on the stage of the amphitheater. The breeder of live stock is specially interested in the hybrid offspring of the horse and zebra. He has the valuable quality of being wholly immune to the bite of the dreaded tsetse fly, and because of his value in foreign service he is being introduced into the German army by the Emperor William.

Another novelty of great interest is a baby elephant which is undoubtedly the smallest specimen that is known to exist. This little creature, which was born on May 10, 1904, is remarkable for the fact that at the time of its birth it weighed only 87 pounds and stood only 27 inches in height. Its great value as an exhibition specimen is realized when the layman is told that it is customary for an elephant to foal a calf weighing from 170 to 200 pounds. When the little fellow left Hamburg, Germany, he carried a life insurance of $75,000, and mother and baby were required to pay a first-class passage of $475 between Hamburg and New York. The little fellow traveled in an ingeniously fashioned cradle, which was swung from a supporting bar, with the idea of preventing any rough knocks or bruising due to the motion of the ship. The cradle was padded with eiderdown on all sides, and within the cradle was constructed a separate department for the Hindoo keepers, who relieved one another in keeping watch over the remarkable youngster.

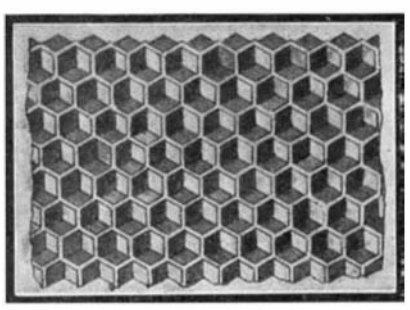
Before closing our mention of this exhibit something should be said of the collection of baby wild horses of Mongolia. These creatures are among the most shy and hard to get at of all wild animals, when in their native state; but, by dint of patience, it has been found possible to tame some of them, and a number are exhibited at the fair.

THE BEE AS AN ARTISAN.

Nowadays, in agricultural, and even in horticultural competitions, bee-culture has generally a prominent place assigned to it, and rightly, too, since the importance of the valuable services that the bee is daily rendering is apt to be overlooked or underestimated. This insect, in fact, supplies us with two very valuable products—honey and wax; while in agriculture, it contributes largely to the fecundation of flowers, and to such an extent, too, that at the present time, in America, almost every large farm has a number of hives. It adds to the profits of the intelligent husbandman, with scarcely any expense, and requires of him in return but a slight amount of care. Bee-cultural exhibitions are multiplying, and every farmer does his utmost to present thereat the finest products of this beneficent insect.

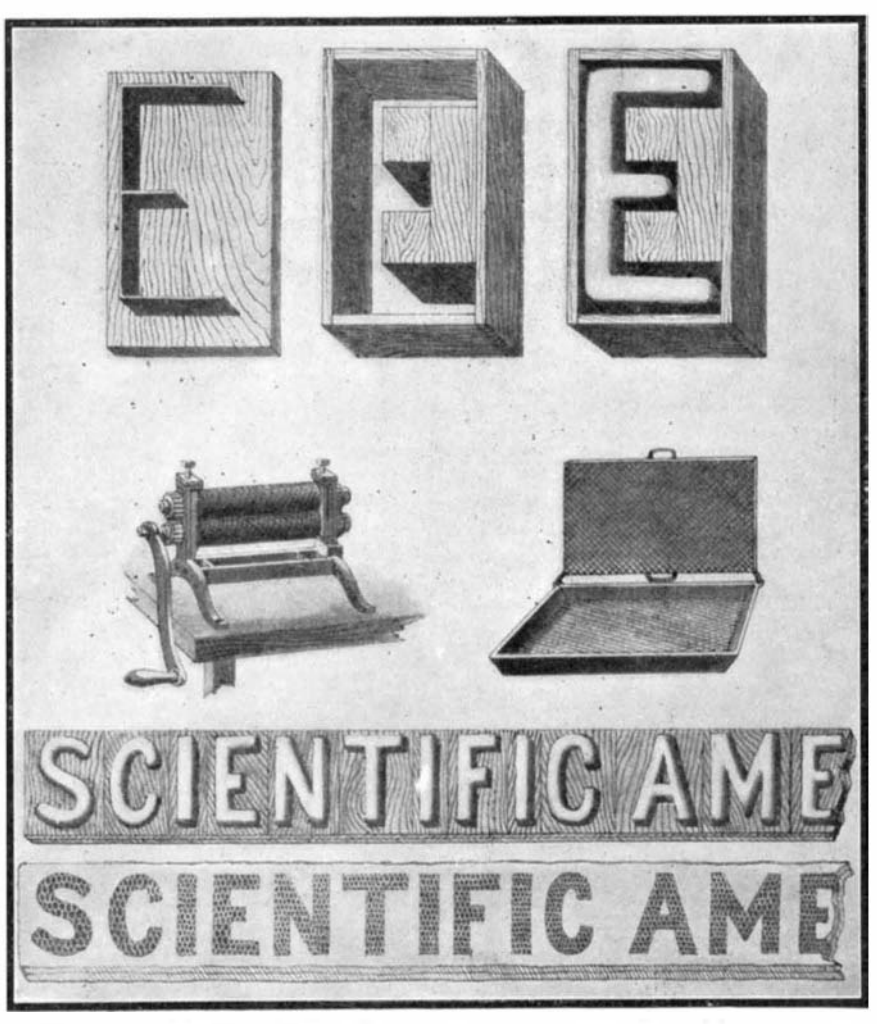
One of the attractions to which bee-culturists often have recourse consists in signs bearing their name or some device formed of honey comb. People stop and gaze at these and then go away wondering how the thing is done, and doubtless thinking that it is by some process of molding like that employed in the manufacture of pastry. A closer examination, however, will show the visitor that the objects are formed of cells of wax full of honey and closed by their natural operculum, as in the honey comb taken from the hive.

The letters that compose the inscriptions we illustrate were, in fact, constructed entirely by the bees, and by them alone filled with honey. In doing this, however, they in nowise gave any proof of art or intelligence, but blindly obeyed the will of their master, who at the moment that it became incumbent upon them to construct cells in which to store their valuable product, caused them to give their constructions whatever form pleased him. This he did through the use of "goffered wax;" that is to say, wax in thin sheets containing impressions having the form that is exhibited by the base of the cells in the comb of the bee. Such wax is obtained by molding it in a goffer-iron or passing it between two cylinders, one presenting in depression and the other in relief the form of the base of the cells. If the sheet is to be of limited dimensions, it is formed by dipping a water-cooled plate into a bath of molten wax. If it is to be of large dimensions, it is manufactured by a method that permits of giving it an indefinite length. Through goffered wax, modern bee-culture has been enabled to make very great progress. It was invented in 1857, after persevering experiments, by John Merhing, a Bavarian bee-culturist. Peter Jacob, a Swiss, afterward improved the Merhing press, and, in 1865, a Mr. Steele, of New Jersey, imported goffered wax into the United States, where, in 1876, a Mr. Root had a cylinder machine constructed, and the use of the wax rapidly spread throughout the world. One of its advantages is that the bee can be forced to construct according to plans laid out for it, and to form a comb with parallel sides that can be easily removed from the hive and emptied by means of centrifugal force apparatus called "extractors." A pure and limpid honey is thus obtained with astonishing rapidity, and that, too, without breaking the comb, which is put back into the hive to be again filled by the bees. The latter are thus enabled to employ the time that it would have taken to construct a new comb in the gathering of a new crop of honey. This, of course, affords so much more profit to the bee-master.



Fragment of a Sheet of Goffered Wax of Actual Size.

It therefore suffices to suspend the sheets of goffered wax in frames to have the bees hasten to utilize them in constructing the lateral walls of the cells, provided the wax used in the manufacture is absolutely pure, since if it is not, the insects will not use it, but will endeavor to cut it in pieces and throw it out of the hive. It is this readiness of the bees to follow the plan laid out by the bee-master that is taken advantage of by the latter to cause them to give their combs the most unexpected forms. It suffices for this to secure sheets of goffered wax at right angles to a board by means of glue or melted wax, and afterward surround them with a mold in such a way as to leave just enough space for the bee to construct its cells and move about in. The most fitting width to give such space is indicated by that which is observed between the combs in hives. The whole is placed upside down (that is to say, the board uppermost) in a hive, and the bees soon install themselves in it. The upper part of our illustration shows a board provided with sheets of goffered wax, the mold, and the mold filled by the bees with honey comb in the shape of the letter E. At the bottom of our illustration the letters, which have been obtained isolatedly, are shown fastened to a board by means of screws. In order to conceal the joints between the letters, the boards are covered with cloth or velvet. The letters at the extreme bottom of the cut were hollowed out of a honey comb by bees. They were obtained by covering the comb with a thin sheet of paper or metal out of which the letters had been cut. The bees then uncovered the cells corresponding to the exposed parts and emptied them of their honey, and after this the sheet of paper or metal forming a pattern was removed. This is how bees, simple laborers for man, become artists in spite of themselves, and sometimes construct their comb in truly curious forms, such as rings, stars, flowers, fruit, etc., through the intermedium of complicated molds and the exercise of great patience. The laborious insects are, however, often so discouraged by the complications of the molds that they have to make many attempts before reaching the result desired.—Translated from La Nature for the Scientific American.



MOLDS AND TOOLS FOR CAUSING BEES TO MAKE LETTERS IN HONEY COMB WITH THE AID OF GOFFERED WAX.

Chemical Composition of Igneous Rocks.

The United States Geological Survey has published as Professional Paper No. 18 a discussion, novel in its form, of a complex subject, which is fully explained in the title: "Chemical composition of igneous rocks, expressed by means of diagrams, with reference to rock classification on a quantitative chemico-mineralogical basis." The author is Prof. Joseph Paxson Iddings, of the University of Chicago.

The materials, erupted from the depths of the earth, vary greatly in composition. Silica, alumina, iron, magnesia, lime, soda, and potash are present in considerable amounts in most eruptive rocks, and other substances often occur in notable quantities. The mineralogical composition and, through that, various other features of igneous rocks, depend in large degree upon the chemical composition of the fluid magmas of which they represent the solid forms. It is, however, difficult, even for the specialist in this science, to readily perceive the significance of the differences in composition between two rocks when presented in the form of long chemical analyses; hence petrographers have for many years sought to express in the form of some diagram the principal facts of each analysis, so that they may at once appeal to the eye. Prof. Iddings describes the various kinds of diagrams that have been used, finally explaining the kind which seems to him the most useful. These diagrams express in very clear form the relations of all the leading constituents of an analysis. Prof. Iddings has also devised a plan for the comparison upon charts, of diagrams representing separate analyses, so that the full range of composition found for known igneous rocks is at once illustrated. This publication, presents these charts, which are printed in four colors and accompanied by descriptive text.

This graphic representation brings out many facts concerning the composition of the earth's magmas which are of much interest. The fact that there are no well-defined chemical groups of rocks, but rather a great continuous series with no natural dividing lines, is clearly illustrated. The author discusses the relations exhibited by the charts, with particular reference to rock classification.

The work is a valuable companion to the more extensive compilation of rock analyses, by Dr. H. S. Washington, recently issued by the Survey as Professional Paper No. 14. Both present a mass of data which was used in constructing the "Quantitative System for the Classification of Igneous Rocks," proposed in 1902 by Cross, Iddings, Pirsson, and Washington.

The Manchester Ship Canal (Finance) Bill of 1904, giving effect to the arrangements made between the Corporation of Manchester and the Canal Company, and to empower the Manchester Ship Canal Company to raise additional capital, has been issued by the Private Bill-office. The corporation are to accept 3 1-5 instead of 4½ per cent on their debentures, which are to be made irredeemable and incapable of transfer. The arrears of interest due to the corporation are to be extinguished, the company giving, in respect of them, pre-preference shares for the amount which the corporation is actually out of pocket, apart from the provision which has been made for the sinking fund. The company will also be empowered to raise $7,500,000 at once by mortgage with priority over the existing debentures.

Although steel containing about 5 per cent of manganese is so brittle that it can be pulverized under the hammer, yet an increase in the manganese content to about 13 per cent gives great ductility combined with great hardness—a remarkable combination of qualities—on account of which manganese steel is used for such purposes as rock-crushing machinery and mine car wheels.