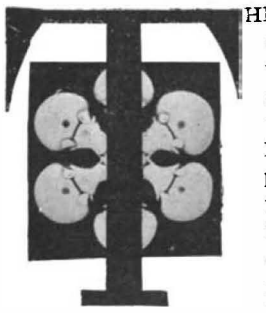
MARVELOUS PAINTINGS OF NATURE.

BY DR. ALFRED GRADENWITZ.



THE novel scope of Nature's artistic work was recently revealed by the marvelous decorative patterns exhibited at the annual show of the French Physical Society. The photographs accompanying this article give only a faint idea of their splendor and delicacy of shading. So far from being drawn by the hand of a skilled and imaginative artist, these patterns had been created by Nature in Prof. St. Leduc's physical laboratory at Nantes.

As our readers will doubtless recall from previous articles, Prof. Leduc has been engaged for many years in investigating what is called osmotic pressure, or the force of diffusion. This force, with which lay people are relatively unfamiliar, plays an all-important part in connection with vital phenomena. It drives the humors of plants and animals through their vessels and pores. According to the views held by the French experimenter, it even determines the forms of vegetable growth. In fact, Leduc has succeeded in producing by simple diffusion experiments the most varied artificial plants, of which we illustrate some particularly beautiful, recent samples.

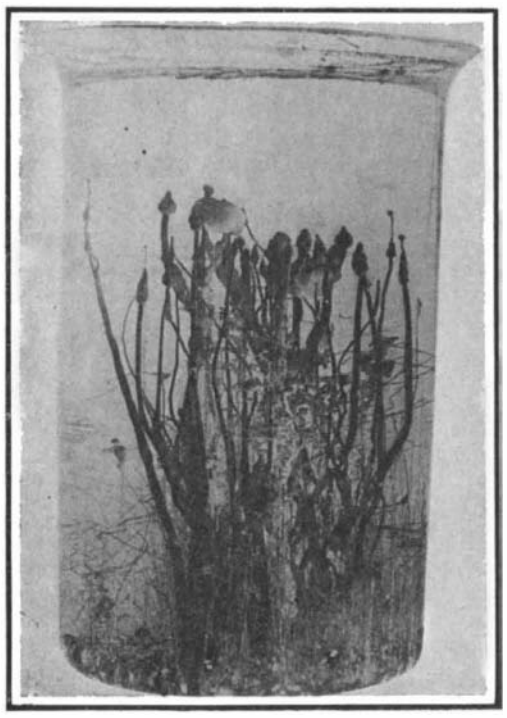
The decorative patterns forming the main subject of the present article are indebted for their existence to the same force of nature which manifests itself wherever solutions of different concentration are separated by a porous partition, bringing about a motion of liquid, until a perfect equality of concentration is produced.

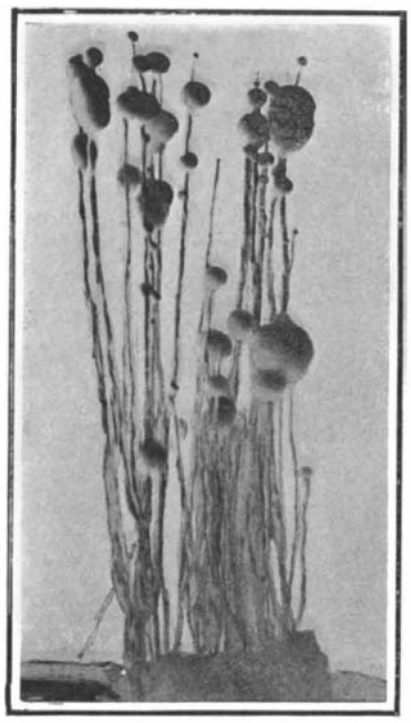
The following particulars will enable any amateur to obtain these figures of diffusion: On a glass plate are poured out five cubic centimeters of a 10 per cent gelatine solution to which has been added a drop of a saturated solution of different composition (preferably ammonium chloride, bromide, or iodide). On the gelatine thus prepared are arranged symmetrically drops of various solutions, such as calcium nitrate, silver nitrate, potassium citrate. If this plate be allowed to rest on a horizontal surface, the liquid drops are seen to diffuse gradually, generating the most surprising effects of form and color. Care should be taken to protect the plate when drying against any shock. The resultant picture is glued on pasteboard, like a photographic print, for use as a decorative pattern.

Certain substances will produce by their diffusion lines of equal distance, alternately transparent and opaque, the thickness of which lines varies from some tenths to less than 1/1,000 of a millimeter. If their thickness is between 1/100 and 1/1,000 millimeter, the patterns are full of networks of lines, and rectilinear or circular gratings, giving the most splendidly colored diffraction spectra.

These gratings are obtained with a large number of substances. Very beautiful samples are produced by allowing a mixture of saturated solutions of potassium phosphate and carbonate in equal parts to diffuse. In fact, the effects thus obtained are quite similar to the scintillation of mother-of-pearl.

As Leduc points out, all living tissues show the same network structure. In fact, not only in mother-of-pearl but in the wings of beetles, feathers of birds, muscles and sinews of man, and in many other living substances, the same structure and color effects, whose production no physical force so far sufficed to explain, may be observed.

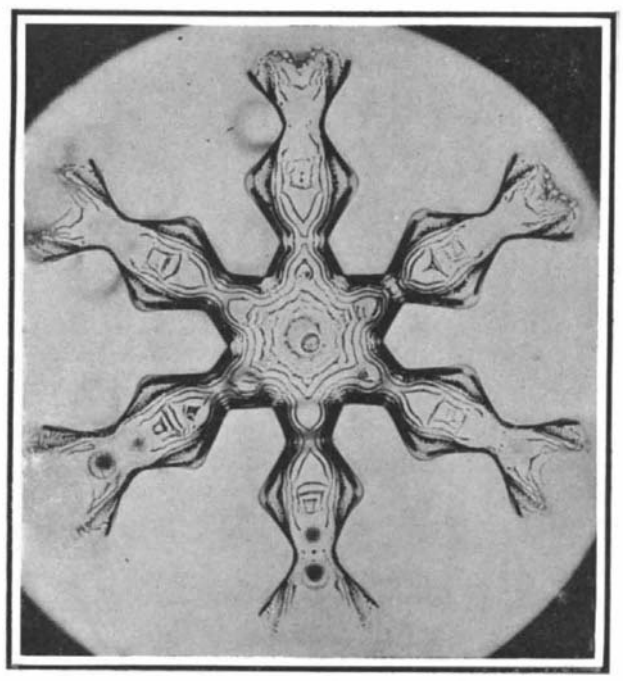


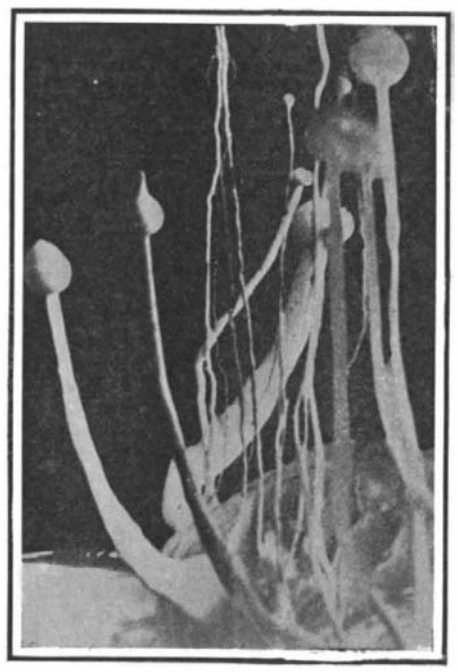


Plant-like forms obtained in Leduc's experiments with osmotic pressure.

In addition to its scientific interest, the process above described is obviously of the highest practical importance. It renders it possible to reproduce the most delicate photographs by coating the gelatine of the photographic plate at 35 deg. C. with a gelatine layer, containing traces of calcium nitrate on which drops of a mixture of calcium phosphate and carbonate are spread out.

In order fully to account for those strange phenomena, the hypothesis should be made that diffusion occurs not continually, but periodically at given intervals of time.





Other forms of plant-like structure obtained by Leduc.

Dentists have made the startling disclosure that they can alter and enlarge the jaws in any child by simple means, and they have found that the teeth themselves and their arrangement are the pattern from which the jaw takes its shape. Three people out of four seem to lack in the proper development of the lower portion of the face by reason of defective and misplaced teeth and weak and ill-developed jaws. Hence we deduce that the "man of destiny," "the man with firm jaw who knows his own mind," is presumably one who was made to chew properly in childhood, and was not allowed to shove down his food half chewed or unchewed by gulps of liquid.—Popular Science Monthly.

Kieselguhr.

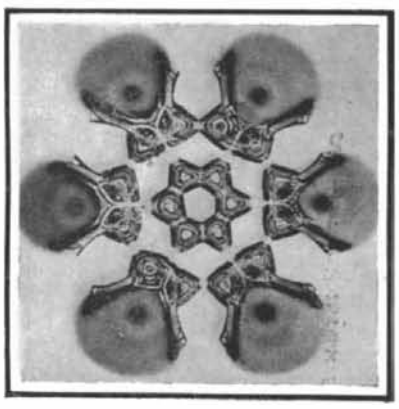
Kieselguhr is a variety of infusorial earth, which is used as a filler for soap, sealing wax, paints, and other products, and employed in the manufacture of dynamite, alizarine, soluble glass, cements, artificial stone, articles of gutta percha and India rubber, and for many other purposes.

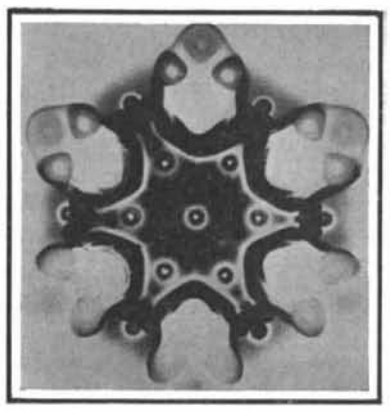
Kieselguhr is found in large quantities in Hanover, where it occurs in gray, brown, or pale green layers in alluvial deposits and near beds of lignite. It is soft and dry to the touch, absorbs water very readily and is not affected by chemical reagents at ordinary temperatures. Kieselguhr is found also in Hesse, Hungary, Bohemia, Tuscany, Sweden, Finland, and Canada.

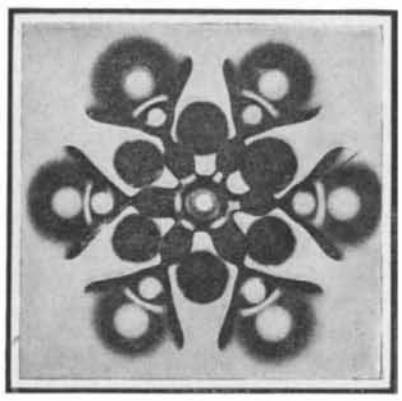
The valuable properties of kieselguhr are its low specific gravity (0.25 to 0.55), its great power of absorbing water, and its low thermal conductivity, which make it one of the best known heat insulators.

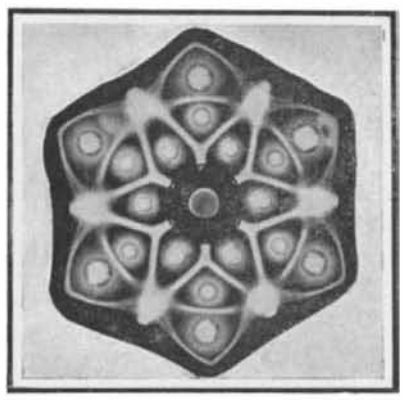
It is extracted from open pits, spread on planks on the ground, and left to dry under the action of the sun and the wind. Artificial desiccation has not proved practically successful, according to a report of the American consul at Hamburg. Drying in ovens presents no difficulty, but also no particular advantage, and has never been attempted on a large scale. (Kieselguhr is quickly calcined by contact with flame.) Various mechanical drying processes have been tried and abandoned, in Germany. Drying by a blast of hot air has been employed to some extent, but only in wet seasons, or after partial drying in the usual way. The method is too expensive for use except for the best grade of kieselguhr, which is employed in making dynamite, and when the market price is unusually high.

Kieselguhr, as it is taken from the pit, contains from 70 to 90 per cent of water, which evaporates very slowly. Air-dried kieselguhr retains from 15 to 25 per cent of water. The dried kieselguhr is ground and packed in bags. During transportation and storage it must be carefully protected from dampness.—Cosmos.









Symmetrical designs obtained on glass plates by Leduc in experimenting with osmotic pressure.

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