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SCIENTIFIC AMERICAN SUPPLEMENT

No. 949.

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THE TIFFANY GLASS EXHIBIT.

During the last few weeks an exhibition of colored glass work has been open to the public which has admirably illustrated what may be fairly termed a typical American industry. The Tiffany Glass Company have installed in their rooms in this city the leading articles of their Chicago exhibit. These comprise, as the main element, perhaps, the beautiful colored windows, although the use of glass mosaic in the way of pavements and screens, and in altar construction, was equally interesting.

In the old time methods colored glass windows were made from flat colored glass. This is cut into pieces of proper contour according to the design to be reproduced, and is then put together with lead strips. These strips are H-shaped in cross section, the glass panes entering the grooves. The strips after introduction of the glass, around which pieces they are closely bent, are soldered together at their intersections. Thus a design is produced all in flat transparent pieces, which are naturally of the most varied sizes and shapes. The design is traversed in every direction by the lines of lead, which have become one of the typical features of the objects.

In the Tiffany windows a most interesting departure from this is effected—the use of thick wrinkled glass is adopted to the greatest possible extent, and windows which as art objects fairly compare with the finest oil paintings are produced. Some notes of the mechanical process followed may be of interest.

From the factory of the firm glass sheets of various colors, opaline, enamel white, and of every conceivable tint, are received. This comes in irregular pieces, two or three feet in diameter, and has its upper surface deeply wrinkled. It is as if one poured out lead upon a marble slab and then trickled more lead upon the surface of the congealed mass. The different colors of glass have each their number.

A design for a window as handed to the workman tells him what colors to use. He attacks his stock of glass, picking out therefrom a piece of suitable color. This is not all; the wrinkles must accord with the design. Thus if the dress of a female figure is to be reproduced, one piece of glass after another must be examined until a proper lay of wrinkling is found. The portion of the glass suitable for the purpose may be in the center of a comparatively large piece. With a glazier's diamond the piece to be selected is scored around, and with a pair of pliers the workman breaks away the rest bit by bit, until he has left the desired part. The glass is so rough and strong that a clean diamond cut cannot be made. In this way the pieces are secured. The figure is built up by cementing these pieces against a sheet of glass, leaving space enough between the edges to represent the place for the lead strip. The care devoted to the wrinkled glass is shown in a white enamel glass, which is thrown into long rows of transversely wrinkled corrugations, which is used for feathers in the wings of angels.

The figure as thus put together lacks arms, face and feet as far as such are embodied in the design. These the artist has to paint on glass, which is then fired. Next the figure is dismounted, and put together finally with lead strips, and a superb effect is the result. The work of artist and mechanic has joined hands in the fullest sense of the term.

Besides windows, glass is applied to the production of other objects. The altar and accessories exhibited under the title of "The Chapel" exemplified the perfection to which iridescent glass mosaic has been brought. The altar, except for its marble slab or ledge, the pavement and steps leading to it, the pulpit, and even the bodies of the candles, are of glass mosaic. It is calculated that one hundred and fifty thousand pieces entered into its construction. Incidentally, the setting of topazes in the cross, each topaz on a spring, so as to produce almost perpetual play, may be noted. Stones from the four quarters of the world were symbolically employed on the altar.

An interesting development of glass mosaic is the iridescent effects produced. In excavating in the churches of Ravenna glass mosaics were exhumed which had become iridescent by change of their surface, due to long action of the elements of the soil thereon. The same effect is now produced in the glass house, and some of the beautiful mosaics of the altar are as iridescent as the ancient Ravenna glasses. A peculiar effect was produced in the design of a peacock, also in mosaic. This was really concave, but the result was that of relief—an interesting use in art of an optical illusion.

The Pan-American Telegraph Line.

We learn that a syndicate has been organized for the purpose of constructing a Pan-American telegraph line to extend along the Pacific coast from Victoria, British Columbia, to Santiago, Chile, passing through the United States, Mexico, the Central American States and the Pacific coast countries of South America. This will greatly add to the facilities for communication with the South American States. The great railway is next in order.

Haiti.

The last *Bulletin* of the Bureau of the American Republics, just issued, is devoted to the subject of Haiti, which, along with its sister republic Santo Domingo, covers an island that, for several reasons, is said to be materially and geographically, as well as historically, one of the most remarkable places in this hemisphere.

At whatever point the island is approached from the sea, it looks, when seen from afar, like a huge mass of mountains running in all directions, all jumbled up and seeming to come right down to the water's brink. It was for this reason well named by the aborigines Haiti, which signifies a mountainous country. This island was the sixth point of land discovered in 1492 by Columbus, during his first voyage, and was named by him Hispaniola. He found it peopled by about one million natives, the gradual destruction of whom has been so complete that not a trace of Indian blood is found on the island to-day.

Everywhere on the coast are bays and inlets, many of which afford safe anchorage for vessels. There are no less than eleven ports open to foreign commerce on the Haitian side of the island; three or four others where foreign vessels are allowed to take cargoes, but not to clear for the high sea; and a large number of smaller ports open only to the coasting trade. There are three rivers, properly so called, and forty three rivulets. In the interior there are some quite large lakes, the waters of which are often very deep. There are several great plains in Haiti, all remarkable for their fertility and productiveness.

The climate is wholly tropical, and, to some temperaments, the blazing sun and the unceasing heat are well nigh intolerable.

The most common ailments are fevers, almost all of a bilious type, well understood and not regarded as serious or dangerous. Yellow fever, which is considered infectious, but not contagious, is exotic in Haiti. All fevers of the typhoid type are very rare, and pulmonary disease is almost unknown. Acute dysentery and other bowel troubles are very rare, and so are Bright's disease and other kidney troubles.

Mining interests have hitherto been wholly neglected in Haiti, and her resources in this respect are kept in the background and seldom referred to. Nevertheless, it is well established that gold, platinum, silver, copper, iron, tin, manganese, antimony, sulphur, rock salt, bitumen, etc., exist. Some of them probably in quantities that would make the production of them remunerative.

The present population of Haiti is estimated to be somewhat more than a million. Less than one-tenth of the population consists of white foreigners, mulattoes, quadroons and octoroons, the remaining nine-tenths being what, in the United States, would be called persons of unmixed African blood, though they have names out there to designate and define the various degrees of admixture from the mulatto toward the pure black Thus, the child of a mulatto and a black is a "griffe" (feminine "griffona"), the child of a griffe or griffona and a black is a "marabou."

Intermarriage among all colors and races in Haiti is common and excites neither special attention nor comment.

The language of Haiti is French, which is spoken and written in all its purity by the educated classes.

The peasants speak only what is called the creole, which almost deserves to rank as a separate language, though it is really only a dialect. Everybody in the republic, the educated and uneducated alike, speaks this creole, which is absolutely necessary in dealing with the country people. It is essentially an unwritten language, and its leading characteristic is abbreviation. For any intelligent foreigner desiring it, and on the spot, it is easy to acquire, a residence of a few months sufficing generally for a fair beginning to that end.

In Haiti, the recognition of the principle of full religious toleration was contemporaneous with the Declaration of Independence. The government has given and is still giving proof that it stands ready to encourage and aid every legitimate effort to establish and spread within its jurisdiction the Christian religion of all recognized denominations.

From the beginning, the government of Haiti has manifested a commendable concern for the education of the youth of the country, and, to that end, has never ceased to encourage the establishment of primary schools and institutions of higher grade throughout the republic. It gives encouragement to all of them and aid to nearly all. Hundreds of Haitian youth of both sexes are abroad every year to complete their general education or to pursue special studies. In many instances, the government comes to the rescue of parents whose means are not adequate to bear the expense of sending their children abroad.

Haiti formally became a member of the Universal Postal Union in 1880. She is, however, in touch with the outside world by means of the submarine telegraph, which was completed and open for operation at Port au Prince December 30, 1890.

Aside from the large number of foreign sailing vessels which visit her ports, there are several lines of

steamers running upon regular schedule time between her principal ports and New York, Europe, Venezuela, Colombia and some of the ports of Central America, Mexico and the islands of the Antilles. From this, it will be seen that Haiti has no lack of the ordinary means of communication with the rest of the world, and, though she has as yet no railways in operation, all her inland towns will soon be put within quick reach of one another by inland telegraph lines now constructing to traverse her interior.

A full list of the articles of export is as follows: Coffee, cacao, cotton, logwood, mahogany, bois jaune, lignumvitæ, bayarondes, hides, raw and tanned, including goat skins, sugar, honey, rum, wax, gum guiacum, peppers, tamarinds, orange peel, sea shells and old copper.

If sugar and rum be excepted, scarcely any others of the articles in the above list require for their preparation the use of machinery, so that Haiti may at present be ranked as almost wholly an agricultural country.

In regard to Haiti's importations, there do not appear to be, in any accessible form, details which will show in full the kind and the quantities of the articles imported.

Natural History Notes.

Gigantic Leaves.—What trees bear the largest leaves? An English botanist tells us that it is those that belong to the palm family. First must be mentioned the Inaja palm, of the banks of the Amazons, the leaves of which are no less than 50 feet in length by 10 to 12 in width. Certain leaves of the Ceylon palm attain a length of 20 feet and the remarkable width of 16. The natives use them for making tents. Afterward comes the cocoanut palm, the usual length of whose leaves is about 30 feet. The umbrella magnolia, of Ceylon, bears leaves that are so large that a single one may sometimes serve as a shelter for 15 or 20 persons. One of these leaves carried to England as a specimen was nearly 36 feet in width. The plant whose leaves attain the greatest dimensions in our temperate climate is the *Victoria regia.* A specimen of this truly magnificent plant exists in the garden of the Royal Botanical Society of Edinburgh. Its leaf, which is about seven feet in diameter, is capable of supporting a weight of 395 pounds.

The Adaptation of Batrachians to Habitat.—Mr. Dissart has been making some researches upon the physiological problem presented by the double habitat of batrachians. Starting from the fact of observation that certain of them have a predilection for a certain medium, for example, the triton for water, the salamander for air, and the frog now for air and now for water, according to atmospheric conditions, and that, on another hand, morphology demonstrates that these three types of batrachians descend from a common stock akin to the group of the crossopterygian ganoids, Mr. Dissart has thought that the explanation of this curious phenomenon of adaptation must be demanded from embryological physiology, called by him physiogenesis.

He is confining himself at present to a study of the role of the functions that he believes to be preponderant in the determination of the evolution, viz., respiration and transpiration. He has found that the aquatic species transpire more than the terrestrial ones, and that the contrary is the case with regard to respiration.

It is this antagonism that, according to him, determines the habitat. In fact, if we place an aquatic species in an aerial medium, its transpiration increases, and, in order to resist such increase, it returns to the water. If, on the contrary, an aerial species is kept in an aquatic medium, its respiration diminishes, and, in order to obviate such diminution, which causes asphyxia, it is necessary for it to return to the air.

Changes of Plumage in the Bobolink.—Mr. F. W. Chapman shows in the *Auk*, November, 1893, a colored plate illustrating the change of plumage in *Dolichonyx oryzivorus.* According to the author, the male bobolink in the course of one year passes through the following phases of plumages: Late in July, when the breeding season is over, the black male undergoes a complete moult and appears in the yellowish plumage of the reed bird, which closely resembles the plumage of the breeding female. In this costume the birds migrate southward, pausing in the rice fields of our Southern States, and apparently continuing their journey to the Campo districts of Brazil. A specimen taken at Corumba, Matto Grosso, Brazil, shows that in the spring, as well as after the breeding season, a complete moult takes place, and the male appears in a suit of black feathers tipped with yellow. As the birds travel southward, the yellow tips slowly drop off, the nape, scapula, and rump fade, and the bill and feet change respectively from flesh color to blue-black and brownish-black. This is shown in a finely graduated series of intermediates in the American Museum, of New York. Birds taken during the summer represent the extreme of faded and abraded plumage.

Commensal Fishes.—Very recently, Professor Leon Vaillant, through the intermedium of Mr. Emile Blanchard, communicated some very curious data to the Academy of Sciences in regard to a new species of fish recently discovered, akin to the genus *Fierasfer*, and which he has named *Rhizoiketicus Carolinensis.* This fish presents some peculiarities of life that are truly very curious. Like the various species of *Fierasfer*, in fact, the *Rhizoiketicus* lives regularly in free commensalism with various marine animals, and especially with certain holothurians. There is nothing curious, however, as to this association of the fish with its host. Professor P. J. Van Beneden, in his interesting work on commensals and parasites, relates in a charming manner the story of this not to be suspected assemblage of two beings: "An interesting commensal of this first category of free commensals," says he, "is a fish of a graceful form called the donzalle, which goes to seek its fortune in the body of a holothurian. Naturalists have known it for a long time under the name of *Fierasfer*. It has an elongated body similar to that of an eel, all covered with scales, and, as it is much compressed, it has been compared to the sword that jugglers thrust down their œsophagus. It is found in different seas, wherein it exhibits the same habits. It dwells in the digestive tube of its companion, and, without any regard to the hospitality that it receives, helps itself first to its part of everything that enters. The *Fierasfer* has found a means of having itself served by a neighbor better equipped than itself for fishing."

Nothing is more ingenious than the process employed by the commensal fish for introducing itself into its host. Profiting by the instant at which the holothurian dilates its mouth, it quickly introduces its tail as far as possible. The surprised holothurian, upon feeling the unknown body penetrating it, contracts its open mouth, and the *Fierasfer* is caught by the tail. Thus held, it takes care not to stir. Soon, however, regaining its confidence, the holothurian opens its mouth again and the *Fierasfer* profits by it to penetrate a little further into the anterior cavity of the animal. After repeating this maneuver once or twice it has soon entered its selected domicile, where it seizes upon all the animal food particles that the holothurian, which is essentially herbivorous, rejects. The mechanism of this association is, as may be seen, truly very strange.

The Sense of Smell in Animals.—Taste and smell are closely allied in man, while in the lower forms of life, especially the aquatic, the organs cannot be differentiated, though there is no doubt of the existence of the sense of smell. The organs of smell in the higher animals protect the respiratory tract. The current of air needed for respiration also conveys odoriferous particles to the nose. The nasal membrane contains the olfactory cells, from which a delicate filament passes to the surface, ending, in birds, reptiles, and other lower vertebrates, in a fine hair or group of hairs. In insects the organ of smell has not been certainly located, but it is now almost certain that it is in the feelers or antennæ. Carrier flies deprived of these organs cannot find putrid flesh.

These slender, hair-like antennæ are organs of wonderful structure; they contain thousands of minute pits and cones—often filled with liquid—each of which forms a termination to a different nerve with its special sensory rod or hair. Wasps and bees have about twenty thousand of these pits or cones in their antennæ, so that it is possible for these organs, small as they are, to contain the nerve terminations, not only of the organ of smell, but of hearing and touch also. It is probably by the sense of smell that bees and ants distinguish between friends and strangers. Ants have doubtless other means of testing identity. With four hundred thousand in a nest, a stranger is at once recognized. Even when pupæ have been taken from the nest and the ants restored they have been recognized as belonging to the hive.

The keenness of the sense of smell in animals is one of their chief means of protection. With many it gives warning of the approach of danger, while some, like the skunk, emit an offensive odor as a means of defense. Smell also forms one of the chief means by which animals recognize their friends. The organ is very large in all carnivorous animals. In seals it is so large and protuberant that it almost blocks up the entry of the respiratory organs.

The vulture's olfactory nerve is five times as large as a turkey's, but it is doubtful if its sense of smell is as strong as has been supposed. Mr. A. R. Wallace's experiments on this point with South American vultures showed that they could not find carrion if wrapped in paper or concealed by the grass. The sense, however, appears to be very highly developed in the apteryx, which has the largest olfactory nerve of any bird probably, even finding worms underground by means of smell. Birds cannot dilate their nostrils, which are in fact only minute apertures. Pelicans have no external nostrils. Scents reach their organ of smell by the palate.

The cetaceans, excepting the whalebone varieties, have no olfactory organ, and, therefore, no sense of smell. The external orifices in seals, water snakes, crocodiles, etc., can be closed by means of a valve. Fish, mollusks and crustaceans are all supposed to possess the sense of smell in greater or less degree. The actual cause of smell is still in dispute. Prof. Ramsey has lately propounded the theory that smells are caused by molecular vibrations lower than those which give rise to heat or light. The olfactory surface to be sensitive must be moist; a moist atmosphere renders scent more perceptible.—*Chambers's Journal.*

A Journey Across Iceland.

At a recent meeting of the Royal Geographical Society, Dr. Karl Grossmann read a paper narrating his journey across Iceland. The journey was undertaken by him in company with Dr. Cahnheim in 1892. They arrived at Reykjavik on June 14. A striking feature to the traveler throughout the journey was the occurrence of low grass hillocks studding almost every part where vegetation was fairly abundant. These had probably originated by the formation of conical sand heaps, which owed their shape to the melting of snow on a loose soil. A few hours' ride took them to the Gullfoss, probably the fullest of the many Icelandic waterfalls, which in two fine cascades fell into a deep chasm with walls of basalt. The state of the country compelled them to return to Thingvellir and to strike northward from there, crossing the inhospitable pass called Kaldidalur (Cold Vale), where a truly Arctic snowstorm prevented them from seeing the beautiful snow cupolas of the surrounding mountains. From Kalmanstunga a short ride brought them to the lava cavern Surtshellir. They explored this cavern and photographed by means of magnesium light the wonderful ice cave which existed in its furthest recess. On their return journey they made a second descent with the view of searching for the coins deposited there by previous travelers. Successful in their efforts, they took two of the oldest coins (these were exhibited), after leaving new ones in their places. It was their intention to restore the old coins to their old resting place at the occasion of their next visit. From Kalmanstungathey had to turn to the west, into the Reykjadalr, full of hot springs. At Reykholt one of these springs had been utilized for a large open air bath, used nearly 700 years ago by Iceland's greatest son, Snorri Sturluson, the poet of the younger Edda. Turning northward they found a great difficulty in fording the river Hvita, swollen at that time to very unusual dimensions. Coming through the desolate Holtavorthuheithi they reached the Hrutafjorthur, an inlet of the Polar Sea, and found on its shores a great amount of driftwood cast up by the north winds. Of the greatest interest were the hills of Hnausar, the Vatnsdalsholar, which had been described as the product of an earthquake. As a matter of fact they were exquisite examples of moraine hills and were legacies of the glacial period. Similar hills were found near Vithimyri, in the Oexnadalr and in the valley of the Northern Laxa. After fording the vast expanse of the river Herathsvatn, where several seals were observed, they reached finally the second town of the country, Akureyri, a flourishing settlement, famous for the biggest trees of the island, a few small mountain ashes. The long estuary of the fjord had to be crossed on horseback to reach the eastern shore, a steep incline about 2,000 feet high. From the crest of this ridge a panoramic view was obtained of the river delta, the snow-covered mountains above Akureyri, and the Arctic Sea to the north. Past the Gothafoss they reached the farm and parsonage, Grenjatharstathir, where they found the only Runic inscriptions on some basaltic columns used as tombstones. Northward they passed the Uxahoer (Ox Spring) geysers, very similar to the better known ones in the south. A long ride through dwarf "forest" and over lava desert brought them to the remarkable rift Asbyrgi. On the following day they were favored with bright sunshine, enabling them to take good views of the remarkable craters called Hljothaklettar (echo rocks). Only five hours distant from there was the imposing Dettifoss, Iceland's and Europe's highest waterfall, formed by the Jokulsa, which leaped with one bound into a rift over 300 feet deep. On their way to the Myvatn (Midge Lake), through a desolate desert of volcanic dust, they passed the steaming sulphur mountains and the spluttering mud caldrons. The Obsidian Mountain, near the Krafla, formed the object of a special excursion from Reykjahlith on the Myvatn. Also Hverfjall, an enormous crater of great beauty of form, was explored. On their return they were compelled to traverse almost the same route. Wherever they entered a farm they were received with the greatest hospitality, and had thereby plentiful opportunities of studying the adverse conditions under which the people lived, and which were most unfavorable as far as hygiene is concerned. This was hardly to be wondered at in a country where fresh food was scarce, the climate extremely severe, and communication difficult. These conditions combined to produce much suffering, and their advice as medical men was often in request, especially on their return to Akureyri, where they were compelled to hold a regular "clinique" to more than fifty patients, some of whom had come from a considerable distance.