[For the Scientific American.]

CHARMING BY SERPENTS.

The power of serpents to charm the smaller classes of animals, which they capture for food, has long been held as an undoubted fact. It has also been believed that they could fascinate the larger orders of animals, so as to bring them within the range of their deadly fangs; and that even the intellect of man is not exempt from their influence. The common theory upon this subject gives to the serpent supposed to have the power of fascination an ability to gain the attention of its victims, to paralyze their volitions as if by an electrical influence, and to attract them toward itself as if by magnetism.

Birds, more generally, are suppssed to be the victims of these charms. They have been seen moving around serpents in such a manner as to indicate, in the opinion of a certain class of observers, that they were under the power of fascination. The testimony upon this point describes the bird as moving in a circle, or semicircle, around the serpent. If upon the ground, they run, with extended wings, gradually narrowing their circle of motion, but never stopping for an instant, till within a foot or two of the serpent. Then, as if conscious of their peril, and just at the moment they are about to be seized, they fling themselves backward upon the wing, so as to be out of the reach of their terrible enemy. The birds, thus escaping for the moment, stop and survey the foe from their distant position. This seems to be a fatal dallying with danger. The serpent's eye, quick as the lightning's flash, again darts its mysterious magic into theirs; and again, and again, they advance and recede, as if drawn irresistibly toward the point which has become the all-absorbing center of attraction. If the serpent is upon a tree, the bird flutters around it, advancing and retreating as when upon the ground.

The popular interpretation of these movements is this: the serpent establishes a connection between itself and them, by which it controls their wills, and draws them within its reach. In accomplishing this object, it does not go in pursuit of them, but lies in coil, with head erect, awaiting their approach. It appears, however, that the serpent's power has its well-defined limits, and its own peculiar philosophical phenomena.

If the movements of birds toward it are due to the attractive powers employed by the serpent, then the law of attraction, in this case, is a positive reversion of the laws of magnetic attraction. The attractive power of the magnet is greatest when the body acted upon is in contact with it, and it loses its force in proportion to the distance to which that body may be removed. That is to say, it requires more force to remove a piece of iron, when in contact with a magnet, than is required for its removal when at a distance of several inches from it But such is not the case of the serpent's power of attraction. In the supposed fascination, the birds, though unable while at the distance of ten or a dozen feet, to resist its attractive powers, are able, nevertheless, at the last moment, when the devourer is in the act of striking, to break the charm, and, by a reverse movement, to fling themselves instantly out of danger's way. Thus it appears that when the birds are at a distance the serpent can draw them within its reach; but that, when they come in close contact, its attractive power is lost, and they can retreat without hindrance.

Such is the theory of fascination, as based upon occurrences that have been witnessed by many observers. Its philosophical defects may be inferred from the hints already given; but whether such transactions prove that serpents possess the power of fascination, or that the observers have been mistaken in their deductions, will be better understood when a case is stated which was witnessed by the writer.

Business led me to cross the Chilhowee Mountain, in Tennesee, on the 27th of June, 1857. When near Montvale Springs, two birds were noticed, at a couple of rods' distance from the road, which were acting in a manner new and strange to me. They were in an open space, near the stump of a fallen tree, but did not take flight at my approach, as, under ordinary circumstances, they would have done. On reaching a point opposite to them, it was noticed that they were the brown mocking bird or thrush, and that a very large black snake lay coiled at the side of the stump. On seeing me, it suddenly began to uncoil itself, and move off as if to make its escape; the birds at the same time pausing a moment in their movements. But before it had stretched itself to more than half its length, they were again in motion, and flew at it in the most energetic manner. Instantly, the snake whirled itself into coil in its former position. The male bird then commenced to run and skip with great activity, in a semicircle, the serpent being the center, and gradually closed in until within a foot or two of its coils, when, with a sudden dart forward, the bird thrust its head toward that of the snake, and, in the same instant, threw itself backward, alighting on the ground at the distance of about ten feet. Before the male had closed this feat, the female had commenced a similar set of actions. All the movements of the birds were made with extending wings, as if ready to fly in a moment. By the time the female had thrown itself back from the snake, the male was in position again, repeating the same movement as at first. In the meantime my horse had carried me some four or five rods into a thicket of bushes, whither my hand had guided him, and where I dismounted and secured him. All this took place in a minute or two; and as only an indistinct view had been gained of the action of the birds in passing, a favorable position for observation was taken, so that all that occurred could be noted. The first movement of the male bird, in thrusting its head forward into close contact with the snake, impressed me with the conviction that a case of the so-called fascination was enacting before me, and I determined to observe it in a philosophical manner.

It was half-past one o'clock, P. M. The birds were still eagerly at work when I turned my eye upon them, after the interruption of hitching my horse. They were panting, as if greatly fatigued by long exertion, but manifested not the least disposition to remit their efforts. If not fascinated, they were, at least, so earnestly enlisted in the affair on hand, as to disregard everything else around them. The snake lay in its coil, with head erect and drawn back, so as to be in the best possible position to strike and seize the birds as they advanced. The many convolutions of its lengthened body moved in graceful curves, as its glittering head followed their motions. Its eye sparkled in the sunlight like the polished diamond, while its movements gave to its ever-shifting scales the brilliant hues of the rainbow. Again and again, as the birds approached, it would strike at them with open mouth, exhibiting a malignity of disposition that portended death to them had they been seized in its jaws.

A few minutes sufficed to show that a battle, and not a scene of fascination, was presented before me. The birds, at each approach, struck the snake with their beaks, or with their talons, when, generally, but not always, it darted forward at them, only to find that it was aiming at a movable target. This can be easily explained. The snake, in striking, could never project itself more than about two-thirds of its length, but its defense was made with the most determined courage. Its position by the stump protected it in the rear, so that the birds could only approach it in the front. They were as adroit in their attacks as it was resolute in its defense. In attempting to seize them, it could not curve to either side, after starting, so as to follow their motions, but invariably shot forward, in a straight line, to the point they occupied when it made its spring. The birds, in advancing to the attack, by a circular movement, were certain of being away from the spot at which it aimed, and when its teeth smacked together, where it expected its prey, it had nothing in its grasp.

The warfare lasted, after I reached the spot, about twenty-five minutes by the watch. Once or twice during the contest, the reptile made a movement to escape up the hillside, but the birds, as at its first attempt, immediately brought it into position again. At last, seeming to despair of success in securing a dinner in that locality, it darted off down the hill, toward a grove of trees and bushes, nor turned to the right or left. The birds swept after it, pecking, scratching, and striking it with their wings, as if inspired with the consciousness that victory was theirs.

At this moment I rushed forward, and, after some difficulty, killed the snake and cut it open. There was not a particle of food from one end to the other of the intestinal canal. It must, therefore, have been hungry; and if it possessed the faculty of charming, it would undoubtedly have employed its powers on such a delicacy as these birds.

When the dissection of the snake was finished, the birds were not to be seen. It was the season when their young were in the nest; and, doubtless, the conflict which had just terminated, had been waged for the protection of their offspring. Less active birds, venturing as close as they did to their enemy, must have been captured.

Remaining most of the summer in the mountains of North Carolina, frequent opportunities were afforded of inquiring of hunters and others, what they knew about birds being charmed by serpents. All believed in the theory of fascination, and several had witnessed encounters such as I have described; but none had ever seen the snake seize the bird. They had looked on until the bird, under the influence of the charm, as they supposed, was attempting to thrust its head into the serpent's mouth, when they had rushed forward and killed the serpent to save the bird from destruction. In all the inquires made, no instance has been related where there was any more evidence of fascination than in the one observed by myself. In all cases, however, there was a singular uniformity in the descriptions of the manner in which the birds fluttered around the snakes. So nearly did their accounts correspond with what I had witnessed, that I was convinced of the truthfulness of their statements.

A few additional facts, having an important bearing on the subject of fascination, came under my own notice during 1859. In the summer of that year, some amusing incidents led me to secure a number of serpents of different species; and, among them, a couple of fine specimens of the rattlesnake. This serpent is somewhat sluggish in its movements, and, unlike many other species of its order, it is not an active climber. While many of the others can with ease ascend bushes, trees, and precipices, to rob the nests of birds of their eggs or young ones, the rattlesnake, less agile, has to find its prey in a more limited range. For this reason, it has been supposed that the rattlesnake must possess the power of fascination: otherwise, it could not secure, as it does, such active animals as mice, rats, squirrels, rabbits, and birds; for, as has been plausibly asserted, this serpent, assuredly, will not use poisoned food—will not first strike the animals it designs to eat; and then, some of these animals are combatants of no trifling power, and could easily kill the snake or escape from it; so that, unless the rattlesnake is endowed with the ability to fascinate, it is averred it could not possibly capture sufficient food upon which to subsist.

The opinion that venomous serpents do not eat the animals they kill by the poison of their fangs, like many other popular notions, turns out to be an error. This I know from my own personal observation; and, for the satisfaction of naturalists, a few particulars are given. One of my specimens of the rattlesnake was placed in a box, covered with glass, and having a wooden lid secured by lock and key. A few small holes, for ventilation, were made in the sides of the box, but too small to allow the escape of even a mouse. Birds, when put into the box containing the rattlesnake, would often hop around and over it for hours unmolested; but at length, when in a favorable position, the snake would strike the fatal blow, and death ensue in a few minutes. One instance, only, need be noticed; a half-grown bird, when struck, at once commenced screaming, with wings outstretched, and, turning round once or twice, seemed to droop and sicken rapidly. In three or four minutes from the moment it was bitten it fell forward toward the mouth of the rattlesnake and expired. The movements of this bird were in accordance with such actions as have been observed, in cases where fascination alone was supposed to be employed. In this case, the charm was a fatal one, truly, being nothing less than the poison of the serpent coursing through its veins.

The birds placed in the box were not swallowed by the rattlesnake, seemingly, as afterward ap-

peared, because it would not encumber its jaws, so as to be unprepared for defense while the human eye rested upon it. In experimenting on the non-venomous species, it was found that they, also, would not take their food when any person was present; but that, when alone and secure, they would eat ravenously; one of them, the common bull snake, having eaten nine young birds in a few hours. Profiting by this discovery, a rat, two-thirds grown, was thrown to the rattlesnake, when it immediately struck it twice. The victim soon exhibited signs of dying, and the box being closed and locked, all present left the room. Upon examination fifteen minutes afterward. the rat had been swallowed, and the serpent's thickness proportionally increased.

By this experiment, and others similar, it was ascertained that the rattlesnake does eat food that has been poisoned by its own venom;* and that it is probable that it always captures its victims by striking them, as, unconscious of danger, they pass its place of concealment; the poison of its fangs being a much more efficient agency than the fascination of its eyes.

It may be remarked, in explanation, that, although the poison of serpents, infused into the veins and arteries, is always fatal to the smaller animals, yet it may be received into the stomach without injury, as it is easily digested, and exerts no prejudicial influence upon the system. In the smaller animals, killed by the bite of the snake, no inflammation, no swelling of the body, takes place, as in the case of the larger animals, for the reason that the extinction of life occeurs too soon to allow of any such effects.

If, then, the venomous serpents eat as food the animals killed by their own poison, and the non-venomous species can climb almost everywhere that birds build their nests, where is the necessity of any of these reptiles being endowed with the powers of fascination? They possess the means of attack and defense, independent of that power, in a degree fully equal to the necessities of their existence, and, in this respect, are not behind any other order in the animal kingdom. Why, then, should they be given such an advantage as fascination would confer, over the other orders of the irrational creatures? But I need not prolong my remarks on these topics.

*Prof. Pratt, late of Tuscaloosa College, adds his testimony to the above, thus: "The rattlesnake does eat the mouse after killing it with its poisoned fangs. I have seen this done."

ENGRAVING FOR CALICO PRINTING.

It is surprising how much of taste and educated fancy is bestowed on the production of the commonest articles. The love of beauty and the desire for ornament furnishes employment to thousands, and gives additional value to that which would before have subserved its purposes of use or necessity. The common calico prints and muslin-de-laines are cases in point. In one instance the fabric is of cotton, and the other, of cotton and wool, the useful qualities of which are in no wise bettered, if they are not really injured, by the process which makes them more agreeable to the eye. But their decoration with figures greatly enhances their value in the eyes of purchasers and wearers. And a great deal of talent, artistic and mechanical, is employed on this work.

The designing of the pattern is a preliminary to the engraving, as that is to the printing. For this purpose men of artistic tastes are employed, although they are not always required to originate the designs used. In many cases the patterns are copied from specimens sent from France and England, which are sometimes surreptitiously obtained by secret agents, who may be employed in foreign manufactories. We have known of instances where an enterprising manufacturer of cotton prints, by this means, put into the market *fac-similes* of English goods before the first invoice was imported from England, and thus forestalled the market. It is no uncommon occurrence, also, to find prints bearing the name of English or French houses which were spun, woven, and printed here; and so exact has been the imitation, that we remember a case where the wife of one of the most extensive calico printers in Rhode Island, on a visit to New York city, purchased an elegant piece of "French" calico, which had actually been printed at her husband's works not a quarter of a mile from her house.

The design is made in duplicate, or rather there is a "sketch" and a "pattern." The first gives the outlines of all the figures drawn in india ink, without coloring. The design is just as large as the "pattern" proper; that is, it comprises the "pattern" once only, which is reproduced indefinitely on the fabric. The "pattern" is a correct representation of the design, perfectly colored, and frequently more beautiful than the figures after being printed on the fabric. The object of the "pattern" is to guide the engraver as to the depth of his lines and to designate the colors.

The design, or outline, being sent to the engraver, he prepares a cylinder of steel, the length of which corresponds with the width of the design, and the circumference with its length. This cylinder is nicely polished and perfectly annealed, being made of the best refined cast steel. It is coated with a varnish of Canada balsam, the sketch being placed upon the steel and rubbed with a hard instrument. The *fac-simile* of the design is impressed upon the varnish, and the engraver begins his work. Now the colored pattern is brought into service. Experience teaches the engraver that for some colors the depth of the engraving must be much greater than for others; as some colors require much of their substance to penetrate the fibers of the fabric, while others seem to have an affinity for the cotton and easily saturate it.

The first "die" is engraved in outline as the "sketch." It is called the "outline die." After being engraved, impressions are taken from it and transferred to similar cylindrical "dies," one for each color and shade, the colored pattern being again called into requisition to guide the workman's graver, as he who is cutting the black must be careful not to infringe on the department of the red or the green, although he has on his "die" the outlines of all the colors. The engraving of these dies is done wholly by hand, and is a work of such nicety that it is intrusted only to experienced hands. Much depends upon the engraver's judgment. If he is engraving a broad leaf, for instance, the bottom of the depression is "cross-hatcheled," that is, scored diagonally twice, like the teeth of a cross-cut file. The intention is to retain by the uneven surface a large amount of color. Other and narrower depressions are scored but once across, while fine lines are not scored at all.

The impressions from the outline "die" are not taken in the same way as that from the paper sketch. The "die" is rubbed over with powdered lampblack, from which the oil has been expelled by roasting at a red heat in an iron vessel. The lampblack remains in the engraving, and that on the smooth surface is removed by the hand. A piece of common white letter paper is then coated with ordinary yellow bar soap, placed, soap side down, on the die, and rubbed with a steel spindle. This transfers a portion of the lampblack in the lines to the soaped paper, which is then placed upon a smooth "die," coated, as the first, with Canadian balsam, and rubbed with the steel. The lampblack outline is, of course, left upon the surface to guide the engraver.

For each color and shade, as before remarked, a separate "die" is used. The figures are in intaglio or sunk below the surface. As these "dies" are seldom or never more than six or seven inches long and two in diameter, they are not suitable for printing the calico from, and other processes are employed before the printing is reached.

The "dies," after being engraved, are hardened. Other cylinders of soft steel are prepared which hold in size a certain ratio to the "die." If the pattern is small the "die" must be small. Some are not more than three-eighths of an inch diameter. The cylinder to which the engraving of the "die" is to be transferred is either exactly the size of the die, twice thrice, or four times its diameter. This cylinder is called a "mill," and has journals or pivots turned on each end. A machine technically denominated "the clams" is the instrument for transferring the engraving of the die to the "mill." It has two parallel rollers, revolving close together, on or between which the hardened "die" is placed and by which it is rotated. Over these are two journal boxes, adjustable, so that the "mill" can be guided by its journals. The "mill" is placed on the die held by these boxes, and by means of a powerful screw is forced strongly down upon the upper surface of the "die," when the "die" and "mill" are made to revolve together. The pressure is not sufficient to produce a perfect pattern of the engraving on the soft "mill," but from time to time it is taken out, the pattern made by the "die" is painted with an "etching ground," composed mainly of asphaltum, and the mill is revolved in a dish of sulphuric and nitric acid and water for a few moments, when the unprotected surface is etched away, or rapidly oxidized. Returning it to "the clams," in connection with the "die," sharpens up the impression, until after repeated operations the design of the intaglio "die" is produced on the surface of the "mill" in bold relief. To insure the rotation of the "mill" in perfect coincidence with the "die" longitudinal scores are cut on its circumference at each end, beyond the pattern, which, by forming corresponding teeth on the mill, actuate the two cylinders as cog wheels.

The "mill" being hardened, is now ready for engraving the copper roller which is to print the calico. These rollers correspond in length to the width of the cloth to be printed, and bear a similar relation in diameter to the "mill" as that did to the "die." The rollers are hollow and are sometimes called "shells." A mandrel is thrust through them having journals at the ends, and the roller and mandrel are placed upon a machine horizontally. The "mill," by means of a sliding head-block, is brought in contact with the roller and its relievo figures impressed into the copper by means of a weighted lever in combination with rotation. As the "mill" transfers its pattern to one section, it is moved along the roller a distance corresponding to the width of the pattern, when the operation is continued, until the roller is covered with the engraving. Sometimes, to aid in this process, etching is resorted to. The surface or unengraved parts of the roller are covered with the "etching ground" and the roller revolved in a trough of diluted acid. This rapidly eats the copper and assists the operation of "milling." As in the "dies" and "mills" the rollers must equal in number the colors required. After being engraved the rollers must be ground, as a burr has been thrown up all around the edges of the figures. For this purpose hollow stones are employed, or rather blocks of stone hollowed to fit the segment of the roller's diameter are used, by being held on the roller as it revolves in water. The surface being polished, the rollers are ready for the printing machine. A description of the process of machine-printing we reserve for another issue.

Recipe for Curing Meat.

To one gallon of water, take 1½ lbs. of salt, ½ lb. of sugar, ½ oz. of saltpeter, ½ oz. of potash. In this ratio the pickle to be increased to any quantity desired. Let these be boiled together until all the dirt from the sugar rises to the top and is skimmed off. Then throw it into a tub to cool, and when cold, pour it over your beef or pork, to remain the usual time, say four or five weeks. The meat must be well covered with pickle, and should not be put down for at least two days after killing, during which time it should be slightly sprinkled with powdered saltpeter, which removes all the surface blood, etc., leaving the meat fresh and clean. Some omit boiling the pickle, and find it to answer well, though the operation of boiling purifies the pickle by throwing off the dirt always to be found in salt and sugar. If this recipe is properly tried, it will never be abandoned. There is none that surpasses it, if any so good.

THE London *Lancet* says:—"Among the uses to which the Atlantic cable has been put is one which would hardly be anticipated. A correspondent communicates to us a telegram which he received from a patient who, being seized with a renewed attack of illness, from which he had suffered in this country, and for which he had been successfully treated, telegraphed to his old medical attendant for directions. These were returned by the same channel, without delay, and we hope they have prospered, and that the proper remittance will follow by an early packet. This prescription will rank among the curiosities of telegraphy."