weighing from a few pounds up to one hundred pounds each, was found in decomposing granite in Chestnut Hill township, Ashe County, N.C. One mass of twenty and one-half pounds was absolutely pellucid, and more or less of the material was used for art purposes. This lot of crystal was valued at $1,000.

In Arkansas, especially in Garland and Montgomery Counties, rock crystals are found lining cavities of variable size, and in one instance thirty tons of crystals were found in a single cavity. These crystals are mined by the farmers in their spare time, and sold in the streets of Hot Springs, their value amounting to some $10,000 annually. Several thousand dollars' worth are cut from quartz into charms and faceted stones, although ten times that amount of paste or imitation diamonds are sold as Arkansas crystals.

Rose quartz is found in the granitic veins of Oxford County, Me., and in 1887, 1888, and 1889 probably $500 worth of this material was procured and worked into small spheres, dishes, charms, and other ornamental objects.

The well-known agatized and jasperized wood of Arizona is so much richer in color than that obtained from any other known locality that, since the problem of cutting and polishing the large sections used for table tops and other ornamental purposes was solved, fully $50,000 worth of the rough material has been gathered and over $100,000 worth of it has been cut and polished. This wood, which was a very prominent feature at the Paris Exposition, promises to become one of our richest ornamental materials.

Chlorastrolite in pebbles is principally found on the inside and outside shores of Rock Harbor, a harbor about eight miles in length on the east end of Isle Royale, Lake Superior, where they occur from the size of a pin head to, rarely, the size of a pigeon's egg. When larger than a pea they frequently are very poor in form or are hollow in fact, and unfit for cutting into gems. They are collected in a desultory manner, and are sold by jewelers of Duluth, Petoskey, and other cities, principally to visitors. The annual sale ranges from $200 to $1,000.

Thomsonite in pebbles occurs with the chlorastrolite at Isle Royale, but finer stones are found on the beach at Grand Marais, Cook County, Minn. Like the chlorastrolites, they result from the weathering of the amygdaloid rock, in which they occur as small nodules, and in the same manner are sold by jewelers in the cities bordering on Lake Superior to the extent of $200 to $1,000 worth annually.

In New York there are sixteen firms engaged in cutting and recutting diamonds, and in Massachussetts there are three. Cutting has also been carried on at times in Pennsylvania and Illinois, but has been discontinued. In 1889 seven of the New York firms ran on full time, but the others were unemployed, respectively, 14, 50, 61, 120, 125, and 240 days, owing to inability to obtain rough material at a price at which it could be advantageously cut. The firms that were fully employed were generally the larger ones, whose business consisted chiefly in repairing chipped or imperfectly cut stones, or in recutting stones previously cut abroad, which, owing to the superior workmanship in command here, could be recut at a profit, or in recutting very valuable diamonds when it was desired, with the certainty that the work could be done under their own supervision, thus guarding against any possible loss by exchange for inferior stones.

The industry employed 236 persons, of whom 69 were under age, who received $148,114 in wages. Of the nineteen establishments, sixteen used steam power. Foot power is used in only one establishment. Three of the firms are engaged in shaping black diamonds for mechanical purposes, for glass cutters and engravers, or in the manufacture of watch jewels.

Beginning in the latter part of 1888, and through 1889, there was a marked increase in the price of rough diamonds, resulting in rapid advances of from 20 to 25 per cent at a time, amounting in all to an advance of from 80 to 100 per cent above the prices of the previous years.

The importation of rough and uncut diamonds in 1880 amounted to $129,207, in 1889 to $250,187, and the total for the decade was $3,133,529, while in 1883 there were imported $443,996 worth, showing that there was 94 per cent more cutting done in 1889 than in 1880, but markedly more in 1882 and 1883. This large increase of importation is due to the fact that in the years 1882 to 1885 a number of our jewelers opened diamond-cutting establishments, but the cutting has not been profitably carried on in this country on a scale large enough to justify branch houses in London, the great market for rough diamonds, where advantage can be taken of every fluctuation in the market and large parcels purchased, which can be cut immediately and converted into cash; for nothing is bought and sold on a closer margin than rough diamonds. There has been a remarkable increase in the importation of precious stones in this country in the last ten years. The imports from 1870 to 1879, inclusive, amounted to $26,698,203, whereas from 1880 to 1889, inclusive, the imports amounted to $87,198,110, more than three times as much as were imported the previous decade.

THE PENINSULA OF KAMTCHATKA.[1]

THOUGH this country passed in 1696 into the hands of the Russians, it is still one of the least known parts of their empire. Professor Umlauft gives its area as 104,200 square miles. It is traversed along its whole length by a mighty chain of mountains, which rise into the regions of eternal snow. On the eastern side are numerous volcanoes, of which twenty-one are now active. Dittmar's map (1850) shows only twelve active volcanoes, from which it may be inferred that the subterranean forces have developed a large amount of energy since his time. At the southern extremity of the peninsula numerous isolated volcanic cones rise from the low ground, of which the Apatcha only is active. To the north of this mountain the country begins to rise, and at length two chains are formed, of which the western extends through the whole peninsula. Only one volcano, the Icha, is situated actually within the range, but several others lie between it and the western coast. Below the 57th parallel the river Tigil has eroded a narrow valley through the range, and a little further north a deep depression interrupts the continuity, but the elevation soon increases again, and is continued in the Voyampolka Mountains. The eastern range is far shorter, extending only to the 55th parallel. It also contains only one volcano; but the short range which runs off from it in a south easterly direction to Cape Shipunskie contains several, among them the Koryaka, which attains a height of 11,218 feet. They are particularly numerous in the elevated country which adjoins the eastern range, and entirely fills the space between the middle and lower Kamtchatka River and the eastern coast. Here stands the Klutshef, the culminating summit of the peninsula, 15,757 feet high. On the left bank of the Kamtchatka the Timaska, a low chain with rounded summits, runs eastward, and is joined on the north by the Novikofskaia Vershina, ending in Cape Stolbovi. Beyond the 57th parallel northwards there is only the one range. Numerous hot springs testify to the volcanic character of the eastern part of Kamtchatka. Dittmar found the temperature of a spring near the Mikishina to be 120° F. on Dec. 16th, when the temperature of the air was —11°. Owing to the great atmospheric moisture and the abundant rainfall, the country is irrigated by numerous rivers, of which the Kamtchatka is the largest. The Shupanof, on the east, and the Bolshaya, Icha, and Tigil, on the west, are also important streams. The climate is changeable and severe, and much colder than that of countries in the same latitude on the other side of the Old World. When Dittmar visited the country, there was ice in May on an inlet of Avatcha Bay, and on the west coast, which is much colder, the thermometer stood at sunrise on Aug. 2d at about 34° F. In winter, temperatures of —40° and lower were recorded. The snow-line lies at a height of about 5,300 feet.

In Kamtchatka, as in central Siberia, the vegetation is surprisingly exuberant. Rich meadow-land alternates with dense woods, composed, in the south, of poplars, willows, and birches. Where the woods are thin, bushes grow freely, and flowering plants bedeck the ground. Wild animals are abundant, and hunting and fishing are the chief means of procuring food. The most important game are wild reindeer, wild sheep, hares, otters, sables, and ermine. Bears, wolves, and foxes are also numerous. Of birds, heathcock,

[1] From the Scottish Geographical Magazine, April, 1891.

swans, geese and ducks, and sea-fowl may be mentioned. In the southern rivers salmon is plentiful.

The southern part of the peninsula is inhabited by Kamtchadales, numbering some 4,000 souls. They have submitted to Russian influence, and are Christians in name, but still cling to the rites of Shamanism. Their mud huts have given place to houses, round which gardens are laid out. They keep cattle and a few horses and fowls, but neither sheep nor pigs. In the north about 3,000 Koriaks live, who are still in a primitive state, and subsist on the produce of the chase and fishing. Their most important domestic animals are dogs, which draw their sleighs.

THE MEAN COAST-DISTANCES OF CONTINENTS.

THE proximity of countries to the sea has a most important bearing on their climate, commercial development, etc., and therefore the problem of ascertaining the relative advantages in this respect of different parts of the world has long attracted the attention of geographers. In *Petermann's Mittheilungen*, Bd. 36, Nos. 3 and 4, Dr. Carl E. M. Rohrbach explains a new method of solving the problem, in which the mean distances of the continental lands from the coast play an important part. As quoted in the *Scottish Geographical Magazine*, he shows, as a preliminary investigation, that the mean distance of a circle from the circumference is one-third the radius, and that this distance is the same for a square, or other rectilinear figure, circumscribing the circle. It is found by integrating the product of an elementary area into its distance from the perimeter and dividing by the whole area. The process is, therefore, similar to that of finding the centre of gravity of the area, and, accordingly, the value may be very simply found by dividing the circle or square into indefinitely small triangles by radii drawn from the centre, the centres of gravity of which are, of course, at one-third of the radius from the perimeter. From this result Dr. Rohrbach deduces the mean distance for a rectangle, and shows how to find it for a *calotte*, or the spherical area contained by a small circle of a sphere. Even for a large *calotte* it differs very little from that of a circle of equal area. These investigations prove that of all figures containing the same area the circle and its circumscribed figures are those in which the distances from the perimeter are greatest, and this proposition is exhibited in a convenient form by means of curves, in which the abscissæ are proportional to the areas, and the ordinates to the distances from the perimeter. In the diagram thus constructed the curve (a parabola, of course) for the circle lies outside all the others, and as the area deviates more and more from the circular form, its curve approximates more closely to a straight line. Owing to this property the circle gives a convenient standard for mean distance from the coast, as will be seen presently.

In dealing with continental areas Dr. Rohrbach draws contour-lines on a map parallel to the coast-line at certain chosen intervals, and measures the areas contained with a planimeter. If great accuracy be desired, the lines must be traced on a map in which there is no distortion, and then transferred for measurement to an equal-area map, but in a first essay, to demonstrate the applicability of the method and the value of its results, Dr. Rohrbach considered Bonne's projection sufficiently accurate for tracing the lines as well as for measurement. A map of the world and another of Europe are appended to the article, on which the contour-lines are drawn, and the coast-distance of the areas between them denoted by different colors. The relative conditions of the continents are also shown, both by rectangles of which the bases are proportional to the areas, and the altitudes to the mean coast-distances, and also by curves — *chorigraphic*, as Dr. Rohrbach calls them — where the ordinates represent the coast-distances corresponding to the areas indicated by the abscissæ. Tables are given showing the areas lying beyond different distances from the coast in the various continents, both in square kilometres and in percentages. The following shows the mean coast-distances: Europe, 208 miles; Asia, 482 miles; Eurasia, 433 miles; Africa, 417 miles; Australia, 214 miles; North America, 292 miles; South America, 343 miles; the five continents, 381 miles.

As a measure of the accessibility of continents from the coast, Dr. Rohrbach proposes the quotient obtained by dividing the mean distance in a circle, or in a *calotte*, of equal area by the actual mean distance, and gives the numbers in the latter case, but the result is scarcely satisfactory. As he himself points out, Eurasia appears to greater advantage than Europe, because the mean distance in the *calotte* is calculated as though sea instead of land lay to the east, and thus the quotient is increased. It is also startling to find North America represented by a higher figure than Europe, and the five continents by a number more than twice as great. It is easy to see that these discrepancies arise because the numbers represent only the advantage each continent derives from its actual shape compared with its accessibility if formed into a *calotte*, and do not indicate the relative accessibility of the continents. A more correct idea is obtained by taking the mean coast-distance (1,416 miles) in a *calotte* of area equal to that of the five continents, or the actual mean distance (381 miles), as unity. In the latter case the numbers are as follows: Europe, 1.83; Asia, 0.79; Eurasia, 0.88; Africa, 0.91; Australia, 1.78; North America, 1.30; South America, 1.11; the five continents, 1.00.

Dr. Rohrbach claims that his method is superior to those before employed, because the mean coast-distance is a quantity admitting of simple definition, and not deduced by any artificial means from the geometrical forms. Its value also is easily reckoned, and can be worked out to any desired degree of accuracy, maps of various scales being employed according to the extent and configuration of the countries under examination. In almost all other methods the length of the coast-line has been used, the estimation of which leaves much room for speculation, causing great uncertainty in the results. In the present method this quantity is not needed, and yet the meanderings of the coast-line exercise their due influence on the curvature of the contour-lines, as may be clearly seen on the map of Europe already alluded to. And not only is the method applicable to purely morphological investigations, but charts may also be constructed, showing the relative conditions of the various parts of a country with regard to means of communication. Thus, an ice-bound coast may be treated as an inland boundary, and, where a chain of mountains intervenes, the contour-lines may be drawn so that their normals run to the sea past the extremities of the chain, or converge to the passes. Navigable rivers, railways, etc., may also be taken into account, and also the elevation, etc., charts being constructed to show the work required to transport a unit weight of goods, say a hundredweight, from the coast. Each contour-line in such charts will pass through all places to which the labor of transport is the same, and will therefore resemble an isobar or isotherm.

BOOK-REVIEWS.

Grammatica elementar do Kimbundu. Kimbundu Grammar. Por HELI CHATELAIN. Genebra, 1889.

La Lengua Cunza. Por FRANCISCO DE SAN-ROMAN. Santiago de Chile, 1890.

Kreolische Studien. Ueber das Malaisportugiesische von Batavia und Tugu. Von HUGO SCHUCHARDT. Vienna, 1891.

Etudes de Grammaire Comparée. De la Categorie des Modes. Par RAOUL DE LA GRASSERIE. Louvain, 1891.

THIS batch of recent linguistic works, in widely diverse fields, is but a faint indication of the activity in this branch of scientific research.

Mr. Chatelain has been connected with the American mission in south-west Africa, and his grammar of the Kimbundu, a member of the wide-spread Bantu group, has particular interest, not only for its practical value in missionary work, but because the Smithsonian Institution is about to publish the author's collections of folk tales and legends in the original tongue, together with translations and notes.

The Cunza language is spoken by a native tribe on the south-west coast of South America, at the northern border of the Desert of Atacama. It is supposed by the eminent linquist von Tschudi to be the ancient Calchaqui. Although San Roman does not furnish a full grammatical view of the tongue, we are glad to have even his incomplete notes, as heretofore there has been absolutely nothing on its grammatic structure.