

## THE CUBAN INSURRECTION.

At the entrance to the city of Santiago de Cuba, on the royal highway of the island, stands the fort of Jarayó. It is one of many similar structures that were built by the Spaniards at the time of the former insurrection, twenty years ago, for the defense of the entrances to the principal towns. Jarayó guards the head of the bridge over the river of the same name, and is garrisoned by a company of soldiers under the command of an officer. The fort is built of mortar concrete, like all the others that were erected as before mentioned; and although it has been attacked many times by the enemy, they have never been able to effect its capture.

The city of Santiago de Cuba is situated on the south side of the island near the eastern extremity, and is the capital of the province of the same name. The province is divided into seven judicial districts, among which are Manzanillo, Bayamo, Holguin, Baracoa and Guantanamo. The province of Santiago de Cuba is at present the scene of active hostilities between the Cubans and the Spaniards. We are indebted to La Ilustracion Espanola for our engraving.

The distinguished Spanish statesman and patriot Pi y Margall has lately given expression to his views on the condition of Cuba, in an article published in El Quijote, a Madrid newspaper. He urges the

## A New Method of Making Lantern Slides.

BY E. W. SCRIPTURE, YALE UNIVERSITY.

In lecturing on experimental psychology I have found it useful to project on the screen numerous views from the illustrations in my book, "Thinking, Feeling, Doing." At first I prepared the slides, at considerable expense, in the usual way by photography; but it finally occurred to me that it might be possible to print directly on glass from the blocks used in the book.

The electrotypes were obtained and the glass printer in a clock factory was found to do the work. After several experiments, the correct method was established.

The metal portion of the cut is mounted on a board of a thickness suited to the particular frame used in the printing.

It is inked with a fine ink (e. g., a \$2 cut or ex-job ink), tempered to the proper consistency with Calcutta boiled oil and japan drier. The precise degree of temper depends on temperature, humidity, and other conditions.

The inking is done by a simple hand roller, of the kind used in ordinary printing.

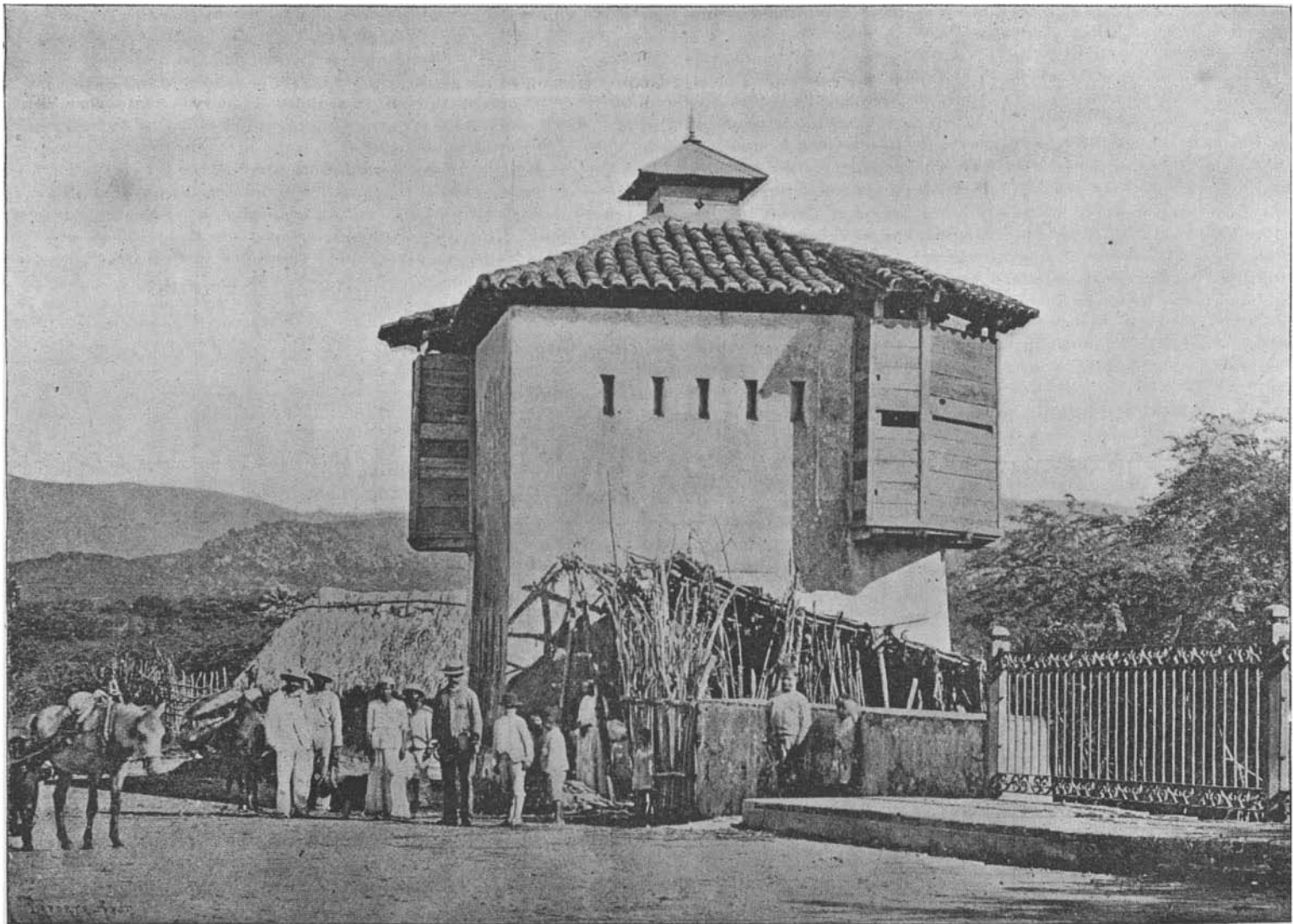
The block lies face upward on the table and the piece of plain glass is placed at the appropriate distance on a level with it. A composition roller of glue and molasses, made a trifle harder than the regular

have given a description that makes the method possible to any glass printer, or to any one willing to learn by practice. Where such persons are not available, I am willing to put any one into communication with the printer of my own slides.

## The Pigeon Tremex.

ANSWER BY PROFESSOR C. V. RILEY.

The insect sent by Mr. Edward Pollock, of Lancaster, Wis., about an inch and one-half long, with brownish-black body, four purplish-brown wings, legs more or less yellowish, and the abdomen transversely marked with yellow, most prominent on the sides, and having an awl-like ovipositor which projects beyond the tip, is the female of the pigeon tremex (*Tremex columba*). The male is much smaller and darker and lacks the awl-like ovipositor. This insect is quite commonly distributed over the United States, and, therefore, is not out of its latitude in Wisconsin. It is relatively harmless, for while its larva feeds upon the wood and bores into the trunks of various trees, it is never so numerous as to do any material harm. It belongs to the order Hymenoptera and the family Uroceridae or horn-tails, and will be referred to under one of these various terms in any cyclopedia which may happen to mention it. The boys quoted were wrong in saying that they found these insects burrowing in holes in a



FORT JARAYO, NEAR SANTIAGO DE CUBA.

Spanish government as a measure of justice to come to terms with the Cuban insurgents without delay, by granting them freedom and independence. He reminds the Spanish people that no nation has the right to occupy territories populated by other people unless with their consent. If a nation occupies them by force those conquered can at any time fight them until they drive them from their soil. For two centuries, he says, Spain fought for independence against Rome. During seven centuries the Spanish people fought against the Arabs, who occupied the choicest regions of the peninsula. The Spaniards did not lay down their arms until the Moors were driven out over the sea to Africa. At Malaga the Spaniards even robbed the departing Moors of their jewelry. "If we acted in that way," says Senor Margall, "is it just that we denounce as bandits those who are now fighting against us for their independence? For the same deeds and the same cause must we call those bandits whom here we call heroes? Those who drove us away from Mexico, Guatemala, Colombia, Ecuador, Venezuela, Peru, and Chile are hailed as heroes all over America and over the world. Let us be just to those who are now fighting in Cuba. If there is now war in Cuba, it is all our own fault. It is our duty to mend our error and stop it. Let us allow them to govern themselves politically and economically; and in order that they may be grateful for our generosity, let us help them to their autonomy without any disturbances or bloodshed."

We regret our limited space prevents us from giving the full text of this enlightened and admirable essay.

printer's roller, is then run forward on two guides. As it passes over the block it takes the impression. On reaching the glass, after one complete revolution, it transfers the ink impression directly to it. I do not think it possible to run this roller evenly enough without the steel guides; at any rate, it would not pay to waste time in trying it.

The result is a print on the glass just as if on paper. Curiously enough, the prints on the glass are superior to those on paper from the same block. The positives are then finished up as lantern slides in the usual way.

The superiority of the process lies in its great cheapness. Ordinary slides never cost less than 50 cents each. Prepared in my way, the first slide costs about 75 cents, but the future slides from the same block do not cost over 5 cents each.

The possibilities of the method are extensive. The publisher of an illustrated book, for example, can print off sets of slides for lecturers. Lectures on art, botany, geology, history, etc., can be provided at a small cost. Moreover, views not taken from books could be prepared by first turning them into zinc etchings, half-tones, or wood cuts and then printing from the blocks. The extensive use of the lantern for purposes of instruction in the common schools is impracticable at present, mainly owing to the cost of the slides. With printed slides at a trifling cost the difficulty is removed.

People often complain that new ideas may be useful, but that, when anyone wants to put them in practice, it is difficult to find just the proper method. I

lawn and covering the holes up before leaving them. They had in mind, without much doubt, one of the common large hornets (*Stizus speciosus*), which has somewhat similar coloring, but is a stouter and somewhat larger insect.

The female pigeon tremex bores with her ovipositor into the trunks of various trees that are already somewhat enfeebled. She may often be caught at this operation, and in fact sometimes gets so fast secured that she is unable to withdraw her ovipositor and perishes in the act of boring. She consigns an egg to the bottom of the perforation, and the larva that hatches therefrom bores into the trunk. The egg is rather elongate, pointed at each end, and about one-twentieth of an inch long. The larva has short thoracic legs, very strong gnawing jaws and a short anal thorn. It transforms to a naked pupa within the burrow, but is much pursued and preyed upon by the larva of our largest ichneumon flies, species of *Thalessa*, which, in the female sex, have immensely long and thread-like ovipositors, well calculated to probe and discover the burrows of the tremex larva.

## Long Distance Telegraphing.

By the connection of several different lines telegraphic communication was established between Derby and Cape York, Australia, a distance by the wires of 7,246 miles. This is believed to be the longest telegraph line in the world. The rate of transmission was eleven words per minute. There were fourteen repeating stations.

### The Bicycling Era.\*

This is the era of the bicycle, and nearly all the able-bodied men and women, boys and girls in the country are giving thought to the advantages secured by this distance-reducing and time-saving machine.

Every person who can walk can ride a bicycle; this method of progression is open to all save the very aged and infirm and those disabled by accident or disease. While ago we now and then heard a protest against riding because it was undignified and conspicuous. It merely seemed so because it was unusual. Several years ago a bishop denounced the practice by women as immodest and therefore immoral. An immodest woman on a bicycle would surely be immodest still, the wheel not having any power to save her, but an immodest woman would be immodest walking in the street or sitting in church, or wherever she might be. The bicycle has nothing whatever to do with modesty or immodesty, with morality or immorality; and when the pious bishop uttered his denunciation of the machine and its use, his intellect must have been befuddled by too much pondering on subjects too hard or too easy for him. But his dictum has not counted for much, for the bicycle is growing in popularity every day, and the manufacturers, one of whom at least is turning out 100 machines every day, have difficulty in filling the orders that are sent to them.

In 1887 A. H. Overman, who had for years been experimenting with bicycle construction, recognized that in a new type which he then began to build, and which he called the Victor, a bicycle had been invented which was not merely an implement of sport, but a factor in the civilization of the world. This is now known as the safety bicycle, and is the universal type. When this type was first introduced, the wheels had narrow steel tires, and the rider, when the way was rough, was jolted in a manner that was uncomfortable and exhausting. Rubber tires were introduced, and followed by the introduction of springs under the seat or saddle. These inventions were an improvement, but still the vibration continued, though in a less degree. Then the pneumatic tire was introduced, and when its construction had been so perfected that the user could have reasonable confidence in its lasting qualities, the bicycle problem may be said to have been solved.

To be sure, there has been a constant effort to secure lightness of construction, and this has been in a great measure achieved. Five or six years ago a light machine would weigh about 50 pounds; now a good machine for general use on the roads and streets will weigh only about 25 pounds. For racing purposes machines are made considerably lighter than this, but for work on the roads a machine of a less weight than 23 pounds is apt to be unsafe, and those who are about to go in for bicycling are advised most strongly against being influenced in their choice of a machine by this question of weight alone. A good bicycle is of as much importance to the wheelman as a good horse is to him who prefers horseback riding over other forms of exercise. A man with an unsatisfactory machine to start with is more likely than not to take prejudice against bicycling and give up permanently, much to his own injury, what is the most healthful and most exhilarating sport and method of progression yet given to man.

At present, as has been previously intimated, the bicycle is coming into very general use. Chiefly, no doubt, just now it is used as a means of sport and pleasant exercise. And it may be that these will long be its chief uses; but even now it serves other purposes. In the smaller cities, where there is not such continuous and crowded travel on the streets, the bicycle is used quite commonly to go to and from business. And in the country, where the roads are at all decent, it is used by laborers, artisans, and mechanics to go to and from their work. A man who has once experienced the joy to be had from this exercise is persuaded that it is something so good that all should know of it, and therefore does not count time thrown away when it is given to the conversion of others to his way of thinking. Now, horseback riders are not like this, nor skaters, nor walkers, nor rowing men. Indeed, the bicyclists are singular in this matter of wanting others to enjoy what they enjoy. The reason for this is plain. In no other form of exercise is there such a chance for good comradeship. From this comradeship grow a kindly expansiveness, a friendly enthusiasm, remarkable and pleasant to contemplate. There is no telling how much active moral force this expansive enthusiasm may in time generate.

In business the bicycle is already utilized to some extent, the telegraph messengers in some smaller cities and country towns being mounted on them, and also the letter carriers. The perfection of the bicycle and the extension of good roads will hasten the time when letters will be delivered free to country as well as to city houses. This is the case now in Great Britain, where there is a free delivery at every house in the kingdom every day. Nothing now retards such extension of the postal facilities in America, save the bad roads,

which are sure to be very much improved in the near future. Shops in England and France now use the bicycle to deliver small parcels, and there has been invented a very ingenious three-wheeled delivery wagon propelled on the safety bicycle principle, which is in use in Europe and is sure to find favor here in America. With such a carriage as this, milk and bread could be quite inexpensively delivered without the cost of keeping a horse.

Horseback riding is out of the question for many who would be most benefited by it, on account of the expense, whereas the bicycle is within the reach of very nearly all who have any need for it. The medical men have recognized this favorable feature of bicycle riding, and at a recent meeting of the Academy of Medicine, in New York, they discussed its advantages and disadvantages in a most serious manner. They came to the unanimous conclusion that, as a general thing, it was most excellent for both men and women, and a suitable form of exercise in every case where horseback riding would be suitable. At the same time they recognized the fact that riders sometimes, through ambition or other less explicable form of silliness, over-exert their strength and do themselves serious injury. The doctors also discussed what has come to be known as the "bicyclist's stoop." The racers stoop so as to present less surface to the wind when going at top speed, but an ordinary rider who sits in other than an erect position is simply making a monkey of himself for no reason whatever, and very likely is permanently injuring the erectness of his figure. For other than racing purposes the handles of a bicycle should be so adjusted that the erect position will be natural.

It has often been asserted that bicycle riding is very injurious to women; if that be so, these medical men at the meeting mentioned failed to say anything about it. I asked one of the most famous gynecological surgeons in New York about this matter, and he said that as a general thing a woman could do nothing wiser than ride a bicycle in moderation. He frankly admitted that some women would be hurt by it, as they would be by any form of exercise, but he did not see that there were any peculiar dangers from bicycling to women on account of their structural peculiarities.

Now a word about the speed of bicycles. This table will show the record of a bicyclist compared with the best speed made by horses:

	¼ mile.	½ mile.	¾ mile.	1 mile.
Johnson (bicyclist).....	0' 21½"	0' 46½"	1' 11½"	1' 35½"
Salvator (race horse).....	0' 23½"	0' 47½"	1' 11½"	1' 35½"
Flying Jib (pacer).....	0' 20½"	0' 59"	1' 28½"	1' 58½"
Robert J. (pacer).....	0' 30½"	1' 00½"	1' 30½"	2' 01½"
Alix (trotter).....	0' 30½"	1' 01½"	1' 32½"	2' 03½"

In distance racing, whether on the road or the track, the bicycle rider has greatly the advantage of the horse, and can beat that animal at any distance, the farther the distance the greater the advantage in favor of the bicyclist.

### A New Theory of Sleep.

Since the discoveries made by Golgi, Cajal, Retzius, and others, of the peculiar anatomical characteristics of the nerve cells, a number of new theories regarding brain function and brain action have been in the field. The nerve cell, as it is now understood, consists of a very large number of long branched processes, which are called the protoplasmic processes, and a single axis cylinder which extends out, becoming eventually the nerve fiber and giving off fine lateral branches. It has also been shown that each nerve cell in the brain is in contiguity with some other nerve cell, or rather with the terminals of the axis cylinder process of that cell, but that no actual union takes place between the processes from the one cell and fiber process of the other. When one set of nerve cells, for example, are thrown into activity, impulses are sent out along the axis cylinders and their terminal end brushes, and these affect by contact the protoplasmic processes of other cells. Cajal and others look upon the axis cylinder and nerve fiber as conveying impulses out from the nerve cell or body, while the protoplasmic processes receive impulses brought to them and carry them to the cell body. These latter, therefore, are sometimes called cellulipetal, while the axis cylinder process is called cellulifugal. We are speaking, of course, now of the relations of the different groups of cells in different parts of the brain, rather than of the relations of these cells to the spinal cord and parts below. Some time ago Professor Duval proposed the theory of sleep based upon the peculiar relations of the brain cells and fibers. According to this theory, the nerve cells in repose retract their processes, which, as he thought, were really pseudopods. The cell processes being thus retracted, the contiguity of the cell with other cells was less perfect; hence their functions became lowered, consciousness was lost, and sleep ensued. Kolliker objected to this view, on the ground that amoeboid movements are never observed in nerve cells, at least of the higher animals; Duval having contended that he had seen such movements in the lower orders of animals. Cajal, siding with Kolliker, states that no matter what

way you kill an animal—by shock, strangulation or anaesthesia—the nerve cells never differ in aspect, and one never can discover any amoeboid movements among them, even when they are placed freshly in the field of the microscope. Cajal has, however, suggested another theory of sleep which he believes more rational and more in accordance with facts. While nerve cells do not have amoeboid movements, there are, scattered richly throughout the brain tissues, other cells known as neuroglia cells. These are cells with very numerous fine processes, and they form in a large measure the supporting framework of the brain tissue, sending their fine processes in among the nerve cells and blood vessels. Now Cajal's theory is that these neuroglia cells during repose extend or relax their fine hair-like processes. As the result of this the perfect contact between the processes of the nerve cells and the end brushes from the axis cylinders that surround them is interfered with, hence the brain function is slowed up, and sleep ensues. During activity these neuroglia cells retract their numberless fine processes, the contact between the nerve cells becomes perfect again, and mental functions are resumed. The practical facts upon which Cajal bases this ingenious theory are that the neuroglia cells are found to be in different states. In some their processes are retracted and shriveled and in others they are extended. There is unquestionably an amoeboid movement, therefore, in this class of cells. Furthermore, it is in accordance, he says, with physiological facts that a cell would retract its processes during activity and relax them during repose. The physical basis of sleep, therefore, according to this view, would be the bristling up of the hair-like processes of the neuroglia cells, a squeezing of them in between the machinery by which the nerve impulses pass, and a sort of a clogging of the psychological mechanism.

Such theories are, of course, as yet only theories, and may be regarded by practical minds with great contempt. Still, there is sometimes an advantage in scientific hypotheses, even if they furnish only an intellectual exercise to the student.—Medical Record.

### Railway Accidents in 1894.

(From the report of the Interstate Commerce Commission.) During the year, 1,823 railway employes were killed and 23,422 were injured, as compared with 2,727 killed and 31,729 injured in 1893. This marked decrease in casualty is in part due to the decrease in the number of men employed, and the decrease in the volume of business handled. The increased use of automatic appliances on railway equipment also may have rendered railway employment less dangerous, and it may be that the grade of efficiency of employes has been raised.

The number of passengers killed was 324, an increase of 25, and the number injured was 3,304, a decrease of 195. Of the total number of fatal casualties to railway employes, 251 were due to coupling and uncoupling cars, 439 to falling from trains and engines, 50 to overhead obstructions, 145 to collisions, 108 to derailments, and the balance to various other causes not easily classified. To show the ratio of casualty, it may be stated that 1 employe was killed out of every 428 in service and 1 injured out of every 33 employed. The trainmen perform the most dangerous service, 1 out of every 156 employed having been killed and 1 out of every 12 having been injured.

The ratio of casualty to passengers is in striking contrast to that of railway employes, 1 passenger having been killed out of each 1,912,618 carried, or for each 44,103,228 miles traveled, and 1 injured out of each 204,248 carried, or for each 4,709,771 miles traveled. A distribution of accidents to the territorial groups exhibits the diversity in the relative safety of railway employment and of railway travel in the different sections of the country.

### Lightning and Barns.

Mr. McAdie's pamphlet on "Protection from Lightning" has been revised and republished. Among the additions made to the old material is a discussion of the question whether barns are any more liable to be struck by lightning after being filled than before. Mr. McAdie cites these figures; Last year, prior to August 1, 223 persons were reported as killed by lightning in this country; after that date, 113; dwellings struck, before August 1, 173; after, 87; churches, before, 10; after, 15; barns, before, 130; after, 138. It thus appears that while much more than half the year's damage done by lightning in other directions occurred prior to the date mentioned, a trifle more than half the injury to barns from that cause came afterward. Mr. McAdie mentions three possible reasons for this increased peril after harvesting the crops: (1) The stalks of grass and growing grain serve as tiny lightning rods, and relieve the electric strain between sky and earth, but when they have been cut down only the buildings and trees are left to serve that purpose; (2) a full barn is warmer, and hence more readily ignited than an empty one; and (3) the vapor in the warm air, rising from a barn filled with new hay, attracts the electric current and invites a discharge by that route.

\*John Gilmer Speed, in Lippincott's.