The Cocoon of a Spider.

At a recent meeting of the Academy of Natural Sciences, of Philadelphia, Dr. H. C. McCook stated that, while walking in the suburbs of Philadelphia lately, he had found under a stone a female Lycosa, probably L. riparia Hentz, which he placed in a jar partly filled with dry earth. For two days the spider remained on the surface of the soil, nearly inactive. The earth was then moistened, whereupon she immediately began to dig, continuing until she had made a cavity about one inch in depth. The top was then carefully covered over with a tolerably closely woven sheet of white spinning work, so that the spider was entirely shut in. This cavity was fortunately made against the glass side of the jar, and the movements of the inmate were thus exposed to view. Shortly after the cave was covered the spider was seen working upon a circular cushion of beautiful white silk about three-fourths of an inch in diameter, which was spun upward in a nearly perpendicular position against the earthen wall of the cave. The cushion looked so much like the cocoon of the common tube weaver, Agalena naevia, and the whole operations of the lycosid were so like those of that species when cocooning, that it was momentarily supposed that a mistake in determination had been made.

After the lapse of half an hour, it was found that the spider had oviposited against the central part of the cushion, and was then engaged in inclosing the hemispherical egg-mass with a silken envelope. The mode of spinning was as follows: the feet clasped the circumference of the cushion, and the body of the animal was slowly revolved; the abdomen, now greatly reduced in size by the extrusion of the eggs, was lifted up, thus drawing short loops of silk from the expanded spinnerets, which, when the abdomen was dropped again, contracted, and left a flossy curl of silk at the point of attachment. The abdomen was also swayed backward and forward, the filaments from the spinnerets following the motion as the spider turned, and thus an even thickness of silk was laid upon the eggs. The same behavior marked the spinning of the cushion, in the middle of which the eggs had been deposited. The ideas of the observer as to the cocooning habits of Lycosa were very much confused by an observation so opposed to the universal experience. Upon resuming the study after the lapse of an hour and a half, he was once more assured of being right by the sight of a round silken ball dangling from the apex of the spider's abdomen, held fast by a short thread to the spinnerets. The cushion, however, had disappeared. The mystery, as it had seemed, was solved; the lycosid, after having placed her eggs in the center of the silken cushion and covered them over, had gathered up the edges, and so united and rolled them as to make the normal globular cocoon of her genus, which she at once tucked under her abdomen in the usual way.

This was a most interesting observation, which Dr. McCook believed had not before been made. The manner of fabrication of the cocoon of Lycosa had been heretofore unknown to him, and, by reason of her subterranean habit, the opportunity to observe it was of rare occurrence. He had often wondered how the round egg-ball was put together, and the mechanical ingenuity and simplicity of the method were now apparent. The period consumed in the whole act of cocooning was less than four hours; the act of ovipositing took less than half an hour. Shortly after the egg-sac was finished, the mother cut her way out of the silken cover. She had evidently thus secluded herself for the purpose of spinning her cocoon.

Dr. McCook also alluded to another interesting fact in the life history of the Lycosa, which had been brought to his attention by Mr. Alan Gentry. A slab of ice having been cut from the frozen surface of a pond about eight or ten feet from the bank, several spiders were observed running about in the water. They were passing underneath the surface, between certain water plants. It is remarkable to find these creatures thus living in full health and activity in mid-winter, within the waters of a frozen pond, and so far from the bank in which the burrows of their congeners are commonly found. It has been believed heretofore, and doubtless it is generally true, that the lycosids winter in deep burrows in the ground, sealed up tightly to maintain a higher temperature.

Golden Streets.

The well known French electrician, M. Louis Maiche, has found that there is gold to be obtained from the quartz with which the roads round Paris are paved. M. Maiche has extracted small quantities of the precious metal by crushing the stone and treating it with mercury. We have not yet heard of the formation of a company for working the streets of Paris to obtain this gold, nor do we suppose that there will be much of a rush for the new "diggings."

EVEN delirium tremens is now traced to a micrococcus: "the worm of the still."

ELECTRICITY WITHOUT APPARATUS.

(1) To produce an electric spark, it is only necessary to warm a sheet of ordinary paper in front of a good fire or stove or over a lamp. Upon going into a dark place and applying the knuckle to the paper a very decided spark will start from the latter, accompanied by a slight crackling sound.

(2) Take two sheets of paper and interpose a sheet of gold-leaf between them. After electrifying them as above described, it will be only necessary to pass a pencil point in a

AN ELECTRIC SPARK FROM A SHEET OF PAPER.

zigzag manner over their surface to cause the appearance thereon of a luminous flash of considerable intensity.

These experiments, which are very easy to perform, may serve to demonstrate the fundamental rules of static electricity to children.

Fireproof Paper.

A fireproof paper is made by a combination of asbestos and infusorial earth.

About forty parts, in bulk, of fine or disintegrated asbestos fiber and about sixty parts of what is known as "infusorial earth" are taken and placed in a dry state in an ordinary beating engine, and then sufficient water is added while the machine is in operation to beat the mass into pulp just thin enough to form upon an ordinary cylinder. The web is taken from the cylinder and finished in the usual manner. The asbestos fiber is long enough to give strength and elasticity to the paper, and the infusorial earth, which is a good non-conductor of heat, and fireproof, forms a filler or padding, the two adhering together strongly and forming a flexible paper, which may be used wherever ordinary paper board is employed, it differing, however, from ordinary board in being fireproof.

The infusorial earth should be calcined before use to free it from impurities not fireproof.

If desired, and in some instances, a small quantity of lime, starch, or other cementitious substance is added. The proportion of asbestos and infusorial earth may be varied.

THE TARANTULA OF SOUTHERN CALIFORNIA.

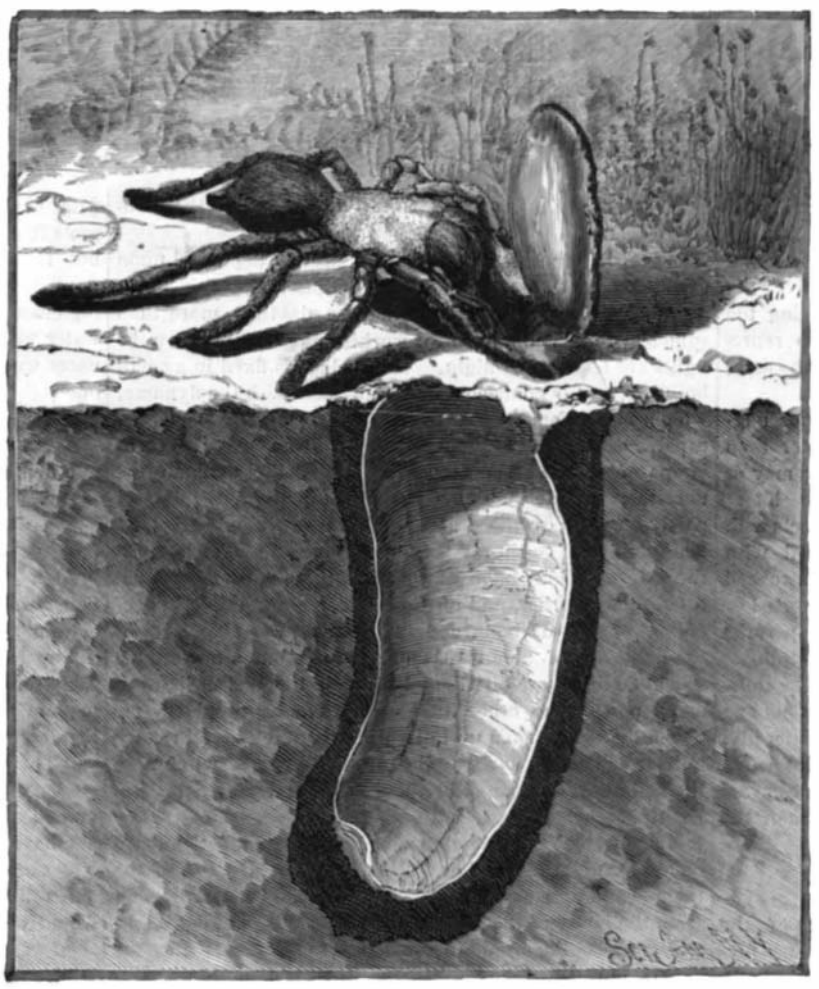
Ugly, vicious, energetic, and to a certain degree poisonous, are the spiders that infest the southern part of California, and yet when closely studied they present many peculiar characteristics, both in regard to their structure and habits. Among the most valued trophies tourists carry away with them from the coast are neat cards adorned with these animals, and a case containing the nest so arranged as to show it wonderful trap door and the delicate lining of the interior. The adobe rauches are full of these strange little habitations, and some of the sunny valleys among the foot hills are literally strewn with the small tunnels, capped with the almost invisible door. Our engraving shows the tarantula (*Mygale hentzii*) as he is about to enter his abode, both being full size.

The general appearance of the tarantula is very clearly shown in the engraving. The legs are larger, and are not furnished with so long and dense a growth of hair as are the specimens found in other sections of the Southwestern States. The back is covered very thickly with extremely fine short hair; the back and the outer joints of the legs are of a light brown color, the remainder being of a deeper shade. The forward part of the head is divided, and each division terminates in a sharp, downwardly curved, and jet black horn or hook.

The tarantula pounces upon his prey, and thrusting in the hooks most securely holds his victim. It is seldom met in the daytime, preferring to seek its food during the night, returning to its nest in the early morning. Although pugnacious when cornered, he will not seek a fight, and is more anxious to escape than the stranger whom he chances to meet.

This tarantula is justly celebrated for the architectual skill he displays and for the luxurious comfort of his dwelling. Having selected a suitable site, he digs a hole varying from four to eighteen inches in depth, and just large enough around to admit him easily, although it is puzzling to conceive how he ever gets his long, ungainly, and many jointed legs comfortably disposed in so small a space.

The walls are carefully smoothed, and are completely covered with an exceedingly fine fabric of his own manufacture. The top of this tunnel is slightly flared, and in this widened part is fitted the door, which is hinged at one side so that it may be easily lifted. The inside of the door is finely finished, and covered with a web similar to that on the sides. The tarantula knows that this door is not heavy enough to insure a tight fit when it is dropped, so he makes a small handle near the center of the under side by which he pulls the door closely down, thereby insuring a joint that most effectually excludes all dampness from his abode. The handle is a strong web, the two ends of which are attached to the door at points about one-sixteenth of an inch apart. The outside of the door is placed about at the level of the ground, and is so nearly the same color as the surrounding soil that it can be discovered only after the most careful search. The joint of the door is so well made and the colors are so nearly alike that it is almost impossible to ascertain upon which side the hinge is placed, except by raising the door. The framing of the door seems to be a coarse, strong web, which is extended at one side to form the hinge, and which is bonded with earth to give it the requisite stiffness. The hinge is about three-eighths of an inch wide, and acts as a spring to shut the door immediately after the owner's exit. For the tarantula and nest from which our engraving was made, we are indebted to the courtesy of Mr. H. J. Finger, of Santa Barbara, Cal.



THE TARANTULA OF SOUTHERN CALIFORNIA.

Preparation of Aluminum.

According to an account which the SCIENTIFIC AMERICAN finds in *Chemiker Zeitung*, ferro-silicium is mixed with fluoride of aluminum in equal proportions, and the mixture is exposed to a fusing heat. The materials decompose each other, and volatile fluosilicium with iron and aluminum are produced, the latter two bodies being alloyed together. In order to extract the valuable aluminum, a copper alloy is formed by melting the iron alloy with metallic copper; by reason of the greater affinity of the copper for aluminum this is secured, leaving with the iron only a slight residue of aluminum. When the fused mass is cold, copper bronze and iron have so settled that both bodies can be easily separated. In place of the pure fluoride of aluminum, chloride can be used, when chlorsilicium and iron aluminum alloy are formed. If in practice the chemical reactions above outlined are found to hold true, this patented process promises to be of considerable value.

LARGE fortunes are rare in Switzerland, and the salaries of public functionaries very modest. The President of the Confederation receives $3,000 a year, few judges more than $1,250, and there is probably no bank manager in the country who gets more than twice that amount. A man with an income of $2,500 is considered very well off indeed, and to have $5,000 is to be rich.