 44,000 tons.

The coal used in the manufacture of gas for all purposes in New York last year was 528,000 tons. Let this be packed into a compact mass, with no spaces for windows or other openings, and it would be 5,363 feet in height, occupying exactly the same ground space as the insurance company's mighty monument. Its weight would be 1,850,000,000 pounds. The highest point would not be visible to the naked eye, even if the observation were attempted from the summit of two Eiffel towers, one on top of the other. To travel from the surface of the earth to the summit would require by the modern elevator, running at top speed, longer than a passage by train over the East River Bridge and back again, or more than twice as long as a journey through the Hudson River tunnels to the Jersey shore and the return trip to the island of Manhattan.

Resolve this wonderful obelisk of black diamonds into the rough, broken lumps of coal with which we are familiar. Pile them into carts—the biggest you can find, say, four tons each—and fancy the procession of 207,000 vehicles, with 207,000 drivers! There you would have a population sufficient to constitute a big city.—Gas Logic.

# SOME POINTS ABOUT BUILDING A BUNGALOW

## The Roof is a Subject Demanding Much Careful Thought.

CHAPTER IV.

After having surveyed in general the field of bungalow construction, the thoughtful owner is likely to recur to an important phase—roofing. The roof is a large subject in itself. Merely from an æsthetic point of view it looms up as a principal feature which may make or mar a building. Being the covering of a low, single story structure, it is notably visible and announces itself to the approaching visitor sooner than any other part. It may be insignificant or positively ugly. It may impart a tone of cosey, opulent romance more desirable than the effects of a hundred castles. None who has seen it will fail to cherish the picture of a red-tiled low roof on a western hillside, flanked by greenery and harmonizing with sunset hues. There is instant suggestion of comfort, snugness and hospitality. Beauty is at the top, and whatever may be discovered afterward cannot entirely remove the first impression. What the fireplace is to the interior the roof is to the exterior.

While much depends on the architectural lines of the roof, more may depend on the material. Rolling shingled eaves may barely escape a barn or stable effect, while variegated slate will impress any eye that there is a home underneath. Solidity, quaintness, comeliness are inherent in the material. The impression of superior quality will reach the average person, although he cannot locate the source of it.

From the practical point of view, the roof involves questions of durability, fire protection and insurance, heating under summer rays, weight upon the side walls—and cost. Doubtless it would be illogical to put a fifty-year roof on a shack intended for a few summers' occupancy, and, besides, the frame would not support the weighty materials necessary. Insurance, whether at high or low rates, is not a consideration in the real wilderness. It is always desirable to be protected from chimney sparks and forest conflagrations by a fireproof top, yet the item of cost for this improvement may be quite disproportionate to the value of the structure and practically prohibitive. Not only does the fireproof roof cost more in itself, but it entails a stronger and more expensive building to uphold it. For a bungalow 20 by 35 feet, with an estimated roof area of 1,000 square feet, the difference between the cheapest and a fairly costly roofing is at least $100, not including the extra expense for stronger framework. The pitch of the roof will determine to a degree the kind of material suitable for a covering. If slate or shingles are used on a roof of low pitch there is likelihood that the rain will drive under them and the bungalow will be a leaky failure. In this case a homogeneous roof of tin is desirable.

The least expensive roofing and the one "hardest to look in the face," though it may serve for a remote summer cabin, is tar paper. It may be obtained two or three ply, and comes in rolls. The application with caps and nails, laying the strips parallel to the length of the roof and overlapping the upper edges, is simple and speedy. A little cementing and "flashing" with tin around the chimney will be needed. When there is no felt lining beneath, as in city roofs, tar paper is said not to be insufferably hot. It must be coated with tar paint every season, and then lasts five years or so. The cost of material and labor to put it on is from three to five cents a square foot. Rolls of similar roofing material, a little less obnoxious to the eye and slightly more expensive, are sold under patented names. The use of paint may conceal the nature of this material and harmonize it with the color of forest leaves. The amateur builder may be tempted to nail on the strips of tar paper or composition himself, but he will find that even this simple operation requires a degree of skill, and that a botch with poor material is the worst kind of a mistake.

A tin roof is light, fireproof and durable if painted every two years. It entails considerable labor in putting on, the seams between sheets having to be soldered, and repairs are difficult when the nearest tinsmith lives many miles away. It is hard to detect the location of a leak, due to a slight crack at the soldered joints, when heat has unduly expanded the metal. The sheets of tin must be painted on the under side when laid, else they will rust, and a first upper coat of paint must be followed by a second coat after a month. The cost of material and labor is from 10 to 20 cents a square foot. As for looks, dependence must be placed on paint. In a lively hailstorm the dweller under tin will imagine that his home is being bombarded with the batteries of a foreign invader and may have to stuff his ears against the clashing uproar.

Shingles of galvanized iron are, of course, fireproof, rather neat in appearance and last practically forever. They come high, about 15 cents a square foot, laid on. They are painted only on the outside. Their use is mostly confined to steep gable roofs and projections around bay windows. The wooden shingle is cheap and popular, the standby of American builders outside of the cities. The lowest grade of white cedar, cut from the outside of the tree, and therefore knotty and sappy in the thick part, sells for a $3 a thousand, against $5.25 for the best red cedar from the Pacific Coast. By overlapping the butts sufficiently the disadvantage of sap and knots in the lower grades may be somewhat obviated. A full sized shingle should be laid 5½ inches to the weather, the rest of the shingle, 12½ inches, being covered by the two upper courses. Red cedar looks well in natural color. White cedar may be stained or painted for effect, but it is doubtful whether any treatment except dipping in creosote before laying will prolong the life of a shingle beyond the allotted ten or fifteen years. After weathering, white cedar turns a pleasing gray. One thousand shingles laid in the approved manner will cover 120 square feet of roof. A good carpenter, laying eight thousand shingles in a day, will be able to roof a small bungalow between morning and night. He will ask from $2.50 to $3 for his day's work.

Tile does not compete well with other material on account of weight and cost, despite a magnificent appearance. A roof weighing several tons requires heavy support. The unglazed variety absorbs water and crumbles away. A Chicago man covered his $50,000 home with a specially made tile and then found that his roof leaked. Tile costs from 12 to 75 cents a square foot, laid on. Disregarding weight and cost, the best grades are a highly eligible material.

A slate roof of good quality and well laid is almost ideal. It is fireproof and lasts a good part of a century. It has possibilities of highly ornamental color. The weight is not excessive for a permanent residence, being about 650 pounds for one hundred square feet. The cost of getting it laid on the roof is about double the price at the quarry, making the expense for an average grade 8 to 12 cents a square foot. The ordinary grade has a minimum thickness of three-sixteenths of an inch and is said to be just as durable as slabs half an inch thick. Every lot ordered from the quarry has, in fact, a wide divergence of thickness between three-sixteenths and half an inch, and the skillful slater will sort out the thick and thin ones beside the building and use them appropriately together. It is a needless extra expense to demand an absolutely uniform thickness at the quarry. Money and material are saved by having the slate punched for nail holes at the quarry instead of on the ground, since there is an inevitable breakage in the process. Enough slates will be broken when they are being put on the roof, especially if a poor mechanic handles the job. If the country slater will lay four hundred square feet in a day and ask no more than $3.25 for his services the owner is in luck.

A three-inch lap of the third course over the first course is necessary to make a tight roof. Moreover, the owner must beware that a worthless black slate which crumbles to powder in a few seasons is not foisted upon him. Some years ago the competition among slate roofers in the neighborhood of an Eastern city led to the use of such bad material and poor workmanship that all slate roofs fell into disrepute. A good black, sea green, green and purple or variegated slate may be had at the prices given above. Vermont sea green undergoes a remarkable and apparently ominous change of color after a few months; it develops streaks and patches of yellow, brown and black. Yet this does not affect its lasting quality, as shown by careful tests, and the changing color is really a picturesque advantage. The variegated purple is interesting and is only slightly less tough than the sea green. One architect to whom a quarry representative was showing samples of many hued slates had an inspiration. "I want them all," he exclaimed, sweeping his hand over the diversified array. He ordered small quantities of each and had them put on the roof of a country dwelling with an effect that was rich and gorgeous.

Unlike wooden shingles, slate makes a clean roof for supplying a rain water cistern. It is false economy to lay slate on lath or boards several inches apart. There should be boards of even thickness, matched and planed. Asbestos shingles, made of cement and asbestos fibre subjected to a pressure of twelve thousand pounds to the square inch, are a close rival of slate as a roofing material. They are said to be fireproof, waterproof and practically indestructible. They do not need paint. Like all cement material, they become stronger with the passage of time, hardening to a granite condition after a dozen years. They are somewhat elastic, so as not to be injured by frost or heat. The uniform thickness insures an evenly laid roof, compared with slate of irregular thickness. The weight for a hundred square feet is 250 pounds and upward. The minimum cost is about nine cents a square foot. There are three colors obtainable—gray, red and blue black—which are incorporated in the material of the shingles. It is possible, though unnecessary, to stain the shingles in any hue. While weighing more than wood and approximating slate in the heavier grades, it is said that the asbestos shingles will not weigh more than wood shingles when the latter are wet. Recent experience has led to the fastening of asbestos shingles with copper fasteners at the lower end of the exposed portion. Thus there is no danger of warping. The cost of copper fasteners is inconsiderable. It is recommended that the underroofing be composed of rough matched boards covered with asbestos slater's felt. There are several methods of applying the shingles, the French or diagonal method being the most economical and attractive. Between this and the American square style there is a difference in weight of 125 pounds for a hundred square feet of surface. According to the French method, each shingle is fastened independently of its neighbors. This allows for expansion and contraction in each unit, and makes repair, if there should ever be need of repair, easy. Many beautiful designs can be worked out in the diagonal method. Sometimes there is an interesting variation between diagonal and square on the same roof. The asbestos shingle may be cut, sawed, nailed or otherwise treated like a piece of hard wood. Where the pitch of a roof is less than four inches to a foot, it is not advisable to use asbestos shingles.

(To be continued.)