

A CHEMICAL GROWTH.
BY GUSTAVE MICHAUD, D.SC.

A curious experiment which any one can perform at the cost of a few cents is herewith explained and represented :

Buy one ounce of liquid sodium amalgam, a sheet of aluminium costing a few cents, and about six inches of stout copper wire. With a file sharpen one end of the copper wire, so as to give it the shape of a pencil. Rub off the surface of the aluminium plate with a knife just before beginning the experiment.

Dip the pointed end of the wire into the amalgam, and, after removing it covered with the liquid alloy, write or draw on the aluminium plate. Dip your wire into the amalgam from time to time, just as if you were writing with pen and ink. Never mind the fact that your ink is a metal, your pen a metal, your tablet a metal, and that your pen seems to write nothing but a few scratches on your tablet. Finish your work and then watch and see what happens.

The lines just traced by your pen will suddenly assume a dull, whitish tint, contrasting with the brightness of the metal. Then they will rise above the metallic surface at the rate of about one inch an hour. In less than five minutes your drawing will be in strong relief. You may wipe out the white substance which has thus sprung from the metal, it will develop again with the same vigor, as would some kind of mushroom gifted with the rather abnormal property of thriving on metallic ground.

These white formations consists principally of alumina. The cause of their growth is the formation of an amalgam of aluminium, in which that metal is in a molecular state altogether different from that in which it exists in its coherent form. Although mercury has less affinity for oxygen than aluminium, as soon as an alloy of the two metals is made, aluminium loses its previous chemical inertia and undergoes a slow combustion, the product of which is alumina.

Sodium plays no direct part in the reaction, yet without it, I found it difficult to get the mercury to adhere to the aluminium. Sodium facilitates also the adhesion of mercury to the copper wire. The best results are obtained in damp weather. If the air is dry at the moment of the experiment, results just as good will be obtained by breathing gently from time to time on the drawing, so as to slightly moisten the amalgam of aluminium.

A FEAT IN HALF-TONE WORK.

The editor is frequently supplied with good matter accompanied by such poor illustrations as to render the article, as a whole, unavailable for publication. In such cases he occasionally invokes the aid of the photo-engraver whose skill enables him to present a creditable half-tone from a poor photograph. A case in point is the article on the "Chemical Growth" found on this page. In this case the illustrations which present so satisfactory an appearance were made from the same negatives used for the illustrations accompanying this article. It can be seen in the annexed cuts, that the photograph was printed with the idea of bringing out to the best advantage the words "SCIENTIFIC AMERICAN" which illustrates the phenomenon described in the experiment, the face of the child and the other details being sacrificed to this main feature. This illustration was prepared from the author's photograph, and is a faithful reproduction of the original as it appeared when placed in the editor's hands. To an emphatic "that won't do" from the editor, the photo-engraver answered by sending in the plates accompanying the article on the "Chemical Growth." The defects in the original photographs were due to the fact that the subject was unevenly lighted, producing too

great contrast, in other words very extreme high lights on one side and correspondingly deep shadows on the other. In order to procure a plate that would be admissible to the columns of the paper it was necessary to overcome this defect by reducing the intensity of the light portions of the photograph and lightening the portions in deep shadow.

With his work thus mapped out for him the photo-engraver first procured the original negatives ; then by means of aniline coloring matter, which was put on the reverse or glass side of the negatives over the clear portions which produce in the photograph the deep shadows, he increased the actinic density of the negatives in their shadow portions and was thereby enabled to produce prints in which there was less contrast between light and shade, bringing out details that were entirely missing in the dark portions of the original photographs. This operation caused the words "SCIENTIFIC AMERICAN" to fade away until they were too faint for reproduction. The parts of the original photos in which the aluminium plate with the raised lettering were reproduced with the required depth of tone, were then cut out and neatly pasted over the same parts of the new photographs. Then the half-tones were made with the results shown. The results clearly justify the pains that were taken, and



1.—A CHEMICAL GROWTH—FIVE MINUTES AFTER WRITING.



2.—HALF HOUR AFTER WRITING.



3.—A FEAT IN HALF-TONE—THE ORIGINAL PHOTOGRAPH.



4.—ORIGINAL PHOTOGRAPH BEFORE MANIPULATION.

it will be of interest to those who have made a study of such work to know that the plate was not "touched up" but that the hair of the little girl, the texture of the wall paper, and the fabric of the table cover are all brought out by manipulating the original negative in the manner described and that the artist's brush was not made use of except for the purpose of modifying the shadows of the negative.

The Work of the Division of Botany of the Department of Agriculture.

The Division of Botany of the Department of Agriculture is performing a most valuable work. The many deaths of human beings and farm animals caused by poisonous plants justify continued work by the division. During the fiscal year ending June 30, 1899, 67 cases of poisoning were investigated, 41 pertaining to man and 26 to farm stock. The fatalities included over four thousand head of farm animals and at least twenty-one persons. The death rate of human beings in the United States from poisonous plants is twice as great as the average death rate in England from the same cause. This is unquestionably due to a lack of proper knowledge about poisonous plants. This is supplied by Bulletin No. 20 entitled "Principal Poisonous Plants of the United States."

Under the authority of the law authorizing the Secretary of Agriculture to purchase seeds in the open market, test them at his discretion, to publish the result of the tests including the names of the dealers, several hundred tests were made and the delinquents were

notified by letter, and it remains to be seen if they will mend their ways. Trial grounds for seeds are located at Kensington, Md. The work of seed and plant introduction has been attached to the division of botany in order to avoid multiplicity of supervision. During the last year explorers have been sent to Russia to secure superior varieties of cereals resistant to cold, draft, and fungous diseases. A specialist has been sent to Japan to secure a variety of rice suitable for cultivation under the new system developed in Southwestern Louisiana, in particular a high-milling quality as described in SCIENTIFIC AMERICAN SUPPLEMENT No. 1257. Another expert investigated the agriculture of the Mediterranean region and secured a stock of fig-fertilizing insects for the Division of Entomology as is also described in SUPPLEMENT No. 1257. Others visited South America and other points.

A testing garden has been secured on the Potomac flats, through the courtesy of the War Department, where observation may be had of plants introduced from foreign countries. There is wide-spread interest in the economic plants of the tropics and in tropical agriculture. The botanist of the division is Frederick V. Coville, Esq.

THE owner of a coal tract near Pittsburg is building a model mining town with a view to supplying 3,000 workmen with all possible benefits at a minimum of expense. The houses will be built only of brick or stone, and will stand on a quarter-acre lot, with flower-beds and hedge in front. It is arranged that the houses shall be owned by the individual miners when they can pay for them, and the miners are to run the village themselves, and the stores are to be managed on the profit-sharing plan. Several model industrial towns have been built, but they have always been managed on the paternal system which has usually ended in failure.

The Current Supplement.

The current SUPPLEMENT No. 1262 has a number of articles of remarkable interest. "The Arrow Point Spearheads of Prehistoric Times" is a brief review of a paper contributed by Prof. Thomas Wilson to the report of the United States National Museum. The "Cruise of the 'Albatross'" is Prof. Agassiz's third letter from the "Albatross" to the Hon. George M. Bowers, United States Fish Commissioner of Fish and Fisheries. "The Increasing Productiveness of Labor, the Result of Invention" is by Francis H. Richards. "Santa Ana Canal," describes an important engineering work and is fully illustrated. "Are Further Experiments Needed for Determining the Atomic Weight of Oxygen" is by Prof. Edward W. Morley. "The Origination of Printing Types by Photographic Methods" is by Thomas Bolas. "Working Drawings of an Electric Cab" deals with the carriage portion of an electric carriage of the latest style. "Pictures Produced on Photographic Plates in the Dark" is by Prof. William James Russell, Ph.D.

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