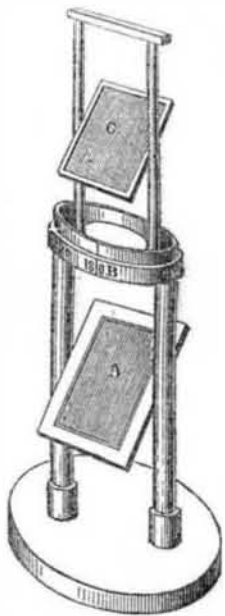


Imponderable Agents.—No. 9.
[Second Series.]

POLARIZATION OF LIGHT—Various mechanical arrangements have been invented for the illustration of this remarkable property of light; the polariscope of M. Biot, introduced in 1824, is perhaps the best of its kind. The annexed figure will explain this apparatus. A, is a frame containing a number of plates of glass placed parallel with each other, and termed the polarizing glass; it is swung on two side pillars, in the fashion of a mirror. The tops of the two side pillars carry a circular ring of wood, B into which is loosely fitted a moveable upper circular disc of wood, with a central opening. This upper disc again carries two light pillars, supporting a second frame, C, containing a sheet of glass, painted on the back with lamp black, termed the analyzing glass. The upper wooden ring has an index placed opposite to the middle of the analyzing glass, so as to point to graduations on the outer or lower ring, B. The substances to be submitted to the action of polarized light are placed over the hole in the upper ring, by a small disc of glass forming a supporting stage.



To show the difference between polarized and common light, the polarizing and analyzing glasses are set with their faces parallel to each other, as represented in our figure, and a ray of light, whose angle of incidence is 56° , is allowed to fall upon the polarizing plate, so that it may be reflected to the analyzing one above.—Supposing, now, that the analyzing plate is turned slowly round, the reflected light upon it will become gradually fainter, until it has been turned 90° , when the light will be barely visible. If the motion is still continued onwards, the light will again become brighter until it reaches the opposite 90° , at which point its intensity will be the same as at first. At 0° , and at 180° , the intensity is greatest; and 90° and 270° , it is least. If we suppose the polariscope to be placed with B, pointing to the south, it follows that when the north or south side of the ray, reflected from the polarizing plate, is towards the analyzing plate, the plate reflects it as a common light; but when the east or west side is nearest the analyzing plate, it is incapable of reflecting the light, and at the intermediate points different degrees are reflected, showing the difference existing between polarized and common light. So far as we at present know, light, in polarization, undergoes no other change than such as is caused by reflection; therefore we come to the conclusion that light is polarized by reflection from glass at an angle of 56° , water $52^\circ 45'$, and so on according to the substance used. The fact of the refusal of polarized light to be reflected from the surface of a transparent substance, when it is incident of an angle of 56° , and that it is the same in two positions at right angles to each other, is a clear test of polarization.

The laws of the polarization of light form a distinct science of vast extent and beauty; for, though this property (first observed by Newton) was never experimented on till the present century, yet during this short time discoveries have thickened, and have led, step by step, to higher and higher generalizations, till at length the late French mathematician, Fresnel, was

enabled, by a magnificent theory, to bring all these complex and wonderful phenomena under the simple laws of mechanics.

Perhaps the most important rule respecting polarization is, that light coming directly from a source, as the sun or a candle, never possesses this property, while that which has been reflected always possesses it more or less. It is very singular that a ray once polarized retains that property during all its subsequent course, whether that be for inches, miles, or billions of miles. Thus, with no other apparatus than a fragment of a crystal, we may examine the polarizing effect of the far distant surface of the planet Saturn as readily as that of the page before us.—We may ascertain whether a star at the outskirts of the visible universe shines by its own or by reflected light. In this way Arago has proved that, in some of the binary systems, the two stars are two suns, while in others the smaller is only a vast planet reflecting the light of the larger. In this extraordinary observation we cannot fail to be struck with the great disproportion between the means of observation and the fact observed,—and especially with the astounding universality of this agency, light, which at once pervades galaxies and penetrates between atoms.

We have presented no small amount of information on the polarization of light, because it is a subject not generally understood. Although these articles might be extended to a great length, we do not deem it prudent to occupy much more space with them at present, we will therefore conclude the series, in our next number.

Agassiz on the Races of Man.

We give the following from the Boston Traveller's report of Agassiz's lectures, delivered at Lowell, Mass.:

We next come to geographical distribution of the races of man; and here we must leave out of consideration all question as to the unity of the races. Professor Agassiz is conscious that his views, on some points, are not generally received, and he fully respects the motives which make the views of others almost sacred to them. He hopes that his views will be received in the same spirit as he represents them, viz: in the effort to arrive at truth.

We will first study the limits of the range of each race on the different continents, and must consequently eliminate every element depending upon migration, as the present American races. We are to consider the primitive location of the races, that is, the distribution of man as recognized by the earliest traditions.—The question is, where the race was originally placed, rather than what are the modern changes in their distribution.

The first race to be considered is one peculiar to the Arctic regions, a race different much from any inhabiting the temperate zone, and still more from those of the tropics. This race comprises the Esquimaux of this continent, the Laplanders of Europe, and the Samoyedes of Asia. They are all characterized by a broad face, short in its vertical diameter, a low forehead, and great length of body, when compared with the shortness of the legs. For more minute descriptions the works of Pickering and Prichard must be consulted. The distribution of the races correspond nearly to the zoological regions of the north.

The races of temperate zones are three.—The Mongolians in Asia, the whites in Europe, and the aborigines in America; and it is remarkable, also, that these races occupy the same territories as the faunas previously described. In Asia has been described the terrestrial Japanese fauna, the insular Japanese fauna, Chinese fauna, and the fauna of the Caspian regions, intermediate to that of Europe and Asia. Inhabiting precisely the same countries, are the Japanese, Chinese and Turks.

The Indians of North America are a distinct race, (on this point Prof. Agassiz disagrees with Dr. Pickering,) differing from the races of the Old World, as the inferior animals of North America differ in species from those of the Old World. It is only within a few years that the animals of North America have been considered not to be identical with those of Europe.—The aboriginal Indian race is identical, from the Arctic regions to Terra del Fuego, the only dif-

ference being one of tribes, not of races. These tribes are divided into an infinite number of small tribes, a fact perfectly in accordance with the distribution of the inferior animals upon this continent.

We have seen that a great Mountain chain, extending from the Canadas to Patagonia, connects North and South America, and produces a certain uniformity in their faunas; that their faunas are sub-divided into those of the Pampas, the Antilles, the Andes, the Southern States, the Middle States, the Canadas, the table lands west of the States, and those of Oregon and California. In the same manner the aborigines are sub-divided into a large number of small tribes, which are circumscribed within narrow limits. They form no great nations, as do the Chinese, Tartars and Japanese of the east.

The Caucasian race is widely distributed and divided into many nations. Those inhabiting the eastern part of Africa, the northern part of Arabia, Mesopotamia, Asia Minor, &c., all constitute different nations, with different languages. The Teutonic branch, including the German, Dutch, English, Danish, &c.; the Slavonian branch, including the Russian, Poles, &c., each have a nationality and language peculiar to themselves. But they all have a feature in common, viz: a noble expression of the face, above that of all other races, a mirror of the innermost movements of the soul, and it is this branch, also, which is capable of the highest moral culture, and the highest degree of civilization.

Africa has one characteristic race—the negro. But the interior of the great desert, Nubia and Abyssinia, have races different from the negro. The Hottentot lives at the south, and the western shores have their peculiar tribes. It was possible, even, during his recent visit to the Southern States, to recognise among the negroes those belonging to these several African tribes.

In the East Indies are three distinct species: the Malay, Telingan, and Negrillo, (like the negro, only dwarfish.) The Australian is a tribe peculiar to that country. The features are those of the negro, but the hair is straight and flowing. The inhabitants of Madagascar are a peculiar tribe, but our information concerning them is scanty. They are not negroes, but resemble more the inhabitants of the Sandwich Islands.

With these facts before us we can assert that there is a law of distribution of the human race, as well as of the inferior races, and that these laws are in accordance with each other.

The Island of Iceland.

The Island is divided into four districts, or Fiordnungs, which are administered by deputies. The ancient laws of the country are still chiefly used; but the law of primogeniture is not known, and land is held either in fee or under long leases from the Crown. The island appears to have been once covered with forests, which are, however, now nearly extinct; only a few dwarf birches and willows are seen, but no trees, and the people are dependant for fuel upon turf or peat. The poorer people suffer much from the severity of the climate and leprous disease, induced by the dirtiness of their habits, and the coarse unwholesome food on which they subsist. Their chief occupation is fishing and raising herds of cattle. In numbers they have greatly diminished; once there are said to have been 100,000 souls in the island; at present, however, the population is supposed not to exceed 48,000 persons. As a people, they are of mild, honest, and religious dispositions, and remarkably well educated, much superior knowledge being found among them which, considering the poverty of the country, is worthy of note. Parents, assisted by the parish priest, are the chief instruments of education, the latter acquiring their means of teaching at a sort of college, or high school, at Besasted, in the peninsula of Altanese. The Icelandic dialect, is (as well known) a variety of the great Indo-European family of languages, and belongs to the Scandinavian sub-division. An excellent grammar of it has been published by the celebrated Danish philologist, Professor Rask, who lived in Iceland for three years.—This dialect is called by the natives, "Iaengkarunga." The Icelanders were early famous for

their cultivation of literature, and the skalds, or the poets of the island, have obtained a European celebrity. Many, however, of the oldest songs have been oral, and, having never been committed to writing, have now perished.

Steamboat Inspection.

In November last the Supervising Inspectors of Steamboats, appointed under the Act of August 30th, 1852, met in convention at Cincinnati, and the report of their doings has just been published. It contains the following statistics of the several districts.

| LOCAL DISTRICTS. | No. of steam vessels that have been inspected and certificates granted. | No. of pilots licensed. | No. of engineers licensed. | Amount of tonnage inspected. |
|---|---|-------------------------|----------------------------|------------------------------|
| FIRST DISTRICT. | | | | |
| Portland, | 16 | 16 | 11 | 8,491 |
| Boston, | 20 | 24 | 19 | 8,568 |
| New London, | 16 | 18 | 7 | 4,926 |
| SECOND DISTRICT. | | | | |
| New York, | 135 | 161 | 365 | 52,229 |
| Philadelphia, | 36 | 60 | 80 | 14,560 |
| THIRD DISTRICT. | | | | |
| Baltimore, | 34 | 60 | 58 | 13,112 |
| Norfolk, | 8 | 14 | 14 | 2,164 |
| Charleston, | 18 | 32 | 52 | 6,865 |
| Savannah, | 8 | 10 | 20 | 2,496 |
| FOURTH DISTRICT. | | | | |
| New Orleans, | 87 | 226 | 333 | 26,100 |
| Mobile, | 24 | 102 | 107 | 4,800 |
| Galveston, | 4 | 15 | 17 | 512 |
| California and Oregon, (not organized.) | | | | |
| FIFTH DISTRICT. | | | | |
| St. Louis, | 83 | 302 | 254 | 27,712 |
| Memphis, &c. | 17 | 41 | 42 | 2,543 |
| SIXTH DISTRICT. | | | | |
| Louisville, | 72 | 170 | 263 | 19,758 |
| Nashville, | 14 | 70 | 83 | 3,401 |
| SEVENTH DISTRICT. | | | | |
| Pittsburg, | 83 | 148 | 184 | 18,392 |
| Wheeling, | 24 | 44 | 76 | 5,724 |
| Cincinnati, | 81 | 248 | 214 | 22,000 |
| EIGHTH DISTRICT. | | | | |
| Chicago, | 8 | 30 | 39 | 5,321 |
| Detroit, | 32 | 53 | 53 | 19,518 |
| NINTH DISTRICT. | | | | |
| Buffalo, | 40 | 99 | 86 | 25,600 |
| Cleveland, | 14 | 49 | 38 | 6,870 |
| Oswego, | 7 | 16 | 11 | 6,700 |
| Burlington, | 7 | 14 | 14 | 4,600 |
| Total, | 882 | 2028 | 2448 | 217,968 |

Lubricating Oils.

MESSRS EDITORS.—In my report upon the test of lubricating oils, published in No. 19 of the "Scientific American," instead of "Devlin & Co." I should have written "Delavergne & Yockney," manufacturers of oil under Cumberland's patent. The present firm is Yockney & Co., No. 67 Exchange Place, New York City. Please rectify my error, and oblige,

JOSEPH E. HOLMES,
Director of Machinery.
Crystal Palace, New York, Jan. 30, 1854.

A Baffling Illustration.

At one of his lectures, Dr. Boynton related that, wishing to explain to a little girl the manner in which the lobster cast the shell when it has outgrown it, he said, "What do you do when you have outgrown your clothes? Throw them aside, don't you?" "Oh, no," replied the little one, "we let out the tucks?" The Doctor confessed that she had the advantage of him there.

Railway Traffic in England for 1853.

From the traffic returns for the past year the total amount appears to be 17,180,530 $\frac{1}{2}$, on 7200 miles of railway, being at the rate of 2386 $\frac{1}{2}$ per mile.

A good cement for luting the joints of steam boilers, pipes &c., is made by mixing equal parts by weight of red lead and black oxyd of manganese in linseed oil, to render it of the proper consistency.