OTTO LILIENTHAL'S END.

AN ACCOUNT OF HIS LAST FLIGHTS.

Prof. Wood, Who Was With the Fearless German, Describes Lilienthal's Last Experiment—How the Machine Was Started—The Fatal "Scaling" of the Aeroplane.

From the Boston Evening Transcript.

LONDON, Oct. 16.—On Saturday, Aug. 8, I received a letter from Otto Lilienthal, asking me to accompany him on the following day to this Rhinow Mountains, a range of high, barren hills some one hundred miles north of Berlin, where he was in the habit of exercising every Sunday with his flying machine. Being exceedingly busy with preparations for a trip to Siberia I was unable to go, and was spared the ordeal of witnessing the dreadful accident which caused his death, the news of which reached Berlin the following evening.

The readers of the *Transcript* will doubtless be interested in an account of the last flights of the fearless experimenter, which I witnessed the previous Sunday, and also, perhaps, in hearing of my own experience with the machine.

Herr Lilienthal had asked me to visit his engine factory in Berlin, where his flying machines are built, and it was here that I first became really acquainted with him. A small corner was given over wholly to the "Flug Apparat," and here I found a number of men at work upon a new pair of enormous wings of more than twenty-five square yards superficial area. Of this machine he had great hopes, and explained every detail of its construction, little realizing that he was destined never to put it to actual test.

On the following Sunday I met him by appointment at the Lehrter station in Berlin. He was accompanied by his 14-year-old son, whom he always took with him, and a man servant to assist in putting the machine together. We steamed out of the city and across the flat green fields just as the sun was rising, and after a ride of a couple of hours alighted at Neustadt on the Dosse. Here we were met by a comfortable farm wagon and driven over the twenty-odd miles which lie between Rhinow and the railroad. A brisk wind was blowing, and the storks were sailing over the fields on each side of the road in search of food for their young on the chimney tops. These he watched with great interest, calling them his teachers, and drawing my attention to the various methods practised by them in preserving their equilibrium when flying and alighting, which I had never noticed before. We had a hurried lunch in the little inn at Rhinow, where his arrival always causes a hum of excitement among the peasants; the flying machine was brought out of the barn and loaded on the wagon, and we drove away to the mountains, which are two or three miles from the village.

A more ideal spot for flying could hardly be conceived. Rising abruptly from the level fields is a long range of high, rounded hills, varying from one to three hundred feet in height, and thickly carpeted with grass and deep, spongy moss. The slopes vary in steepness, and face all possible points of the compass, so that one can always find a suitable declivity facing the wind.

The machine was laid out on the grass and put together. It was one of the new models, consisting of two large lateral wings measuring twenty feet from tip to tip, and an upper wing or aeroplane. The material was thin, strong cotton cloth, tightly stretched on a frame of bamboo. A rectangular wooden frame which fitted around the body a little above the waist supported these wings and the duplex tail, consisting of a horizontal and vertical wing joined together on the end of a curved bamboo pole in the rear of the machine. The upper aeroplane was supported some six feet above by means of two vertical rods of bamboo and firmly fixed by a great number of tightly stretched strings or guys. So perfectly was the machine fitted together that it was impossible to find a single loose cord or brace, and the cloth was everywhere under such tension that the whole machine rang like a drum when rapped with the knuckles. As it lay on the grass in the bright sunshine with its twenty-four square yards of snow-white cloth spread before you you felt as if the flying age was really commencing. Here was a flying machine, not constructed by a crank, to be seen at a country fair at 10 cents a head or to furnish material for encyclopædia articles on aerial navigation, but by an engineer of ability, and embodying the results of eight years of successful experimenting—a machine not to look at, but to fly with.

We carried it to the top of the hill, and Lilienthal took his place in the frame, lifting the machine from the ground. He was dressed in a flannel shirt and knickerbockers, the knees of which were thickly padded to lessen the shock in case of a too rapid descent, for in such an emergency he had learned to drop instantly to his knees after striking with his feet, thus dividing the collision with the earth into two sections and preventing injury to the machine.

I took my place considerably below him by my camera and waited anxiously for the start. He faced the wind and stood like an athlete waiting for the starting pistol. Presently the breeze freshened a little; he took three rapid steps forward and was instantly lifted from the ground, sailing off nearly horizontally from the summit. He went over my head at a terrific pace, at an elevation of about fifty feet, the wind playing wild tunes on the tense cordage of the machine, and was past me before I had time to train the camera on him. Suddenly he swerved to the left, somewhat obliquely to the wind, and then came what may have been a forerunner of the disaster of the next Sunday. It happened so quickly and I was so excited at the moment that I did not quite grasp exactly what happened, but the apparatus tipped sideways as if a sudden gust had got under the left wing. For a moment I could see the top of the aeroplane, and then, with a powerful throw of his legs, he brought the machine once more on an even keel and sailed away below me across the fields at the bottom, ticking at the tops of the haycocks as he passed over them. When within a foot of the ground he threw his legs forward, and notwithstanding its great velocity the machine stopped instantly, its front turning up, allowing the wind to strike under the wings, and he dropped lightly to the earth. I ran after him and found him quite breathless from excitement and the exertion. He said, "Did you see that? I thought for a moment it was all up with me. I tipped so, then so, and I threw out my legs and righted it. I have learned something new; I learn something each time."

Though I had read many articles about Lilienthal, and had seen numberless photographs of him in the air, I had formed no idea of the perfection to which he had brought his invention, or of the precision with which he managed it. I have seen high dives and parachute jumps from balloons, and many other feats of skill and daring, but I have never witnessed anything that strung the nerves to such a pitch of excitement or awakened such a feeling of enthusiasm and admiration as the wild, fearless rush of Otto Lilienthal through the air. The spectacle of a man supported on huge white wings, moving high above you at racehorse speed, combined with the weird hum of the wind through the cords of the machine, produces an impression not to be forgotten.

A few moments' rest was necessary before carrying the machine once more to the hilltop, and we sat on the grass and discussed the incidents of the first flight. The grasshoppers clicked about on the cloth wings, and Lilienthal laughed at them and said that they loved to jump about on the smooth white surface, that they were his only passengers, and he frequently heard them hopping about on his machine when he was in the air. The wind had freshened a trifle, and a shower was seen coming across the plain. We crawled under the wings, together with a swarm of peasant children who had flocked from the neighboring farms to watch "Die Weise Fliddermann," and kept quite dry during the cloudburst. The sun came out presently, and by the time we had reached the top of the hill the wings were quite dry. Once more he took his place in the frame and sailed away, the children running screaming after him down the steep hillside and falling over each other in their excitement. Of this flight and the subsequent ones I was fortunate enough to secure some excellent pictures, the last ones that were ever taken of the man.

Toward the end of the afternoon, after witnessing perhaps half a score of flights and observing carefully how he preserved his equilibrium, I managed to screw up courage enough to try the machine. We carried it a dozen yards or so up the hillside, and I stepped into the frame and lifted the apparatus from the ground. The first feeling is one of utter helplessness. The machine weighs about forty pounds, and the enormous surface spread to the wind, combined with the leverage of the ten-foot wings, makes it quite difficult to hold. It rocks and tips from side to side with every puff of air, and you have to exert your entire strength to keep it level. Lilienthal cautioned me especially against letting the apparatus dive forward and downward, which is caused by the wind's striking the upper surface of the wings, and is the commonest disaster which the novice meets with. The tendency is checked by throwing the legs forward, as in alighting, which brings the machine up into the wind and checks its forward motion. As you stand in the frame your elbows are at your side, the forearms are horizontal, and your hands grasp one of the horizontal cross-braces. The weight of the machine rests in the angle of the elbow joints. In the air, when you are supported by the wings, your weight is carried on the vertical upper arms and by pads which come under the shoulders, the legs and lower part of the body swinging free below.

I stood still facing the wind for a few moments, to accustom myself to feeling of the machine, and then Lilienthal gave the word to advance. I ran slowly against the wind, the weight of the machine lightening with each step, and presently felt the lifting force. The next instant my feet were off the ground; I was sliding down the aerial incline a foot or two from the ground. The apparatus tipped from side to side a good deal, but I managed to land safely, much to my satisfaction, and immediately determined to order a machine for myself and learn to fly. The feeling is most delightful and wholly indescribable. The body being supported from above, with no weight or strain on the legs, the feeling is as if gravitation had been annihilated, although the truth of the matter is that it hangs from the machine in a rather awkward and wearying position. My second attempt was not so successful, the wind getting under the left-hand wing and tipping the machine until the tip of the other wing dragged on the ground. No damage was done, however, and I was satisfied with my attempt.

On the way back Herr Lilienthal talked about his experiments and his plans for the future. Certain features of his machine he has patented, though his experiments have been made without any money-making view. The machines cost about 500 marks, or $125, to build, not much more than a first-class bicycle, and when made in quantity can be made very much cheaper. He told me that he hoped to sell his American patents and asked me if I thought he could get $4,000 for them. His plan was to build, in or near Berlin, a sort of flying rink, with an artificial slope which could be turned so as to always face the wind. Here people could come and hire machines and learn to use them, commencing with small elevations and gradually going higher up the slope, as practice gave them skill. He hoped to get people, particularly athletes, interested in the sport, for with a wide interest would come improvements. The present bicycle is not the work of a single man, but the result of years of experiment and thought given by many men. It must be the same with the flying machine. If the unfortunate death of the pioneer does not deter others from experimenting along these lines, and it does not seem to me that it should, the results accumulated by him will not be lost and he will not have given up his life in a vain cause. He has made thousands of flights in safety, and felt absolute confidence in his ability to control his machine in any ordinary wind, and his accident was merely one of those liable to come to any one engaging in any of the popular outdoor sports.

Undoubtedly the danger element is greater in this sport than in most others, but with improved apparatus it can be made, in my opinion, as safe as tight-rope walking, which is really not so very perilous when you know how. Lilienthal is certainly the first man of modern times who has navigated the air for any distance without the aid of a balloon. Maxim's wonderful airship, so far as I know, has not yet been run in free flight, though developing astonishing speed and buoyant power on its track. The former practised soaring flight against the wind. Without any movement of the wings, the latter drives his aeroplane through the air by an engine and screws. Lilienthal had the advantage of being a part of his machine, as it were, feeling every change of plane and instinctively correcting it with a motion of the body. He thus slowly acquired the skill to keep the apparatus level with varying wind pressure.

The aeroplane at present is an unstable machine, requiring the agency of a human mind to keep it in equilibrium, and the necessary skill can be best acquired with small machines fastened directly to the body. I do not think that any one who has experienced the difficulties encountered in keeping one of these small machines in equilibrium would venture to carry Mr. Maxim's aeroplane into the air, the balancing being effected by rudders put into action by opening or closing throttle valves. It would be, to my mind, like trying to ride a steam bicycle fifty feet high, perched in a small cab on top of the huge wheel, with a row of valves for driving and steering, without having had any experience with a small machine. The small machine is undoubtedly the one to commence with, and what Lilienthal's machine needs to increase the safety factor is some means of loosening things when struck by a sudden gust. I use this expression in a very broad sense, of course, and possibly the desired effect could be obtained by a ballasting device; but flying with the machine as it now is is like trying to sail a boat with the main sheet fast. It can be done, but it is risky in squally weather.

CAPTURED A MERMAN.

Pacific Porpoise Hunters Shoot a Strange Marine Monster.

From the Washington Post.

TACOMA, Wash., Oct. 31.—What appears to be a genuine merman was brought into this port last week by a party of Englishmen. They had been porpoise fishing in the Pacific and were more than confounded at the extraordinary creature they captured. They came in with their prize fully convinced that the old stories about merman and mermaids were all true, in spite of the scoffers. The man who deserves the credit of this wonderful discovery is Major W. E. Thorncliff of the British army. The Major was at first rather averse to giving the details of his novel adventure, fearing that he would be classed with the spinners of ordinary fish yarns of Puget Sound, but knowing that his social and official position put his word above question, he finally consented to relate his unique experience and to exhibit his interesting captive, only stipulating that I should repeat the facts exactly as he stated them, and describe the sea monster precisely as it really is.

This is the story of the Major's adventure in his own words:

"Our party, which consisted of several English noblemen, a French statesman, and a Russian prince, left Hokondach, Japan, on a fishing and hunting expedition to the coast, on board of of Prince Gerenoff's steam yacht Anedamoff, on June 20, and we cruised along the shores of the Aleutian peninsula, calling into many very fine bays and harbors along the coast.

"We shot on shore and fished in the waters of both Behring Sea and the Pacific Ocean, and have as trophies a fine collection of pelts, as well as skeletons of many rare creatures.

"But the climax of all came on the morning of July 26, when we were off the island of Watmoff. Our men sighted a school of porpoises, among which could be seen several white ones.

"Our hunting boat was lowered, and Lord Devonshire, the Earl and I, with the boat's crew, put off from the yacht, determined to capture some of the rare sea pigs. After pulling about four miles we found ourselves in the centre of the school, and Lord Devonshire got a shot at one of the white boys with a large express rifle, which quickly ended its career.

"Just as we were putting our guns away the Earl called out, 'See that!' pointing to a most startling looking beast not more than a cable's length away. Picking up his express he fired point blank at it, striking the creature between the eyes. The shot, though it did not kill it, so stunned it that it lay perfectly still on the surface of the sea.

"As our boat hauled alongside we saw the most hideous and uncanny looking monster probably that human eyes ever looked upon. Although at a distance it might perhaps be mistaken for a porpoise, as we came near we saw that it could truly be described by no other name than that of 'merman.'

"As we reached over the side of the boat to haul the creature in it regained some of its vitality. It caught the boat by the gunwale amidship, and had it not been for the fact that when the arms came up out of the sea we naturally shrank to the other side of the boat, it would, without doubt, have capsized us. One of the men picked up an ax and quickly despatched the monster.

"The better way now would be for you to come with me and I will show you the strange creature which I am now taking to England to present to the British Museum. After seeing it you will, I am sure, be inclined to the opinion that once it is placed there it will easily outrank all of the many strange things to be found in that great repository of the world's rarities."

Then the Major led the way to a storeroom on Pacific avenue, where, in the middle of the floor, was a large coffin-shaped box. It was ten feet long, three feet wide, and three feet deep. Taking a screwdriver the Major unfastened the top. All that could be seen was some ice, covered with a white woollen blanket. Taking the blanket by the end he quickly removed it, and as he did so the sight of the contents of the box almost froze my blood, for right before my eyes was apparently the naked body of a large man.

The Major then removed the cloth which covered the lower part of the body. This is exactly the same as that of an ordinary porpoise. The monster is one of the most remarkable freaks nature ever put together. The strange monstrosity measures ten feet from its nose to the end of its fluke-shaped tail, and the girth of its human-shaped body was just six feet.

It would weigh, it is estimated, close to 500 pounds. From about the breast bone to a point about where the base of the stomach would be, were it human, it looked exactly like a man. Its arms, quite human in shape and form, are very long and covered completely with long, coarse, dark reddish hair, as is the whole body.

It had or did have at one time four fingers and a thumb on each hand, almost human in shape, except that in place of finger nails there were long, slender claws. But in days long since gone by it had evidently fought some monster that had got the best of it, for the forefinger of the right hand, the little finger of the left, and the left thumb are missing entirely.

Immediately under the right breast is a broad, ugly looking scar, which looked as if some time in the past it had been inflicted by a swordfish. On the sides and body of the monster are numerous other evidences that its life in the ocean had been far from a placid one. There is hardly a space the size of one's hand that does not show evidence of having at some time or other received wounds.

When the hideous body reaches England that country can safely say that it possesses the strangest freak the mysterious waters of the Pacific ever gave up.

"Now mind," was Major Thorncliff's parting salutations, "don't in any way try to embellish what you have seen and heard, but just tell the plain facts, and though this coast may be renowned for strange and weird stories, this story of the merman, simply and truthfully told, will, I am confident, prove the adage, 'Truth is stranger than fiction.'"

Now it only remains for some man as responsible and well known as Major Thorncliff to discover the mate of the merman, and we will be convinced that the old mariners had not, after all, the wonderful powers of imagination and romance so long ascribed to them.

No Fear of Bryan.

TO THE EDITOR OF THE SUN—*Sir:* Those who think the Chicago platform embodies living issues, and that Bryan is to be a perpetual candidate, know little of the temperament of the American people. They have no patience with stamped-out heresies and no use for back numbers. Before he is a month older Mr. Bryan will have fallen into the most innocuous sort of desuetude, or will be remembered only as a pestilent agitator who held the country for a time in terror. And after the 4th of March he will be followed into oblivion by the man who, instead of exercising the "kingliest act" of citizenship, could think of no better use for his opportunities and duties on election day than to go duck shooting.

E. W.

STAGE FRIGHT INCURABLE.

ACTRESSES DON'T BELIEVE THE ANNOUNCEMENT OF A REMEDY.

May Irwin, Virginia Harned, and Odette Tyler Tell Why Specialist's Prescription of Wine of Opium Must Fail, and Explain the Nervousness of Players.

"A remedy for stage fright!" exclaimed jolly May Irwin in amazement; "Oh, no. There's some mistake about that. I've been on the stage a score of years and know all about stage fright from A to Z, and I know that it can't be cured. But tell me something about this so-called remedy."

When told that an English specialist, in an article on nervous diseases written for a recent number of a French medical journal, had prescribed wine of opium to be taken by actors and singers before going on the stage, she said in a puzzled way: "What for?"

"Why, the Englishman says that from five to six drops will give to the most timid actresses the self-possession of the boldest and most spirited old player," the reporter explained.

"Now what's he giving us?" continued Miss Irwin. "You wouldn't think that one of my ample dimensions would suffer from stage fright, would you? No. Well, just let me say that I do. I can't say, either, that it is stage fright, but rather extreme nervousness. My idea of genuine stage fright is where you lose your head entirely and forget your lines. I've never done that, but I had an amusing experience with my sister once. It was when we were tots of girls and first went on the stage to sing. I was only 11 years old. One night we were billed for a new song, a duet. Just as our time was rolling round, she was seized with an attack of stage fright.

"'Oh, May,' she cried, 'I can't remember a word—not one.'

"'You must,' I gasped excitedly, and just then, as the call came for us, she fell over in a dead faint. What did I do? I skipped out on that stage and sang that duet by my lone self. That's what I call the recklessness of youth. I couldn't do that now, for every thoughtful actress will tell you that stage fright grows on one with years."

"Did you ever hear of any one who has tried wine of opium for stage fright?"

"No, I never even heard of the remedy before and I, for one, would want to try it first on the dog. I should think the experiment would be a very dangerous one. In truth, I think it foolish to take anything for stage fright, for I am sure it is incurable. A first night is agony to me. My fellow actors say that no one can tell that I am nervous, but they know that cold perspiration stands out on my forehead and drips from the tips of my fingers. It is the same thing when I am to sing a new song, and I get worse and worse every year. My mother has no patience with me about this and nor has anybody who hasn't been there. She says: 'You've been on the stage all these years and why you get so wrought up and cantankerous just because you are to sing a new song is a mystery to me; you know you will get through all right, for you always have; now can't you compose yourself?' I don't say anything, but I can't, and if the song doesn't come until the third act I'm in an agony until I've sung it. No matter where it comes in the piece, I never know what I'm doing until I've finished with that new song. Some actresses take whiskey and soda or brandy on a first night to boost 'em up. I don't believe in taking anything, for nothing does any good, and one wants a clear head when one has to play. As for this wine of opium which the English doctor prescribes, I think that it would be worse than whiskey. There would be great danger of contracting a habit, I fancy. After I have played a piece a few times I grow less nervous, though I never lose that indescribable, sickening feeling entirely, even after appearing in the same play for months. But there's one consolation: a certain amount of nervousness is necessary to good acting, and those who don't suffer from stage fright never have the pleasure of carrying the crowd with them. No, I don't believe there is anything that will help stage fright. Occasionally if I am worn out with work, as I have been this week with eight performances, a glass of champagne at the close of the second act stimulates me to a final effort, but after the curtain goes down finally the reaction always follows, so I wouldn't advise one to take even that. The best remedy, or, rather, precaution against nervousness, is early hours and regular habits."

Virginia Harned, like May Irwin, had never heard of wine of opium as a remedy for stage fright. She said:

"I wouldn't try it for anything in the world, for I want my brains clear when I act, and I should think that any preparation of opium would have a tendency to cloud the senses. All actors and actresses who are in any measure successful suffer from nervousness known as stage fright, and it can be neither helped nor cured. I shall never forget an experience that I had on the opening night of 'Trilby' in Boston. I was the original *Trilby*, and it was the first time that the play had been produced, so all of these things combined to make me uncommonly nervous. The opening scene, you will remember, is in the studio, which was up four long flights under the roof. Everybody enters puffing and blowing after the long ascent. When I made my entrance and a storm of applause greeted me, I was mentally and physically paralyzed. The applause lasted a full minute, and every second of it seemed an hour to me. Well, that first scene is very short, and I was so frightened that instead of making my exit by the door and walking down the four flights, I calmly walked out of the window, stepping into what was supposed to be immense space or thin air. I saw the stage manager waving his hands in a frantic manner, but I couldn't think for the life of me what I was doing wrong.

"Stage fright grows on one, instead of decreasing. I began to act at the age of seventeen, and was much frightened on my first night, but after that I dashed on and off the stage in my part without realizing the responsibility. People often ask me, if actresses suffer so from this incurable nervousness, why the stage has so many recruits every year. That's the very reason. The young do not know the agony that they will be called on to suffer.

"A certain amount of nervousness is necessary to good acting, but the genuine stage fright that comes to every earnest worker on a first night prevents one from doing the best work, and for that reason I am opposed to first-night criticism. It can never be just, inasmuch as the performers never do themselves justice. When an actress plays a part so often that she ceases to be nervous over it, then the bill should be changed. Her performance becomes merely an imitation of what she can do, and while the audience may not know it, and may go away perfectly satisfied, she goes to her dressing room conscious of the fact that she has been untrue to her art, and she feels mean, oh, so mean! I've felt that way after playing a part not thoroughly congenial month after month, but that was not true of *Trilby*. I was almost as frightened over my last performance as I was the first. That part was exceptionally congenial to me, however, and I, for one, approve of four bills a season.

"The actress who takes a stimulant on a first night is the exception, though a few do use wine, whiskey, or brandy to quiet their nerves. My experience has been that it is best to take nothing, since nothing does any good, and all stimulants have a tendency to undermine the constitution with the result of rendering one more nervous than ever. The only thing that I know to do about stage fright is to tough it out."

Odette Tyler has the nervous temperament of the typical Southern woman, and perhaps suffers more from stage fright than either Miss Harned or Miss Irwin. When a SUN reporter called on her she had just come in from a long bicycle ride, and looked as if she could face the biggest and most critical audience without a pang of fear, but she, like all the rest, is a victim of the malady.

"Do you see this rig I've got on," she asked, settling herself among the cushions. "Well, it's my bike rig, though it doesn't look like the regulation wheeling suit. Just let me tell you I find biking a right good thing for stage fright. Now, you see to-day was matinée day, and I was nervous and tired and would have been frightened half to death at the performance to-night if it hadn't been for a spin in the Park."

"Do you have any other specifics for stage fright?"

"Yes, three others. I can't call them specifics, for, strictly speaking, a specific should be a preventive or a cure, and stage fright can't be prevented or cured. But I have three things that I take to settle my nerves. One is a certain preparation of tasteless cod-liver oil; the second—it will look horrid in print—is asafœtida pills, and the third is aromatic spirits of ammonia. The cod-liver oil keeps one built up, the asafœtida pills—one three times a day—are an excellent nerve tonic, even if they do make one's friends think of onions, and as for the spirits of ammonia, I wish every actress knew about that. It is excellent on a first night and perfectly harmless, for I frequently take five doses. But as for this wine of opium, recommended by the Englishman, I really think he must be crazy. It is so easy to contract a habit of that kind. For that reason actresses should not indulge in stimulants for stage fright. They soon get so they can't play without their brandy or whiskey. It's astonishing the way some women do gulp down the wine of this or the extract of that on a first night. Go into their dressing rooms and the first thing that confronts you is a big bottle.

"The worst two cases of stage fright that I ever saw—well, I had one and a horse had the other. One night, during a performance of 'The Girl I Left Behind Me' at the Empire, the horse was seized with stage fright and walked right over the footlights down into the orchestra. The audience didn't have the performers to think about, but every actor on that stage sympathized with that horse. It was as clear a case of stage fright as I ever saw, for the animal had played its part night after night before that without evincing the slightest nervousness.

"My own case? Why, it was the other night in 'Secret Service.' I have to call the name of a certain man in the play, and about five lines before I got to it that name went completely out of my head. I could think of nothing but the name of a very prominent man in Louisville, and when I came to it I sang out the name of the gentleman from Kentucky as glibly as you please. Now, wouldn't he have been astonished if he had been present?

"In 'Shenandoah' I had a very long comic letter to read. It was very trying, somehow, and time after time in the most ludicrous parts I burst out crying. A person who isn't nervous cannot act, and when one has a nervous temperament she is bound to suffer from stage fright. When a real artist plays, something goes out of her into the audience. Scientific men can't explain what it is. It wins them to her, but she never gets it back again, and is left just a little more subject to stage fright after each performance. Phlegmatic actresses do not impress their audiences, neither do they suffer much or amount to much."

HORSE SENSE.

Stories of Equine Intelligence by an Observing Country Doctor.

From the Youth's Companion.

The country doctor is expected to go whenever called—rain or shine, heat or cold, night or day; sometimes, perhaps, leisurely, but often as quickly as possible. Through all this his horse and himself are constant companions, and share together the joys and the sorrows of the road. It is not strange, therefore, that an attachment of more than ordinary intensity often springs up between them, during which the man notes the almost human qualities of the horse.

While quite a boy I knew a horse of such humor and intelligence that he gave me a high opinion of horses in general. Somehow the tricks of old Ball led me to consider horses as almost of kin to human beings, and I have always talked to them and treated them accordingly. Ball, a fine animal belonging to my uncle, who lived on a farm adjoining ours, was a sorrel horse of good size and especially fine head, with heavy neck and shoulders. He had done a great deal of farm work in his time, but was now too old for anything but occasional light service; so he usually had the range of a pasture in front of the house that reached up to the yard fence. There were cattle and sheep in the same pasture.

Ball was noted for his cunning and clever tricks, such as opening gates and doors, pulling down bars and the like; but no one suspected him of playing practical jokes on sheep when one after another was found on the wrong side of the fence. It was by his antics and evident delight whenever a sheep was so found that he attracted attention. A watch was instituted, and soon, when Ball thought no one saw him, he slyly picked up a sheep by the wool with his teeth and dropped it over the fence! Then, going away some distance, he anxiously waited, evidently watching for some one to come out of the house. As soon as he saw that the sheep was discovered he gave a snort and began to run and kick up his heels with delight.

Sometimes he would steal articles and hide them, evidently just for the fun of the thing. One day a heavy maul, such as is used for splitting rails and wood, was left so near the fence that he could reach it. When he supposed that no one saw him he took the maul up with his teeth, carried it to the further side of the field, carefully hid it behind the stump of a tree, and then watched the result. This time he had been seen carrying the maul away, so the men made great ado, pretending to be hunting for it, looking in the fence corners and behind stumps, while Ball was running, snorting, and kicking up his heels with unbounded delight. Whenever they approached the maul he tried to attract their attention to some other point.

While I have been engaged in the practice of medicine my horses have had no opportunity to perform tricks like these, but many times I have seen exhibitions of intelligence and humor no less marked. One cold, boisterous day my horse John was driven up to a post in front of a desolate-looking farmhouse about fourteen miles from home. There was not a tree or object of any kind to break the cold, raw wind, so I covered John with his blanket, and on top of this threw a buffalo robe, tucking it well under the harness lest the wind should blow it off. But in my care with the blanket and the robe, I forgot to fasten John to the post. After I had been inside a few minutes the lady of the house, looking through the window, cried out:

"Doctor, there goes your horse!"

I hastened to the door only to see John and the buggy making good time homeward, already beyond reach of my voice. Pretty soon, however, John turned from the road, made a large circuit, something more than a hundred yards in diameter, over the smooth prairie, and came back to the post again, where he shook his head often and pranced about to show how intensely he enjoyed the joke. To me he said, as plainly as a horse could say it:

"Now, didn't I fool you nicely? You thought I was going back without you. Why, I was only playing a practical joke to show how careless you were not to tie my halter. Of course I would not have left you out here alone."

I have known many horses that showed a good degree of humor as well as intelligence, but for good sense I think Frank was a little superior to any other. He was 7 years old when I traded for him, and he had a bad reputation for running away; but he was a proud horse, held his head well up, and was a high stepper. Moreover, he had an intelligent look, and I liked him. Upon inquiry I found that his first runaway was not much to his discredit. A drunken driver had forced him to cross a ricketty culvert and allowed him to run the wheels off the planks at one end and upset the buggy, at which he became frightened and ran away. After this he was easily frightened by any unusual noise and confusion behind him.

I at once began the training of my new horse by trying to convince him of two things: First, that I was his friend and would not forsake him on any account; second, that I was fully competent to care for and protect him. How well I succeeded may be guessed when I tell you that I drove him almost every day for seven years and never had a runaway. Sometimes he would be startled, but a gentle word and a firm, steady rein would always reassure him so that no trouble occurred. His experience had taught him to be very cautious about culverts. If one of these seemed to be the least out of repair he would stop, and no amount of coaxing or pushing could induce him to pass over until I had first got out and carefully examined it. Then, after I had told him that all was right, no matter how rickety the culvert was, he would quietly pass over.

When he first came into my possession he had the habit of frequently throwing his head up, and, as his bridle was somewhat loose, the browband would sometimes lodge upon his ear. Whenever this happened I would stop him, get out of the buggy, and replace it. He soon learned to throw the band up whenever he would like to stop and be petted a little. I might have prevented this at once by making the bridle fit better, but it occurred to me that, with this beginning, I might soon teach him to stop when anything else got wrong. And this I did, so that the least disarrangement of the harness would cause him to stop and wait to have it fixed. Sometimes, however, he would stop when the trouble was not, in my opinion, sufficient to warrant so cautious a procedure.

One day, as I was driving along at a slow trot over a smooth, lonesome road, I had dropped the reins over the buggy apron and was becoming quite interested in the reading of a newspaper when Frank suddenly stopped. I looked all around and over him, but could see nothing wrong, so I said, with some emphasis, "Get up, Frank!" But he still stood, and kept throwing his head up and down. As I sat there with the paper in my hand, I looked again, and especially to the bridle, but saw nothing wrong. I now, without taking up the reins, took the whip from its socket, and giving him a sharp cut, repeated my command to go along. This undeserved punishment nettled him very much, but still he would not move forward. After standing for a few moments, as if in deep thought, he suddenly turned to the right until the wheel on that side touched the buggy. Then again he stood stock still, only throwing his head as before. I now took up the reins and pulled with the left hand to bring him back into the road, when, to my astonishment, I found that the rein on that side, which had been fastened with a snap, was unsnapped.

When I got out to fasten it Frank squealed. I believe a horse never squeals unless he is excited. I never heard Frank squeal before; but now he not only squealed but shook his head, pawed the ground, and manifested his delight by every means that he could command. As we afterward moved along homeward, several times, as the thought would come to his mind afresh, he shook his head and squealed for joy.

When such evidences of thought and purpose, such humor and intelligence, are seen in horses, the line of demarcation between animal instinct and human reason becomes almost obliterated. Frank had decided that by turning to the right the left rein would have to be pulled to get him back into the road, and that then I should discover the rein to be unfastened. He certainly had reasoned, and reasoned intricately, too.

Value of a Definite Purpose.

"Whatever one's calling," said Mr. Glimby, "there is nothing like a definite purpose to insure success. It has always seemed to me that a beggar who just asked in a general way for something, simply fired in the air and not at the target. Anybody can give an indefinite answer to an indefinite request, and most people do. But I met a man the other night who asked for two cents, at the same time holding out two cents which he already had and which he wished to increase to four. This was definite, businesslike, and irresistible. I gave the two cents without the slightest hesitation.

"Still, this wouldn't work always. If, for instance, the man had asked for a dollar, at the same time holding out another dollar, I should certainly not have given it, notwithstanding that this request would have possessed equally with the other the essential quality of definiteness. But then there are exceptions to all rules."

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Hundreds of Caverns of Considerable Size Still Remain Unexplored—The Geological Formations in Which They Abound.

From the Providence Journal.

When we remember that almost every year one or more important caves, hitherto unknown, are discovered in Austria, France, or other regions of Europe, where caves abound, and that many caverns in the best-studied districts of Austria are still known only in name, it is not surprising that a great deal yet remains to be learned about the caves of our own country. It may be that the larger part of them have been discovered, though this is uncertain; but a great many large caves are still unexplored or only partly traced in their intricate windings, and are not known to most of our people even by name. The fame of Mammoth and Luray has spread everywhere, but east of the Mississippi there are caves extending for miles, and we seldom or never hear of them. How many of our people know, for instance, that the cave region of Indiana is surpassed in importance only by that of Kentucky? How many of us ever heard of Wyandotte Cave, in Crawford County, Indiana, whose calcite formations really surpass in beauty and interest those of Mammoth Cave and whose main galleries are about twenty-three miles long?

We have the largest known cave in the world, and also one the beauty of whose formations is believed to be unsurpassed; but in one respect none of our caves is so interesting as quite a number of the European caverns. Our caves have contributed very little to our knowledge of prehistoric man, though a great deal has been learned about him by the study of his remains found in the caves of Europe. It is well known that there are three succeeding epochs in the early life of man, when his habitations, workshops, and many specimens of his handiwork are to be found chiefly in caverns or under rock shelters; but our caves seem to have been little used by the aborigines as dwelling places, and some archæologists believe that when the ancestors of our Indians came to this continent they had already learned the art of building more convenient shelters than caverns afford. In a cold, wet corner of Luray Cave the other day I saw all that is supposed to be visible of the human skeleton which is that of a prehistoric man. One reason for thinking so is because most of it is held tightly in the grip of the stone floor, which indicates that the remains are of great age.

All visitors to our largest caves remark the wonderfully pure air that is found even in their deepest recesses. This is chiefly due to the fact that they are almost entirely devoid of decomposing animal and vegetable matter. No air so pure can be found anywhere in the world except on bare mountain summits or in the polar ice regions or lifeless sand deserts. The ruins may still be seen of two of the twelve cottages that were reared years ago in the depths of Mammoth Cave and occupied by a number of consumptive patients who were sent to live in them in the hope that the pure air would be beneficial. They forgot that they needed sun as well as air, and the experiment was an utter failure. They could not live in the cave any more than the plants and shrubs which they set out around their dark homes, hoping that with the utmost care they might make them thrive.

Our three great centres of limestone caves, in the order of their importance, are found in Kentucky, Indiana, and Virginia. Perhaps not more than one in ten of them is visited by tourists, and hardly a larger proportion has been thoroughly explored. Among the Kentucky caves it seems to be bigness and not beauty that attracts the tourist. Many visitors flock to Mammoth Cave, which is, to be sure, very wonderful in its immensity, though most of its long, low, narrow passages and enormous rooms are about as barren of the weird and fantastic beauty which calcite forms lend to a few favored caves as the walls of a cellar. There are many hundreds of limestone caves in the world, but comparatively few beautiful ones.

Great holes may be excavated by the erosive power of water, but unless certain conditions are exactly fulfilled there will be none of the stone columns and draperies and other brilliant and imposing effects that are peculiar to the stone scenery. These objects are not found except under certain conditions of ventilation, dryness, and water flow. A torrent of water may excavate, but it will never decorate a subterranean ravine. It is the very slow dripping of water through the limestone roof that makes stalactites and stalagmites grow. It is drops, trickling for ages, that deposit, instead of carrying away, their burden of earthly matter and beautifully tint it with shades of red and yellow, as they happen to be more or less charged with carbonate of iron. Adelsburg Cave in Austria is conspicuously first among the beautiful caves of Europe. Visitors to our Luray Cave are piloted through the labyrinthian mazes for only two miles, while the long route in Mammoth Cave covers sixteen miles, and the total length of its tortuous passage is supposed to exceed 150 miles. But Luray was formed under conditions far more favorable to decorative effect, and while Mammoth Cave has its own unrivalled claims, it is not so beautiful as Luray.

Prof. Shafer has spoken of Diamond Cave as the most beautiful cavern in Kentucky, and yet we seldom hear of it. The caves in Edmondson county alone, of which Mammoth Cave is the chief attraction, number 500, and seven other counties, Grayson, Hart, Warren, Butler, Logan, Christian, and a part of Trigg, are underlaid with caves. In other words, 8,000 square miles of the single State of Kentucky are honeycombed with caverns. We have no Martel, as France has, to inspire enthusiasm for cave exploration, and scores of Kentucky's caves will probably not be explored for years to come. Many that have been casually examined, like White's, Proctor, and Grand Crystal caves, show very little that is noteworthy, but a good deal of interesting history is connected with many others. Human remains have been found in Mammoth, Saunders, Haunted, and Dry caves. Putnam found in Salt Cave well-preserved sandals and implements that are believed to have belonged to prehistoric man. Salt Cave has yielded that rara avis among archæological finds in our territory—a well-preserved mummy, which now rests in the museum of the American Antiquarian Society in Worcester. Doubtless many of these caverns are worthy of study and will in time receive it. The same limestone formation extends down into Tennessee, which, accordingly, has caverns of its own; and the formation also crosses the Ohio River into Indiana, where in Crawford, Lawrence, and Orange counties is the second most important American cave region.

Visitors to the largest of these caves, Wyandotte, in Crawford county, usually start from the town of Leavenworth, on the Ohio river. There is nothing disappointing about this second largest of our caverns, though there are very few persons who ever traversed all of its twenty-three miles of ramifying passages. It is richer in fine dripstone formation than Mammoth Cave, and far from its mouth is a superb accumulation of gypsum crystals, almost equal to those of Mammoth Cave, where the imitative forms in gypsum of flowers, vines, shrubbery, and so on are among the chief wonders of our largest cavern. Odd Fellows' hall, the largest room in Wyandotte, is 210 feet long, 100 feet wide, and 80 feet high. Orange and Lawrence counties are also very rich in caves, among which are Campbell's (a half mile long), Donnehew's (nearly two miles long), Shiloh, or Wet (about a mile), Dry, Grinstaff, Connelly's, Harmer's, Donelson's Blue Spring, Buzzard's, and others; and in Orange county particularly is seen the phenomenon, so characteristic of limestone cave regions, of disappearing rivers. The most important of this type is the Lost River, which is swallowed up in the earth five times before it finally comes to the surface to stay. Where it finally emerges at Orangeville, at the bottom of a wooded ravine, it is forty feet wide.

Wyandotte used to be called Saltpetre Cave, and in the days when it was expensive to import gunpowder, and the pioneers made their own ammunition, they often visited this cave for their saltpetre. It will be remembered that when England cut off our supply of this commodity, in the war of 1812, our Government was dependent upon the miners of the Ohio Valley. Six years earlier Dr. Samuel Brown of Lexington, Ky., made a journey of 1,000 miles on horseback to inform the American Philosophical Society that the caves of Kentucky were rich in saltpetre. He was an ardent patriot, and thought his country might have need of this information. His statement was remembered when the war began. Then there were busy times in Mammoth and a few other caves. They still show in the dark passages of Mammoth Cave a few hoof prints of the oxen, made eighty-four years ago, and the stalls where the animals were fed. Their share in the work was to haul the nitrous earth to hoppers, where it was treated with water, and the solution of salts thus obtained was piped out of the cave to the crystallization troughs. Then trains of pack mules carried the crystals across the mountains to the seaboard. It is interesting to remember that caves supplied our Government with the means of making gunpowder when we sorely needed it. In 1814 the firm that produced saltpetre from Mammoth Cave cleared $20,000. But when the war ended the demand fell off, the manufacture was stopped, and has never been resumed. Many of our caves contain large quantities of bat guano, but though its value as a fertilizer has been proven by analysis, no effort has ever been made to put it on the market. This will probably be done some day. Only a few of these hundreds of caves can be turned to good account for exhibition purposes. If capital could see some other way to make money out of them, the number that are still unexplored and almost unknown would not be so large.

The blue and blue-gray limestone caves of the great valley of Virginia belong to a much older geological era than those of Kentucky, and are smaller than the Western caves. Their walls are more elaborately adorned, and they more nearly resemble the caves of Austria and France than those in our other great cave centres. The counties of Shenandoah, Page, Madison, Greene, Albemarle, Augusta, and Rockbridge, in Virginia, were known long before Luray was discovered to be rich in caves. For many years Weyer's Cave, about sixteen miles from Staunton, was supposed to be the largest and finest cave in the Virginia district. It was discovered in 1806. Then, in 1878, a photographer named B. P. Stebbins, attracted by the sink holes on a conical hill about a mile from the village of Luray, told the townspeople he was sure there must be a cave under that hill. He began digging here and there on the hill. He enlisted the interest of two or three other men who helped him in his search. For weeks they found nothing. The villagers called them "cave rats" and made them the butt of good-natured ridicule. But he laughs best who laughs last.

On Aug. 13 Stebbins and his comrades began to examine a depression on the hillside about forty feet in diameter and ten feet deep, half filled with loose stones, grass, and weeds. They spent some hours removing the obstructions, and at last found an opening through which a current of air was rising. A. J. Campbell was lowered by means of a rope, and reaching the bottom, candle in hand, he peered about him. Absorbed by the wonderful scene, he forgot his comrades, who became alarmed by his long absence, and sent his nephew down after him. Luray Cave had been discovered. The name of the quiet village had been made famous by the men who had been ridiculed.

There are many caves in this remarkable region. Count's, Ruffner's, and Water caves are in the immediate neighborhood of Luray. King's Cave, which the Indians used as a cemetery, and Robert's Cave are about eight miles north. Diamond Hall in Zirkle's Cave, about six miles from New Market, is well worth seeing, and nearer to New Market is a large and still only partly explored cavern. In Organ Cave, which excursionists from White Sulphur Springs often visit, the sweetest of tones may be elicited by striking with a stick the slender columns of dripstone. Then there are the Shenandoah grottoes, Madison Cave, and others of less renown. Many may be interested to know that our word "grotesque" is derived from "grotto," referring to the fantastic results of her fancy that nature leaves in these works of her hands.

It is needless to enumerate here the considerable number of caves found in other States, particularly in New York, Pennsylvania, Massachusetts, Tennessee, Georgia, and Alabama. Every one who can do so should see a great cave at least once in his life. It is easy, comfortable, and safe to visit the leading show caves. They are supplied with platforms, stairways, and railings, and every other appliance for convenience and safety. Visitors need not wet their feet, and there is no danger of a fall. No change of dress is necessary. But it is well not to emulate the lady who recently descended into the depths of an elaborate velvet dress and train, or the other lady who greatly surprised the guide by driving up to the cave house with a trunk, prepared to make a complete change of attire.

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THE TIN PLATE INDUSTRY.

This Year's Domestic Output Nearly Double That of Last Year.

WASHINGTON, Nov. 5.—Special Treasury Agent Ayer has submitted to the department his report covering the domestic output of tin and terne plates for the last fiscal year. The report says:

"During the fiscal year ended June 30, 1896, the production in the United States of commercial tin and terne plates was 307,228,621 pounds, against 193,801,073 pounds produced during the previous fiscal year, showing thereby an increased production of more than fifty-eight per cent. Of the production for the year, 303,002,098 pounds, or more than 98½ per cent., were made from sheets rolled in the United States, against about eighty-three per cent. made from such sheets during the fiscal year ended June 30, 1895."

The figures show that more than 86 per cent. of the production belonged to the class of plates weighing lighter than 63 pounds per 100 square feet, the proportion being about the same as that for the previous fiscal year. Of the entire production 69 per cent. consisted of tin plates, against 62 per cent. for the preceding year.

The report embraces the production of fifty-three firms, the output of two firms which were producing but made no report not having been considered. The report for the fiscal year ended June 30, 1895, embraced the production of fifty-five firms.

The quantity of American sheet iron and steel used was 4,300,770 pounds in excess of that for the year immediately preceding, and 3,841,822 pounds in excess of the average for the four previous years.

The production of black plates in the United States during the fiscal year was 334,014,798 pounds, against 185,571,479 pounds in 1895, showing an increased production of about 80 per cent. The proportion of such plates lighter than 63 pounds per 100 square feet is 77 per cent., as compared with 80 per cent. during the preceding year. Thirty-six rolling mills were producing black plates during the fiscal year ended June 30, 1896, against twenty-eight that were producing during the fiscal year ended June 30, 1895.

Of the fifty-three firms reported as producing commercial tin and terne plates during the last fiscal year, fifty used wholly American plates, with an output of 291,725,467 pounds, and three used both American and foreign plates, with an aggregate output of 15,503,154 pounds, of which 11,276,631 pounds, or about 73 per cent., were made from American black plates. No firm used wholly foreign plates.

Of the fifty-five firms reported as producing commercial tin and terne plates during the last fiscal year, thirty-seven used wholly American plates, with an output of 131,429,609 pounds; seventeen used both American and foreign plates, with an aggregate output of 62,311,308 pounds, of which 29,047,325 pounds, or about 46⅔ per cent., were made from American black plates; one firm used foreign plates only, with an output of 60,156 pounds.

As before shown, the proportion of American-rolled sheets used during the fiscal year ended June 30, 1896, compared with the entire production of commercial tin and terne plates, was 98½ per cent., against about 83 per cent. used during the previous fiscal year.

The following is a comparison of production and net imports:

	Pounds.
Total imports for fiscal year ended June 30, 1896	385,070,372
Total exports, same period	137,659,779
Net imports	247,410,593
Total domestic production	307,228,621
Approximate consumption in United States	554,639,214
Average annual capacity of mills completed June 30, 1896 (160)	560,000,000
Same of mills completed and in process of construction June 30, 1896 (168)	585,000,000

IN THE SAHARA DESERT.

A SUMMER VISIT TO THE WASTES OF SAND AND ROCK.

Various Aspects of the Great Desert—Summer Temperature and Vegetation—The Dead Lake of the Perpetual Mirage.

From the Philadelphia Public Ledger.

As the iron horse hurries through the final break in the Atlas Mountains all eyes are instinctively turned in the direction of the desert. The poetry of travel is now presumably to be turned into prose, the soft and smiling picture of nature into that hard ruggedness which speaks of a landscape not yet finished. And yet the first view of the desert is that of one of its oases, and of one which is very nearly the fairest of them all, for it receives the coolness of the north as well as the heat from the south, and the stream that carries the luxury of growth into its deeper recesses has not yet been sapped of its vitality by a continuous summer heat.

Long before we reach the fine gardens of El Kantara we are in the desert. Giant rocks, burned brown and red under the glow of the southern sun, stand out in wild pinnacles from the gently undulating surface, their ragged sides buried deep in the sand which they themselves have made. This is not the desert that is ordinarily pictured in the mind—that flat, endless expanse which fades off unmoved and unbroken to the limits of vision—but it is the desert, nevertheless, just as much as the mountain snows of the far north are a part of the great Arctic "sea of ice." Beyond, however, is the great plain itself, its swelling undulations hardly relieving to the eye the appearance of absolute flatness which the picture presents.

The truth is that the Sahara has a double aspect, that of the flat and sandy plains and that of the rocky ridge or mountain, the so-called Hammada. It is the latter that is more particularly dreaded by the caravans, for among their wind-swept crags there are no, or but few, oases, and only the blowing sands and a relentless sun are the companions of the footsore pilgrim. In the flat desert, at least, where the sand is not too deep, travelling is moderately easy, for over long distances the surface has become coated into a hard, calcareous crust—a solid basement rock, one may call it. We saw no sand dunes of any magnitude, those along the southern face of the great Chott Melghigh, about twenty feet in height, being the highest. But I was informed by competent authority at Biskra that beyond Tuggurt, on our route, they rise to the prodigious height of 1,200 to 1,400 feet. This is certainly an imposing monument to the power of the wind—one that speaks far more eloquently even than the wind-swept sands of coral islands.

It has become custom in certain book quarters of late to say that the Sahara is not as flat as it is commonly assumed to be, and that it is almost everywhere torn into ridges and rents. That is, however, an imperfect statement of the truth. The flat desert is almost interminably flat for days or weeks of travel, with hardly a rise of more than a few feet for mile after mile of perspective. All around is the same expanse; in vain the eye searches for some special object to give it relief; it does not exist, unless it be the far-off tufts of an approaching oasis.

I am not sure that these endless sands are truly imposing. Sometimes they certainly are, but they present most exquisite pictures in the varying lights of the morning and evening sun. It is then that they seem to constitute a world of their own, speaking in color that belongs to them alone. We were not to any extent trouble by their presence, either as impediments to travel or as freely floating discomforts in the atmosphere. Only as we approached Mreir, at the close of a hard day's journey of some sixty-four miles, did we come in disagreeable conflict with them. Our horses had more than their share in the second half of the day's work; for the better part of four miles we had been dragged through deep sand, and finally the courage of the poor animals had spent itself. We were stuck fast in the Sahara sands at a point some seventy feet below sea level. Coaxing and urging had little effect, and it was not until we ourselves took a long hand in pushing and pulling that we succeeded in extricating ourselves.

Let it not for a moment be assumed that the Sahara, even in the parts that do not belong to the region of the oases, is everywhere destitute of growing vegetation. Far from this is really the case. Along the entire length of our journey a generous supply of terebinth bushes, one to two or three feet in height, covered most of the sand elevations, and with them was a form of sickly green salcoliecious plant, the exact nature of which I was unable to discover. And if we can fully believe a war illustration that has recently appeared from the pencil of a staff correspondent, the same feature must be a characteristic of the Sahara about Timbuctoo as well. There are, indeed, a number of spots where the vegetation is even more luxuriant—if a scattering of plants can in any sense be called luxuriant—comprising a number of dry herbs, such as the rose of Jericho, which hardly rises a few inches above the surface, and again there are large areas where the vegetation has been completely stamped out, or where it has been buried deep beneath its canopy of sand.

It is the oasis that is the redeeming pearl of the desert. No poetic temperament is needed to prepare one for the enjoyments of its coming. From miles of distance the eye fastens itself upon the treetops; the dark green is a break in the landscape, and like the black shadow of clouds, it seems to go and come, the gentle undulations of the desert throwing it now and again out of sight. We had penetrated but a moderate distance into the desert, but the coming of the oasis was a relief that can hardly be described—those dense groves of date palms and the circulating streams of water. What must, indeed, the oasis be to those who have wearily plodded its sands for weeks at a time. When we returned to Biskra after our southerly journey the sun had just set behind the palm forest, illuminating the sky with that soft African yellow, which has been matched only by the brush of Edward Frère. The tall tree trunks rose against this in spectre shadows of brown, silent monoliths, rising as if from a silent grave. An Arab group appeared here and there, the flowing waters and the mosque asking each to his special devotions.

The heat of the desert is an unquestionable reality; and yet, perhaps, in the month of our travel, the hottest of the North African months, it was not so dreadful as might have been assumed. It is true that the mercury, whether by night or by day, felt little disposed to leave the region of the ninety-eights, unless it was in the direction of an upward journey. During the hours of mid-day it stubbornly clung to the division line of 110°, passing even beyond it slightly (although, perhaps not in the most perfect shade); at Biskra, during our brief absence, it stood at 116°. In travelling, however, we were subjected to even a much higher temperature, as, at rapidly recurring intervals, the heated reflections from the burning sands were, as it seemed, blown bodily into us. It was then that we remarked: "This is like an oven." And in truth, it was very much so.

I was surprised to find that there was a difference of only 20° between the heat of the open sun (132°) and that of the shade; the temperature of the sunny sands was at its highest, 123°. The excessive dryness made the heat perhaps on the whole more bearable than if the atmosphere had been in a measure charged with humidity, at least such is a general belief, and I am not sure but it is well founded. Certain it is that excessive perspiration has been largely reduced thereby. On the other hand, this extremely dry heat brings to many a partly suffocating feeling—a feeling as though the atmosphere was lacking in the proper amount or quality of oxygen. The parched palate asks for a moistener and for repeated lotions in decreasing periods of time. Still the whole is both bearable and supportable, and the foreigners who have located at Biskra seem to have acclimated themselves in a comparatively short space of time.

It would be doing the Sahara an injustice to allow it to pass without referring to its great salt lake, the Chott Melghigh. When we first saw it from a distance of a few miles it broke upon the landscape with a dazzling whiteness. The salt was on the surface, and the eye failed to distinguish the presence of water. It was like a vast field of immaculate ice thrown into the sands, over which hung the images that were thrust into the sky by the rarely failing mirage. This is the largest saltpan of the Sahara, and it occupies a position depressed considerably below the level of the sea. It is here that the gifted Roudaire had hoped to bring the waters of the Mediterranean to give back to the sea that which once belonged to it.

The Electric Furnace.

M. Moissan has an account of his latest researches with the electric furnace in a recent issue of the *Annales de Chimie et de Physique.* He gives the preparation and properties of titanium, molybdenum, uranium, and the borides of iron and of carbon, the preparation of manganese, and an historical account of the researches already made on the crystallized carbides of the alkaline earths. He also lays claim to the discovery of crystallized carbide of calcium, while assigning to Mr. Wilson the credit of having introduced its manufacture in the United States. With regard to titanium, M. Moissan has found that with a current of 50 ampères and 50 volts titanic acid is converted into crystallized oxide of titanium. With 350 ampères and 70 volts, the bronze-yellow nitride is obtained. When 1,200 ampères and 70 volts are used, the temperature rises above the point of decomposition of this substance, and the carbide is formed, free from nitrogen; and if this is heated with an excess of titanic acid, titanium containing only 2 per cent. of carbon is obtained. These successive actions, says M. Moissan, give a decisive proof of the increase of temperature of the electric arc dependent on an increase of the current, and form the starting point of another long series of experiments. The preparation of the crystallized compound of iron and boron containing over 15 per cent. of boron, and nearly corresponding to the formula FeB, effectually disposes of the assertion of some workers on iron that it is impossible to alloy these two elements.