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The Editor is always glad to receive for examination illustrated articles on subjects of timely interest. If the photographs are *sharp*, the articles *short*, and the facts *authentic*, the contributions will receive special attention. Accepted articles will be paid for at regular space rates.

COMMERCIAL ALASKA.

A million dollars a month is the estimate made by the Bureau of Statistics of the present value of the market which "frozen Alaska" offers the producers and manufacturers of the United States.

By reason of the application of modern systems of travel and transportation, Alaska is now as accessible as Arizona. Three days of travel by modern ocean steamers from Seattle, among the islands and along the coast which form the southeastern extension of Alaska, lands the traveler at Skagway; twelve hours by rail over the mountains carries him to the headwaters of the Yukon, where comfortable and well-equipped river steamers carry him to the gold fields of central Alaska or down the Yukon River, which is navigable for more than 2,000 miles at this season of the year. From the mouth of the Yukon another comparatively short trip by steamer carries him to Cape Nome—the latest and greatest of the gold fields of Alaska.

Gold, fish and furs are the principal industries of Alaska at the present time; and their value to the United States is $15,000,000 annually.

The cost of Alaska was $7,200,000. The revenue which the government has derived from it since its purchase amounts to over $9,000,000, and the value of the products is now twice as much every year as it cost. The total value of the products of Alaska brought to the United States since its purchase is (according to the best estimates that the Bureau of Statistics is able to make) about $150,000,000, of which $50,000,000 is precious metals, $50,000,000 products of the fisheries, chiefly salmon, and $50,000,000 more furs, chiefly seal fur. Probably $50,000,000 of American capital is invested in Alaskan industries and business enterprises, including transportation systems. In the salmon fisheries alone, the companies engaged have a capitalization of $22,000,000 and the value of their plants, including vessels, is given at $12,000,000. In the mining industries there are large investments, the great quartz mill at Juneau being the largest quartz stamp mill in the world, while several other quartz mills represent large investments. With the inflow of capital, the development of transportation systems, and the gold discoveries, have come the building of towns and the development of cities with modern conveniences of life. Nome City, which is located but a comparatively short distance south of the Arctic circle, has now a population of over 12,000; postal facilities have been so extended that the number of postoffices is now about sixty, and mails are being regularly delivered north of the Arctic circle.

Agricultural opportunities in Alaska have, until within a recent period, been considered of but slight importance. As the country was explored, however, and its conditions of climate and soil studied, its natural products observed, and experiments made with various classes of agricultural productions, it became apparent that the agricultural possibilities of the country, and especially of the south and southeast, where the climate is modified by the Japan current, were of considerable importance, in view of the practicability of furnishing at least a part of the food supply of the population which the varied resources of Alaska seem likely to sustain and make permanent. Grasses for the support of cattle are abundant, and the experiments with live stock thus far justify the belief that this feature of the food requirements of Alaska may be furnished by the development of stock farms in the southern sections. In the north vast areas are covered with a moss similar to that upon which the reindeer thrives in other parts of the Arctic regions; and in view of this fact, the introduction of reindeer from Siberia was begun a few years since, and has proved extremely successful, about 3000 now being distributed through northwest Alaska. The experiment has advanced sufficiently to justify the confident belief that the reindeer will within a few years prove an important feature in furnishing both the transportation and food supply of northern and northwestern Alaska.

The gross area of Alaska is, according to the 1900 census, 590,804 square miles. The Governor of Alaska in a recent report states that this is equal to the combined area of the twenty States of Maine, New Hampshire, Vermont, Massachusetts, Rhode Island, Connecticut, New York, New Jersey, Pennsylvania, Delaware, Maryland, Virginia, West Virginia, North Carolina, South Carolina, Georgia, Florida, Alabama, Mississippi and Tennessee.

THE SCARCITY OF HORSES.

With all our American ingenuity and enterprise in manufacturing electric cars and automobiles to relieve the horse of the drudgery of increasing work and the cruelty of drivers, the horse is being advanced to a higher plane of utility and luxury. There is no longer a demand for the cheaper grades of street-car horses. The African war took several thousand, but the armies of the world call for the better class of horses. The old cab horse, that stands in the streets day and night, is being supplanted by automobiles in cities where good pavements prevail, just as the horse was relieved from the street cars by electricity; thus, step by step, the horse is being advanced, and we welcome every improvement in mechanical power as a blessing to the horse.

The growth of our cities and industrial centers increases the demand for horses of a better class. The big draft teams in our city streets indicate the prosperity in this country; and it is the ambition of our manufacturers to get the finest draft horses to be had. While our merchants and express companies are increasing the number of handsome active horses, the grocers and tradesmen utilize many of the cheaper animals. While a few wealthy people own an automobile they must have fine horses, and with the cheap price of vehicles in America, with so many big factories, almost everybody has a horse and buggy, surrey, or carriage, while all who can afford it have handsome coach and carriage horses—the prices of which are higher than ever before known. The demand for all the better classes of horses is far greater than the supply, because our farmers became discouraged six or eight years ago, and quit breeding, when panic prices were below cost of production, and the fear that the bicycle and electricity would soon displace the horse.

With the return of prosperity came the increased demand for horses, but a higher class and at higher prices. We now have an era of industrial horses and horses of luxury, never before known in the history of this country. After our civil war in 1865, we discovered we were horse poor, with millions of little trotters, mules and ranch ponies. We began importing draft horses, and later the large handsome coach horses, to increase the size and utility of our American horses. We imported these animals by the thousand from Europe to improve our own, more liberally than any nation has ever imported any pure breeds of stock, and when prices dropped the export buyers took 50,000 to 75,000 a year to Europe, until our prices last year got so high that they could handle but a few.

With the revival of commercial prosperity came the increased demand for good horses; and with no breeding for a few years, the horse buyers soon culled out the good horses, and we are now in the midst of a horse famine.

Farmers rallied to horse breeding as prices advanced, and our importers are again annually importing shiploads of pure-bred stallions of the Percheron or French draft breed, known in the cities as the Normans; from France some of our importers brought 200 last year, and brought still more this year. The importations of Belgians, English Shires and Scotch Clydesdales are all increasing for our draft horse production, while our importations of French coach, German coach and hackney horses is annually growing.

Eight to ten years ago, these stallions would not sell for more than $200 to $500; now they readily sell at $2,000 to $5,000—ten times as much. They are chiefly bought by companies organized to improve horse breeding in different localities of the horse-breeding States: Ohio, Indiana, Illinois, Iowa, Kansas, Nebraska, Minnesota, Wisconsin, Michigan and Missouri. The little American trotter, while the fastest horse in the world, bred for speed, but lacking the size and beauty of carriage and coach horses, is relegated to the sporting racetrack, much as the thoroughbred is fit only for racing. The draft horse is now the most profitable and most popular horse with the American farmer, who requires a good draft team for his farm work. The little trotters are increased in size and utility by crossing with the large handsome coach horses.

The whole world wants more good horses. England, France and Germany cannot supply their cities and their armies. Russia, with 25,000,000 horses, has no good horses for export. America is the only country from which large supplies may be had, and when our increased horse production begins to mature, we can supply the world as well as our own increased market interests in all our growing cities. The export trade will always maintain good prices for our horses, and while many farmers may still raise scrubs, the enterprising American farmers get the best improved horses to be found in the horse-breeding countries of the old world. Now they breed to suit the market demand for high-class horses to supply the markets of the world.

SOME OLD SHIPS.

Investigations recently made show beyond a doubt that the oldest warship extant is the "Victory," Admiral Nelson's flagship at the battle of Trafalgar. The "Victory" was launched in 1765, and is now 137 years old. She has passed many a year tied up to her dock at Portsmouth, and the tooth of time has left its destructive mark upon her. Not so long ago the British Admiralty spent a considerable sum of money in saving the old ship from ruin.

As a general rule, the lifetime of a ship built of the very best material scarcely exceeds 120 years. To be sure, there are exceptions. Perhaps the most remarkable of these is the case of the whaler "True Love," of Hull. The "True Love" was a bark of 248 tons, and was built in Philadelphia in 1748. After she had sailed for a few years under the American flag, she was purchased by an Englishman and converted into a whaler. When she was 97 years old, old enough to be retired, she still voyaged to the Arctic Ocean. After changing hands once again she was still in active commission for forty-four years as a carrier of wood in the Baltic Sea. Finally, after an active life of 139 years, she succumbed to the inevitable ax.

Still another hoary ship was the sailing vessel "Betsey Cains." The exact date of her launching is not known. But it is definitely recorded that in 1688 she bore the name "Princess Marie," and had the honor of carrying Prince William of Orange to England. She was then used for a time as a pleasure yacht by Queen Anne. After her period of royal usefulness had passed, she was sold and rechristened "Betsey Cains." Her end was pathetic. She was shipwrecked at Tynemouth in 1827, after she had carried the English flag uninterruptedly for 139 years.

A long life was also granted to the three-masted schooner "Three Sisters," a contemporary of the "Betsey Cains." She had taken part in 1689 in the siege of Londonderry. At the beginning of the last century, after she had attained the respectable age of 130, she was still voyaging in the Irish Sea.

In an account of old ships the brig "Brotherly Love," which carried Capt. Cook on many a notable voyage should not be omitted. After a service of 140 years she sank in a collision in the harbor of Hamburg.

In November, 1892, the Danish ship "De Tree Sostrene" cast anchor in the harbor of Dundee. Some curious person hit upon the idea of looking up the history of the vessel. The investigation proved that the Danish ship was built in 1772 in Rudkjöbing, and was at that time 120 years of age.

The "Success," which voyaged from one English port to another, was launched in 1789. As late as 1895 she made a voyage to Australia, and later crossed the Atlantic Ocean.

An investigation carried out some time ago by the shipping register officials of Great Britain showed that on their books were recorded twenty-four English ships over a hundred years old, and thirteen over ninety-five years old. A ship twenty-six years old was reckoned "middle age."

It is, of course, difficult to ascertain what is the maximum term of service of a steamship under the most favorable conditions. It is remarkable, however, that of the steamers built from 1815 to 1830, not a single one seems to be in existence. This is, perhaps, due not so much to a lack of endurance in the steamship as to the fact that the cost of running a modern vessel is less than that of an old-timer. The oldest vessel of the English merchant fleet is the sidewheeler "Sir Charles Ogles," of Halifax, built in Dartmouth in 1830. The oldest English iron steamer is the Cardiff ship "Swift," which is now 71 years old, and is still in active service.

A NEW FORM OF RADIATION.

In a paper read before the Académie des Sciences, M. Albert Nodon describes his researches upon actino-electric phenomena. He finds that when luminous or ultra-violet rays are projected on a thin conducting plate they give rise, on the non-lighted face, to radiations, which are analogous to X-rays or those of radium. The phenomena may be observed by a simple arrangement consisting of a small box of blackened zinc, having a movable slide on one side, on the other a door, and an opening in the bottom. The box is placed upon a gold-leaf electrometer with single leaf, inclosed in a Faraday wire cage. The box contains a brass sphere, insulated, which when charged forms a condenser with the walls of the box, and the variations of charge are observed by the gold-leaf of the electrometer. The metal box is light-tight and con-

nected to earth. The movable slide is formed of interchangeable plates of thin metal. If a luminous beam is now projected on the metal slide, it is found that the inner sphere becomes discharged. When a water-screen is inserted to cut off the heat, the effect is not changed. The discharge of the sphere is more rapid as the light is stronger and contains the smaller wave-lengths. An arc formed between graphite rods with aluminium cores gives a strong effect, on account of the ultra-violet rays. The discharge of the sphere ceases as soon as the passage of the light is interrupted by a screen of ebonite, etc. The effect may also be observed by reflection, and if a lead plate is placed near the box and the light reflected from its internal face, it discharges the sphere. It thus appears that a certain kind of radiation takes place within the box, coming from the inner surface of a metal plate which is lighted from the outside. This radiation will pass through a thin metal plate interposed in its path, and also through black cardboard, wood, glass and other bodies. It produces the discharge of electrified bodies, as in the case of the sphere, but does not seem to produce a fluorescence or to act upon a photographic plate, at least for short exposures. These rays differ from the cathode rays, since they traverse the metals and cardboard. They seem to have properties intermediate between the X-rays and radium rays.

THE HEAVENS IN AUGUST.

BY HENRY NORRIS RUSSELL, PH.D.

The change in the aspect of the heavens from month to month is not great, so that a description of their appearance at any time has of necessity much in common with that of the month before. We recognize this as we study the August skies. Vega, which a month ago was some way east of the zenith, is now almost exactly overhead, and Arcturus is more than half way down toward the western horizon. Hercules and Corona lie between these two stars, and Ophiuchus to the southward. Below is Scorpio, rapidly sinking to the horizon. Libra is west of it, with Virgo setting beyond. Draco is above the pole on the left, and Ursa Major below.

The Milky Way arches right across the sky. At its northeastern base Perseus is rising. Above it are Cassiopeia and Cepheus, and then Cygnus, nearly overhead. To the south we reach Aquila, and finally Sagittarius, at the other foot of the arch.

Andromeda and Pegasus are near the Galaxy in the northeast, and Capricornus and Aquarius occupy the dull southeastern sky.

Saturn is about an hour east of the meridian, and may be recognized by his brightness—he is of the first magnitude—and his yellow color. Jupiter is about an hour farther east. As he is ten times as bright as anything else in the sky, there can be no mistaking him.

Before it passes out of sight let us take the opportunity to look at one of the very few stars of whose real dimensions we have any knowledge. This object—Delta Libræ—may be found as follows: Some 15 degrees west of the head of Scorpio are a pair of fairly conspicuous stars—Alpha and Beta Libræ. Delta Libræ lies to the left of Beta, which is the upper one of the two, at about one-third the distance of Alpha and about as far from the latter as Beta itself.

It is normally of the fifth magnitude, but at intervals of 2 days 7 hours and 51 minutes it drops below the sixth magnitude, and disappears to the unaided vision. As this period is very nearly one-third of seven days, the minima occur on the same days of the week for some time. At present the best observable ones occur late on Sunday evening near midnight. As the star begins to fade about six hours before the minimum, its loss of light should be easily detected before it sets.

There are about twenty other stars that behave like this one, showing a generally constant brightness, interrupted at regular intervals. They form a well-defined class of variable stars, known as the Algol variables, from their most conspicuous member.

In explanation of their behavior it was long ago suggested that they were attended by dark companions which eclipsed them at every revolution. In the case of some of the brightest of these stars the "eclipse theory" has been strikingly confirmed by the spectroscope.

Delta Libræ is the latest addition to this class. Photographs of its spectrum, taken last spring at the Yerkes Observatory, show that the star is receding from us before minimum and approaching us after it, just as it should do on the eclipse theory. The results so far published, though insufficient to determine the orbit with accuracy, show that the orbital velocity of the bright star is about 90 kilometers, or 55 miles, per second.

Multiplying this by the number of seconds in the period, we find that the orbit of the bright star about the center of gravity of the system is some 11,000,000 miles in circumference, so that the distance of the star's center from the center of gravity is about 1,750,000 miles. How far away the dark companion is on the other side we do not know; but we have this basis for conjecture. At minimum Delta Libræ loses about two-thirds of its light. The eclipsing body, therefore, obscures two-thirds of the area of the bright star. If the eclipse is annular the area of the dark star is two-thirds that of the bright one, its diameter consequently about four-fifths as great, and its volume a little over half as much. But if the eclipse is partial the dark star may be as large as the bright one or larger.

What kind of eclipse really occurs can be determined by exact observations of the star's brightness.

In the absence of data on the subject we will assume an annular eclipse. If the stars are of equal density the mass of the dark one will be about half that of the bright one. It must then be twice as far from the center of gravity, that is, 3,500,000 miles. The centers of the two stars would then be a little over 5,000,000 miles apart.

Since the eclipse lasts 12 hours, while the period of revolution of the stars is 56 hours, they must describe about 80 degrees of their orbit during eclipse. A simple geometrical construction shows that the sum of their radii must be about six-tenths of the distance of their centers, that is, in this case, some 3,000,000 miles.

Bearing in mind the ratio of the areas of the two stars, we find for the *diameter* of the bright star the value 3,300,000 miles, nearly four times that of the sun, and for the dark one 2,700,000 miles.

This result depends on the assumption we have made. If we had assumed the two bodies to be equal in size and mass we should have found their diameters to be about 2,200,000 miles.

In any case, it is evident that this inconspicuous star is really much larger than our sun.

THE PLANETS.

Mercury is in superior conjunction with the sun on the 10th, becoming an evening star, but is too near him to be seen this month.

Venus is morning star, rising about two hours before the sun.

Mars is morning star in Gemini. On the 1st he is close to Venus, but by the end of the month he rises an hour before her.

Jupiter is in Capricornus. He is in opposition on the 5th, and, with his satellites, is a splendid object in the smallest telescope.

Saturn is in Sagittarius, well observable in the early evening.

Uranus is in Ophiuchus, and is due south at 7:30 P. M. on the 15th.

Neptune is in Gemini, observable before sunrise.

THE MOON.

New moon occurs on the afternoon of the 3d, first quarter on the night of the 10th, full moon on that of the 18th, and last quarter on the morning of the 26th. The moon is nearest us on the 1st, farthest off on the 13th, and nearest again on the 29th. She passes Mercury on the 3d, Uranus on the 13th, Saturn on the 16th, Jupiter on the 17th, Neptune on the 28th, Mars on the 30th and Venus on the 31st.

SPONGE FISHING IN THE LEVANT.

Greek and Turkish sponges have been known to the trade for hundreds of years. Syria furnishes perhaps the finest quality, and shipments are made from Tripoli and Latakia to Paris, London, Trieste, Hamburg, New York and Piræus. During the last fifteen years, however, the output has greatly diminished, owing to the introduction by Greeks, in the seventies, of diving apparatus, which proved ruinous to fishermen and fisheries alike. It is estimated that the annual exportation of Syrian sponges at present hardly exceeds $85,000 in value. In the adjoining territorial waters of Cyprus, sponge beds are being worked with varying success. Sponges were exported from that island in 1898 to the amount of $10,425, and in 1899, $28,835 worth were shipped. Egypt, Barbary, Crete, Rhodes, Samos, Calymnos, and other islands of the Turkish and Greek archipelagoes also produce sponges for export. A large share of this trade was formerly in the hands of merchants with headquarters in Symrna and Trieste, but it is now centered in London and Piræus. The United States annually buys sponges abroad to the amount of about $500,000, the principal shipments proceeding from Nassau (Bahama Islands), London, and Piræus.

The highest grades of sponges—the softest and finest in texture—are found principally in the Mediterranean. Some of the cheaper varieties are also found there, but none like those taken in Florida or Cuban waters. All through the Mediterranean, except the western half of the northern shore, three species of sponges prevail at a depth of 2 to 100 fathoms, viz., *Euspongia officinalis*, *Hippospongia equina*, and *Euspongia zimocca*.

In collecting the sponges four methods are employed—harpooning, primitive diving, dredging, and diving with special outfit.

With harpoons one of the chief difficulties is to see the bottom clearly through a troubled sea. To obviate this a wooden or zinc plate cone, like a water bucket, open at the top and with a glass bottom, is used. On looking through this water glass, which is partly submerged, the bottom of the sea may be clearly studied even at thirty fathoms and the proper sponges picked out by the harpoonist.

The primitive method of diving, with no other apparatus than a slab of stone as a sinker and a cord to communicate with the surface, is most popular in the Levant. On reaching the bottom the diver hastily snatches up as many good sponges as possible, and, after remaining under water from one to two minutes, tugs violently at the cord and is drawn to the surface. The sponges are collected in a net which the diver carries around his neck.

At greater depths, particularly along the coasts of Asia Minor, dredging is employed usually in winter, when storms have torn up the seaweeds which cover the bottom.

To these simpler operations was added some twenty-five years ago the "skafander," or diving apparatus, which enables the diver in his submarine dress to spend an hour under water at a depth of from ten to fifteen fathoms. Experience has shown that the employment of the last two methods is a severe tax upon the sponge banks, as everything in sight—sponges large and small—is gathered. Germs and seeds also suffer greatly, and it takes years before a new crop matures. The fishermen who use the skafander are frequently stricken with palsy of the lower extremities, stricture, and other complaints.

The abuses which so disastrously affect the Levantine sponge industry have prompted a Russian philanthropist, Prof. Charles Flégel, to inaugurate a campaign for the abolition of diving apparatus in sponge fishing. Through his efforts the authorities of Samos, Crete, and Cyprus have prohibited the use of the skafander; also the governments of Italy and France, the latter acting in behalf of Tunis. The question is also being agitated in Egypt. It is said the matter will be taken up and discussed at the International Fisheries Congress, which is to be held in St. Petersburg in February and March. If the Turkish government joins the crusade the skafander will most likely have to go, and, in the absence of this "engine of destruction," a new era may dawn for sponge fishers and sponge fisheries in the Levant.

As far as known no steps of importance have been taken to protect the sponge beds in Turkish waters. A close season has been proposed, but has not been established by law. The government collects from each boat using the harpoon or the primitive diving system 319 piasters gold ($14.03) a year. A skafander boat pays $145.20 per season, and its operations are limited to eight months in the year, beginning April 1. From the drag-net boat a license fee of $22 is exacted.

At present only occasional shipments of Syrian sponges go direct to the United States. Considerable quantities, however, are bought in London and Piræus. Along the Syrian littoral the demand of merchants, especially for white sponges, exceeds the supply, and prices naturally have an upward tendency. This, in connection with West Indian competition, hinders trade with America. The introduction of antiseptic surgery has also decreased the urgent demand for the Turkish article. With the advent of regular, direct steamship facilities, however, it is likely that Syrian sponges will find a fairly responsive market in the United States. Importers are referred to Dr. Harris, United States consular agent, Tripoli, Syria.—G. Bie Ravndal, Consul at Bierut.

VAPORIZATION EXPERIMENTS.

The experiment of freezing water by its own evaporation is more often described than performed, as it succeeds only with an unusually good air pump. A similar experiment with melted camphor is less impressive in one way, for the temperature required to freeze the camphor is not very low, but the experiment is far more showy, can be exhibited to a greater number at once, and is very easy to perform. A very slight diminution of pressure brings the boiling point below the freezing point, so that if a flask or test tube of melted camphor be connected to an air pump, and but one or two strokes taken, the liquid will boil under the reduced pressure, and almost immediately flash into a bulky, porous, solid mass, puffed up by the vapor that was coming off during the act of solidification.

By heating the camphor under diminished and varying pressure it is easy to change at will from sublimation to distillation. If a cold rod is thrust down a test tube in which camphor is boiling, the cooler vapor in the upper part of the tube condenses on the rod in sparkling crystals, like frost, while lower down the hotter vapor is condensing to liquid. In fact, camphor may be made to illustrate, not only the appearance, but the true cause of formation of frost, snow, etc., while, in its pleasant odor, it has an advantage over many substances used in experiments of this kind.—W. P. White, University of Wisconsin.