ELECTRIC FLYING MACHINE.

The improvements recently made in electric motors have suggested to the eminent French electrician, M. Gaston Tissandier, the idea of employing these machines to propel air balloons. They can be used in connection with M. Planté's secondary couples, which store a large amount of electric energy and weigh relatively little. Such a motor possesses great advantages. There is no danger of firing the volume of hydrogen above, and it has a constant weight, there being no decrease by combustion.

In making his experiments M. Tissandier employed a small oblong balloon ending in conical points. This balloon, which is like that used by M. Giffard, is 3 m. long by 1·30 m. in diameter, and has a volume of about 2 200 liters. Inflated with pure hydrogen it has an ascensional force of 2 kilogrammes.

It is worked by a small electric motor resembling the Siemens dynamo, and weighing 220 grammes. This works a light propeller 40 inches in diameter. This motor is suspended below the balloon, and will propel the balloon for several miles with a Planté element of 220 grammes, while with a secondary couple weighing 1·300 kilogrammes the duration of its rotation is considerably increased. Under these conditions the armature turns 6·5 times a second, and acts as a propeller, giving the balloon a speed of 1 m. a second during more than 40 minutes. With two secondary elements, a propeller 60 inches in diameter can be used, which will propel the balloon at the rate of 2 m. a second during 10 minutes; and with three elements a speed of 3 m. can be obtained.

These experiments took place in the "Conservatoire des Arts et Metiers," at Paris, in a large hall, where the balloon could move freely, restrained only by a light rope dragging behind it, which served at the same time to guide and to measure its speed.

The working power of the electric motor was measured by the simple method of lifting weights. A secondary element, and afterwards two elements together, were attached to the motor, and it was found that the swiftness of the revolutions varied according to the weight lifted.

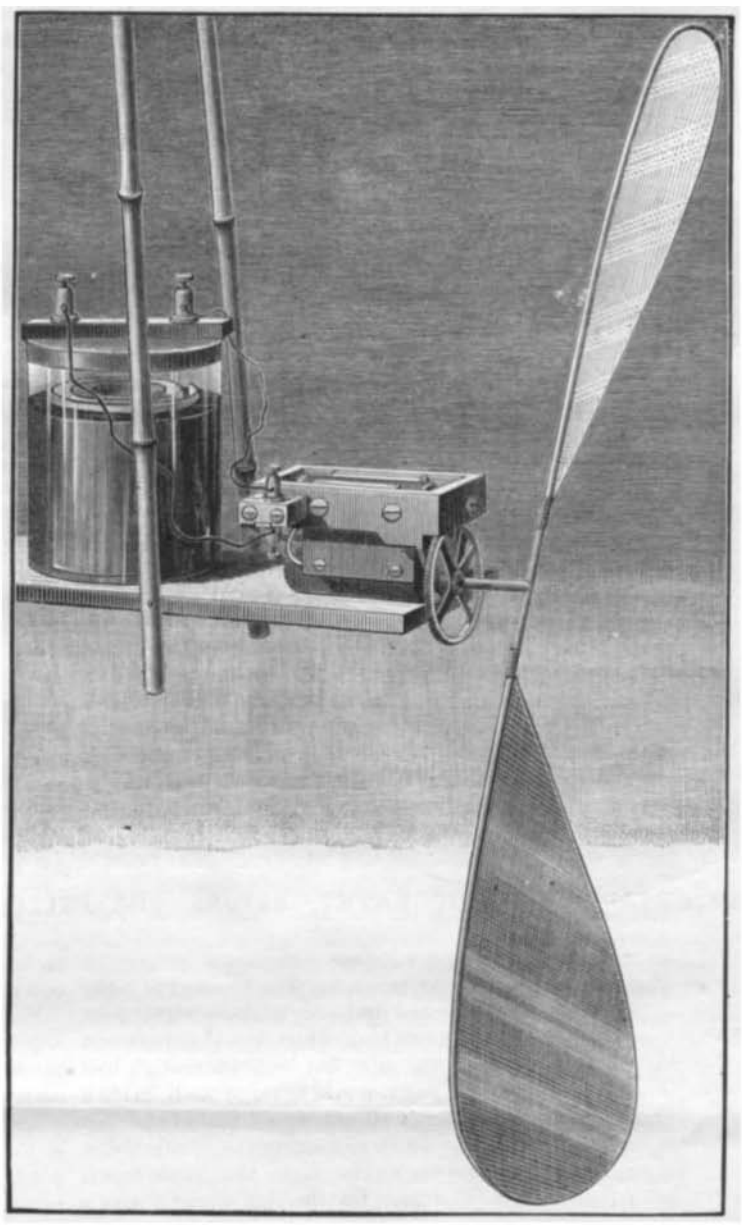
This little motor, when developing a maximum of energy with a single element, produced a force of 90 grammes at a speed of 5 revolutions a second. With two elements a speed of 12 revolutions a second was obtained and a power of 420 grammes. With three elements the power was 1 kilogramme.

In working with two elements, if the speed is reduced to 5 or 6 revolutions a second, the power is also reduced, and, on the other hand, if the speed becomes greater than that which corresponds to the maximum power, the working force is correspondingly reduced. For example, if the speed obtained is 14 or 15 revolutions a second, the power is only 375 grammes. The manner this trial balloon acted, and the speed obtained with the propeller, afford a very satisfactory outlook for aerial navigation, as it must be remembered that in balloons the surface does not increase with the volume, consequently the results obtained with larger balloons would be still more favorable.

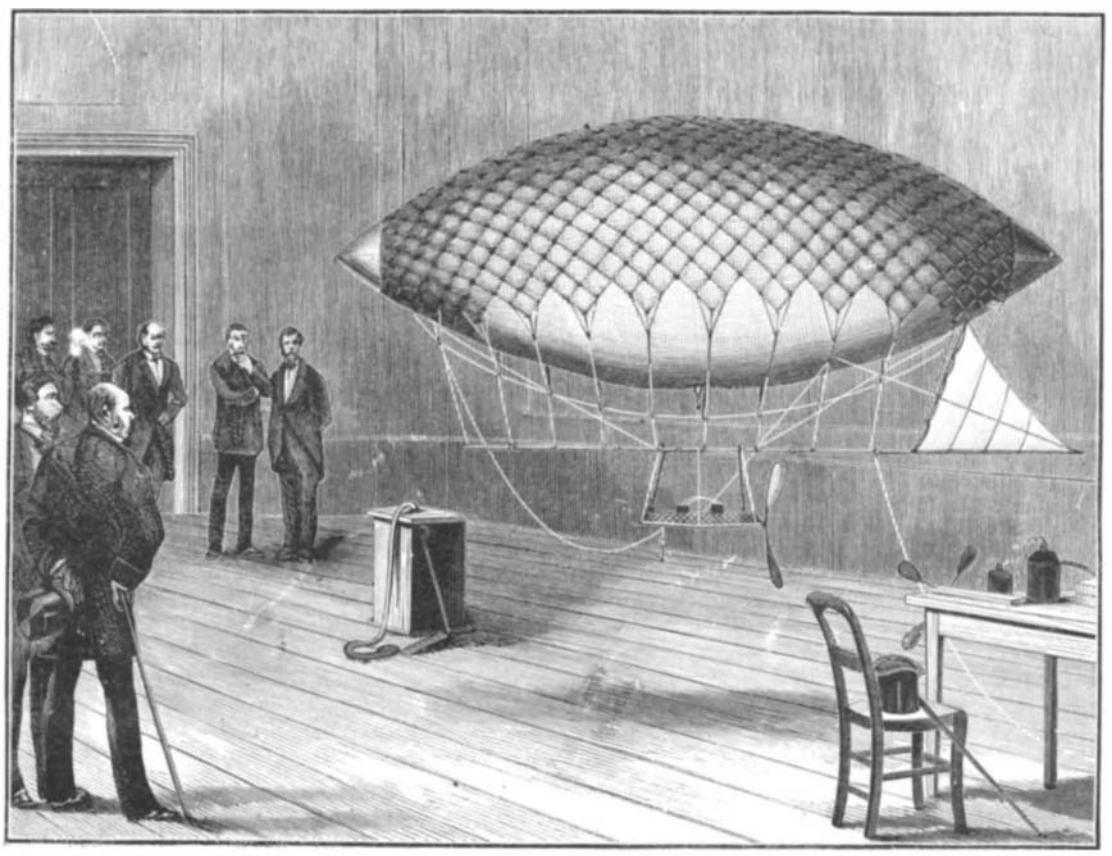
In working condition an electric motor equal to 6 horse power and weighing 3·0 kilogrammes, with 900 kilogrammes of secondary elements, would easily carry 1,200 kilogrammes when attached to in a hydrogen balloon of 3,000 cubic meters, elongated in shape like those used in 1852 by M. Giffard, and in 1872 by M. Dupuy de Lôme. This balloon would be 40 m. long by 13·50 m. wide across the center, and its ascensional force would be about 3,300 kilogrammes. It would weigh, with all its accessories, 1,200 kilogrammes; so there would remain for the voyagers and for ballast over 1,000 kilogrammes. In calm weather this balloon, worked by an armature of 5 to 6 m. in diameter, would obtain a speed of 20 kilogrammes an hour, and in windy weather would be powerful enough to move out of the direct line of the air current.*

Of course, this balloon could only go for a limited time, but that could easily be decided by experiments, in which results even more favorable might be obtained by making the motor and piles especially light for this purpose.

Until now no balloon has ever been really steered, that is, has never returned to its point of departure after having navigated the atmosphere at the will of its pilot. Necessarily such voyages can only take place in calm air and during a short time; but the essential point is that they have succeeded at all; and no physicist can deny that the electric motor and the secondary piles have solved the problem of aerial navigation.



PROPELLER OF ELECTRIC FLYING MACHINE.



ELECTRIC FLYING MACHINE.

* Of course the idea of guiding balloons against strong winds belongs to Utopia; but for short voyages, such as escaping from a city during a siege, it would be very valuable to be able to steer the balloon.

Southern New Jersey Sinking.

Professor George H. Cook, State Geologist of New Jersey, concludes that the land in Cape May and Cumberland counties is gradually but certainly sinking. From knowledge now in his possession he estimates that the surface has settled about eight feet during the last hundred years. During a recent visit he declared it his intention to test the matter by placing stone posts in the ground at certain localities, a record of which should be kept so as to insure their being found at any future time, said stones to be so set and marked with reference to their height above the sea level that it may be positively ascertained whether this portion of the State is becoming lower, and at what rate.

The Alphabet in Prehistoric America.

At the recent Science Convention, at Cincinnati, Major Wm. S. Beebe, of Brooklyn, read a very suggestive paper on the inscribed records of the Mound Builders, especially those discovered at Piqua, Ohio, and Davenport, Iowa. The former were on tablets of earthenware, the latter inscribed slates. On the Piqua tablets the characters are in horizontal lines, and in four of these lines they were, in each case, six in number. In the fifth and remaining instance there were five, but this arrangement was some distance, in the longitudinal direction of the tablet, from the group first mentioned, which were in both cases written in couples.

One of the Davenport slates was inscribed on one side, the other on both. The stone inscribed on but one side bore on its surface a series of concentric circles. Between the outer two of these were twelve equidistant signs, presumably the zodiacal signs. The slate had two perforations on one of its edges, evidently for suspension.

Major Beebe claimed that the Piqua inscriptions are the names of the eight zodiacal signs on the Davenport slate, excepting Capricornus, Aries, Cancer, and Libra, which four signs are represented by four initial letters on the back of one of the Piqua tablets, and which representing the north, west, south, and east respectively, and corresponding to the Tucatec Bacobs, or world holders, as they were called, and to which a peculiar importance is attached.

The forms of the Piqua letters are almost precisely those that occur about the Mediterranean, and whose phonetic values have been determined by Alois Hess. Major Beebe believes that he has been able to trace each form of letter to aboriginal American picture symbols, in which the same significance obtains in both European and American forms. Having fixed the significance of these letters, he has, he says, deciphered the inscription on the stone from the Grave Creek Mound, West Virginia, and that on the Pemberton ax. In all these cases the names deciphered refer to certain stellar combinations, and in the case of the slates and tablets, which are perforated, were probably in the nature of charms. In the case of the Pemberton ax part of the inscription is read with the edge of the ax up, the remainder with the edge down, and this inscription, too, probably, had reference to some rite or species of divination in which the ax played an important part.

A very significant feature in regard to this ax is, that the names read on the ax, when held with the edge up and down, have been preserved with the change of but one letter by an Esquimau tribe in Northwest America as the names of their deities of good and evil respectively, whereas the ax itself was found at Pemberton, N. J. The generally prevalent idea as to the relation of the Esquimaux and preglacial man makes this incident peculiarly suggestive.

The Crater of Kilauea.

Tourists to Kilauea will remember certain active pools of lava, the North and South lakes, which ordinarily bubbled and tossed a fiery flood at a depth of about 120 feet below the floor of the great crater. Now, says the Honolulu *Advertiser* of July 26, these lakes have all been filled up, and there have arisen peaks and cones of hard lava that rise over 100 feet above the south bank of the great crater, which is about 1,000 feet high. But there has burst forth a new opening in the great crater floor not far distant from the old lakes, a new lake, almost round in form, about 600 feet across, and 70 feet in depth, in ordinary stages, below the surrounding brink. Here the great Hawaiian volcano presents the most varied fantastic play of liquid lava. Sometimes it almost seems to steep, and the disappointed visitor looks down into a black valley, and observes a smoking pit giving no more evidence of combustion than a tar kiln. The surface presents a dark silver gray hue, with a satiny shine. This is a crust of quiescent lava, and the observer who has expected to have his sense of wonder strained to speechlessness says: "Is this all?" No! look! the frozen, glassy lake is alive. What a

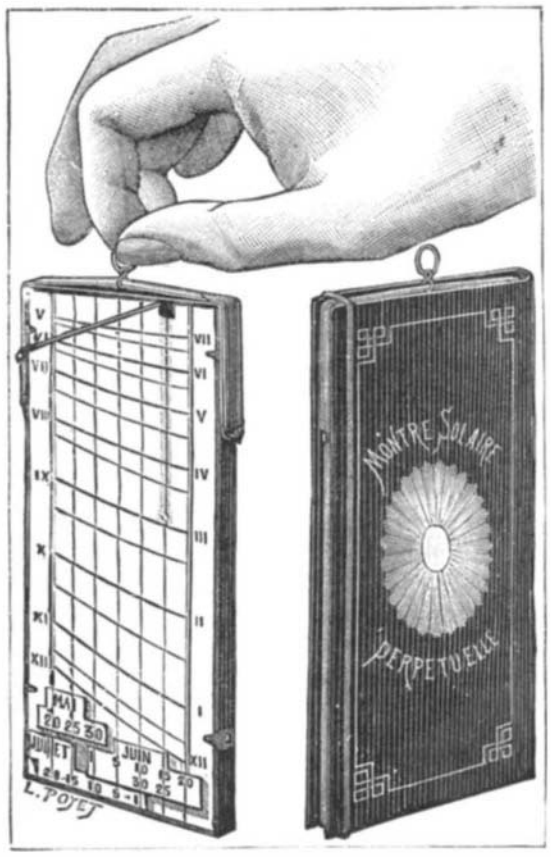
heave in the center—some mighty beast lifting up that floor! Now a wave runs round the incrusted marge, and there is an outburst, a blood-red fount, gushing and bubbling from one of earth's arteries. The broad disk of the lake heaves and trembles. Fitful gaseous flashes flit across. The moving floor cracks. A serrated fissure, like the suture of a skull, runs from marge to marge, and quick, darting streaks, sudden cracks of the crust, shoot across in all directions. These serrated streaks are at first rosy lines on the gray surface, then they widen like crimson ribbons, broadening to the view. They undulate with the billowy motion of the whole upheaving surface. Another crimson fount springs up along the now fretting and roaring rim of the lake, and another and another of the wildly up-leaping fountains of fire toss high their gory crests, even casting gouts and clots of the red spray that fall and harden near the observer's feet. By this time the spirit of our inferno is aroused. The fierce red lake is all boil and leap and roar. It is more than the roar of sea surfs. The surging tide of the molten earth sounds a deeper bass than any note of the sea; and the heaved-up crust, broken into fragments, is churned and dissolved in the boiling flood. The roaring gulf is now, indeed, a vortex of indescribable glories and terrors.

DE COMBETTE'S SOLAR WATCH.

Sun dials are of two kinds: in one the hour is indicated by the inclination of the shadow, and in the other it is shown by its length. The inventor of the very simple little apparatus represented herewith has chosen the latter mode.

The arrangement of the "watch" is as follows: To the sides of a block of mahogany are affixed four clasps, which serve for holding in place the cards upon which are inscribed the different months. In the engraving, we have the card for the months of May, June, and July. Over the top of the block extends a rubber band which is fixed to the sides by means of rings. A third ring, through which the band passes, serves for holding the apparatus. A steel needle having an aperture at one extremity serves for projecting the shadow on the card.

To use the apparatus, the unperforated end of the needle is placed between the wood and the rubber, on the line of the day of the month. Thus, in the cut it is on the line of the 15th and 20th of June. The apparatus is then held by the ring, and turned to the right or to the left until the shadow exactly coincides with the line. The luminous point projected by the eye of the needle indicates at the right the hour for the morning, and to the left that for the afternoon. It will be



DE COMBETTE'S SOLAR WATCH.

at once seen, on reading the card, that on the 20th of June the sun is at its greatest elevation, and that on the 25th it is at the same height as on the 15th; and that on the 1st of July it is at the same height as on the 10th and 30th of June, etc.

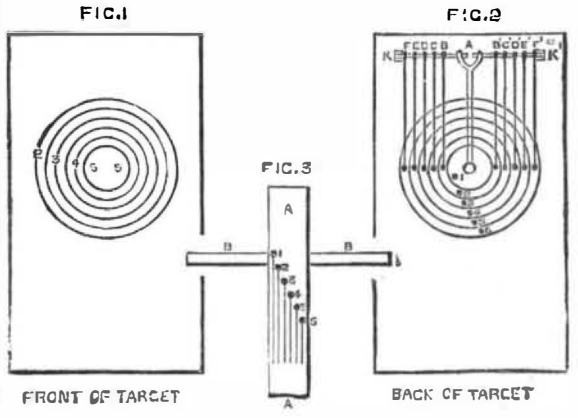
The figure to the right shows the apparatus inclosed in its case.—*La Nature.*

Scientific Exploration of the Northwest.

It is said on good authority that the Northern Pacific Railroad Company and the Oregon Railway and Navigation Company have united in putting a scientific exploring expedition into the field, for the purpose of examining into the mineral, agricultural, and other resources of the territory tributary to the two companies between Lake Superior and the Pacific coast. Prof. Raphael Pumpelly, until now in charge of the coal and iron department of the late national census, has been appointed chief of the expedition, and he has already started for Montana to examine the principal mining districts in that Territory. The work of the expedition will extend through several years.

SELF-REGISTERING TARGET.

The target here illustrated is the invention of Dr. Wilson, of Hawkhurst, Eng. It consists of a sufficiently thick plate of iron, out of which six circular disks or concentric flat faced rings of necessary breadth are made, as seen at Fig. 1. The rings must be of such diameters that there shall be a clear opening all round between each of them of about three-sixteenths of an inch or a quarter of an inch, so that the disk rings—see Fig. 2, back of target—hang by hooks of sufficient length on the cross rod, K K, and work on it, as an easy joint, may move backwards and forwards without



touching each other. They support in pairs—with the exception of No. 5—one of the disk rings, which form the face of the target, F F support ring 2; D E, D^1 E^1, support rings marked 3; B C, B^1 C^1, rings marked 4; and A supports 5, the bullseye. When the bullet hits the face of one of the disk rings, it swings back, but, by the ring's own natural weight, it immediately rights itself, and falls back into its original position. The spots, 1 2 3 4 5 6, are nipples or tongues. One is fixed in the back of each of the disk rings; and when the ring is suddenly forced back, its nipple plunges into a small hole—see Fig. 3—opposite, to correspond in the strong plank, A A, faced with iron, behind the target, and to which the target is fixed. The holes in A A, Fig. 3, are also marked 1 to 6; into these the nipple plunges deep enough to touch the sensitive needle, and through this medium sets a signaling apparatus in motion. The sensitive needle must be sufficiently deep in each hole to be entirely protected against any accidental breaking and flying about of pieces of the bullet. The electric apparatus can be made safe behind the broad plank, A A. On the inside of the crossbar, B B, Fig. 3, a short distance behind the target disk, there are pads or buffers, to deafen the harsh sound of the iron disk in dashing against an iron surface, and also to prevent the disk ring being thrown back too far by the impact of the bullet. In Fig. 1, 5 represents the bullseye; then 4 and 3 are each divided into two rings. If the bullet strikes on the opening between 5 and the inner ring 4, forcing both back, it would not be a bullseye, but the best position on 4; if on the inner ring of 4 only, it would be a more valuable position than if it struck on the opening between the two rings marked 4, forcing both back, but this position of the shot again would be still more valuable than if the bullet hit the outer 4 ring only. These hits would point out a relative value, say equal to 4¾, 4½, 4¼, 4, yet all equal to 4, but showing a difference, and they can be recorded with unfailing accuracy in the firing point at the moment the bullet hits the target. The rings marked 3 may be divided in the same manner. Thus eleven different values of hits may be recorded by this target. The hooks by which the disk rings hang require to be considerably bent outwards, all except F F, to allow the rings to swing sufficiently far back, and not touch any of the other's hooks.

Trade Schools in New York.

In the fall of 1880, under a joint arrangement between Richard T. Auchmuty, of this city, and the trustees of the Metropolitan Museum of Art, a technical school for the industrial education of artisans in the elements of mechanics and of design was established in a building specially erected and presented by Mr. Auchmuty for the purpose, and situated in First Avenue, near Sixty-eighth street. The school at once drew a large attendance. Classes were formed for practical instruction in drawing and design, decoration in distemper, modeling and carving, carriage draughting and plumbing, and no less than 143 pupils were enrolled. The school was open day and evening. Lectures were given by specialists in the trades and arts, but a prime feature was made of shop instruction by foremen and journeymen from factories in this city.

Since the schools were closed last spring a wealthy gentleman of this city has given $50,000 to the Metropolitan Museum of Art, to be devoted to the advancement of art education. It has, therefore, been deemed best to withdraw the art classes from the building at Sixty-eighth street and to establish them on an independent basis at Glass Hall, in Thirty-fourth street. The artisan classes will remain in the Sixty-eighth street building, and be known as the New York Trade Schools. The school for the decorative arts will be under charge of Mr. John Buckingham, former manager of the schools, and the trade schools will be under the supervision of Mr. Charles F. Wingate, sanitary engineer, who had charge last winter of the classes in plumbing and sanitary engineering.

The course of instruction for the coming year will embrace many new features. There is a large and well appointed workshop, where instruction will be given in the manual branches of the trades. Attached to this workshop will be a collection of the articles and materials used in plumbing. It is proposed to make this collection as complete as possible. Dr. Chandler, president of the Board of Health, and Professor Egleston, of the School of Mines of Columbia College, will take part in the series of lectures to be given to the class.

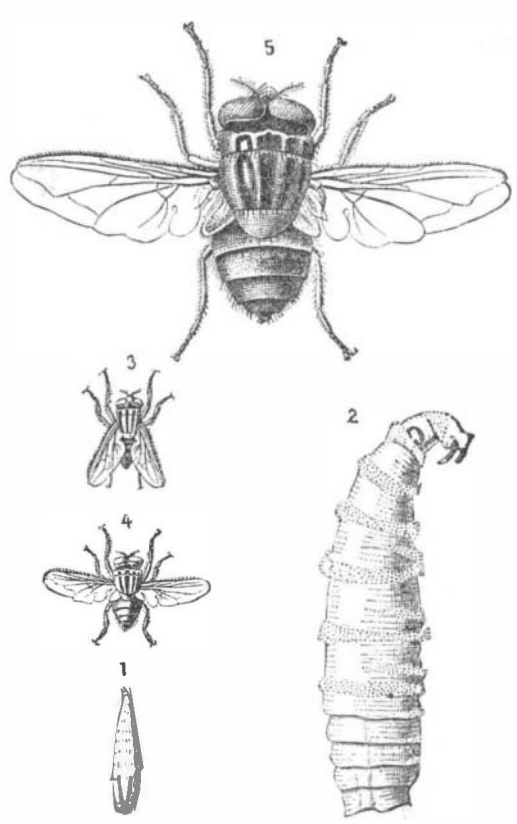
These trade schools are not intended to be either a charitable or a money making institution, the charges being based on the actual cost of the instruction given.

A DEADLY FLY.—NEW CASE OF MYIASIS OBSERVED IN THE ARGENTINE REPUBLIC.

Mr. P. Auguste Conil has recently described, in the *Annales des Sciences Naturelles*, some new cases of myiasis observed by him in the province of Cordoba (Argentine Republic). This affection, which is nearly always fatal, is brought about by a fly, *Calliphora anthropophaga*, Conil, represented herewith, and which, depositing its eggs in the nostrils of an individual, lays the germs of a horrible malady. We will allow Mr. Conil to describe in his own words one of the cases that he witnessed:

"The house situated alongside of mine is occupied by Mr. Auguste Ortiz, whose family lives at Totoral, a village lying sixty miles to the north of Cordoba, very near the line of railway connecting the latter with Tucuman. One of his sisters, Josefa Ortiz, aged 18, was taken sick, and experienced so acute pains that she decided to consult a physician, who, after questioning and examining her, said that she had an attack of angina and treated her for that affection. In spite of all the remedies administered, the pains, far from ceasing, increased in intensity, and the mother, justly alarmed, wrote to her son to consult another practitioner at Cordoba.

"He went at once to Dr. Lesbini, and gave him all the details that he had just received in regard to his sister's case. On Sunday, January 5, 1879, Josefa began to complain of insupportable itching in the right nostril, and, on the same day, had several attacks of bleeding at the nose. The days following she experienced violent pains in her face, nape of the neck, and throat. The physician in attendance, finding that he had made a wrong diagnosis, advised that the patient should be sent to Cordoba in order that she might be within reach of remedies and medical skill



CALLIPHORA ANTHROPOPHAGA.

1. Larva, natural size.—2. The same enlarged, side view.—3. The perfect insect, natural size.—4. The same, wings extended.—5. The same, enlarged.

"On the 14th of January her palate was perforated, and two larvæ, accompanied by matter, came out of her mouth. Having smelled a branch of basil, eighty larvæ, pretty well developed, escaped from her right nostril. The pains becoming more and more violent, Auguste Ortiz was notified and at once left for Totoral. Having arrived at home his sister's state seemed to him to be so grave that he resolved to take her with him to the city. He narrated in all its details the consultation that he had had with Dr. Lesbini, and said that, according to the opinion of the latter, Josefa's trouble was produced by larvæ, which, in the egg state, had been deposited in her nostrils by a fly. The relatives of the patient, notwithstanding the eighty-two larvæ expelled, could not believe such an assertion, as it appeared impossible that the *worms* that they had seen could come from a fly. They doubted it all the more, too, because the patient asserted that no fly had entered her nose.

"Struck by what she had heard, one of the sisters of the