

## THE GUACHARO, OR OIL BIRD.

In the deep rocky caverns of the mountains of Central America there lives a wonderful bird, which undoubtedly exhibits the principal characteristics of the night swallows, but nevertheless preserves an independent character, and may therefore be considered as an archetype of a distinct sub-family, called *Steatornina*, or oil birds.

The guacharo of Venezuela is fifty-five centimeters long, and double that breadth from tip to tip of wings. Its body is very slender, the head broad. The bill is longer than it is broad, curved considerably, and has a prominent overhanging point, and its edges are indented. The claw is very powerful, the leg short and bare, the wings very long and pointed. The tail is considerably shorter than the wings and rounded. The bill is surrounded with bristles, and little bristly feathers border the eyelid and protect the large half globular eye. A layer of fat extends under the chin and surrounds the intestines, so that they may be said to be embedded in fat. The color of the feathers is a beautiful chestnut brown mottled with dark brown. Upon the under side of the wings and the upper part of the tail there are distinct lance-shaped yellowish white spots with a narrow border. On the upper wing covers these spots are larger and elongated. The eye is dark, the bill reddish brown, the foot yellowish brown. The sexes are not distinguished by their coloring.

Alexander von Humboldt discovered the guacharo in the year 1799 in the large rocky caverns of Caripe. Later travelers have found it in other rocky clefts, such as are frequently found in the Andes. The knowledge which we have obtained of this remarkable bird is tolerably complete, but there remains yet much to describe. The following account is compiled of the most important statements of Humboldt and Grosz.

Humboldt says the caverns of the Guacharos do not lie in the valley of Caripe, but three miles from the monastery toward the west-south-west.

On the 18th of September we set out for the Sierra of Guacharo, accompanied by the Indian alcaldes and the most of the monks from the cloister. A narrow path led us first for about half an hour southward over beautiful turf-covered plains; then we turned westward up to a small river which springs forth from a cavern. For about three-quarters of an hour the way leads upward, sometimes in the water (which is not deep) and sometimes between the river and a rocky wall, the ground being very slippery and marshy. Numberless earth-falls, and the trunks of trees lying around, over which the mules make their way with difficulty, render this part of the way very wearisome.

Standing at the foot of the high Guacharo mountain, not more than four hundred paces from the mouth of the cavern, no place of entrance can be seen. The river runs through a gorge which the water has dug out for it, and the road passes under an overhanging rock, so that the sky cannot be seen. The road winds with the river, and at the last bend

one stands before the immense mouth of the cavern. The view is magnificent even to eyes familiar with the picturesque scenery of the Alps, for the luxuriant growth of tropical plants invests the mouth of these caves with a peculiar character.

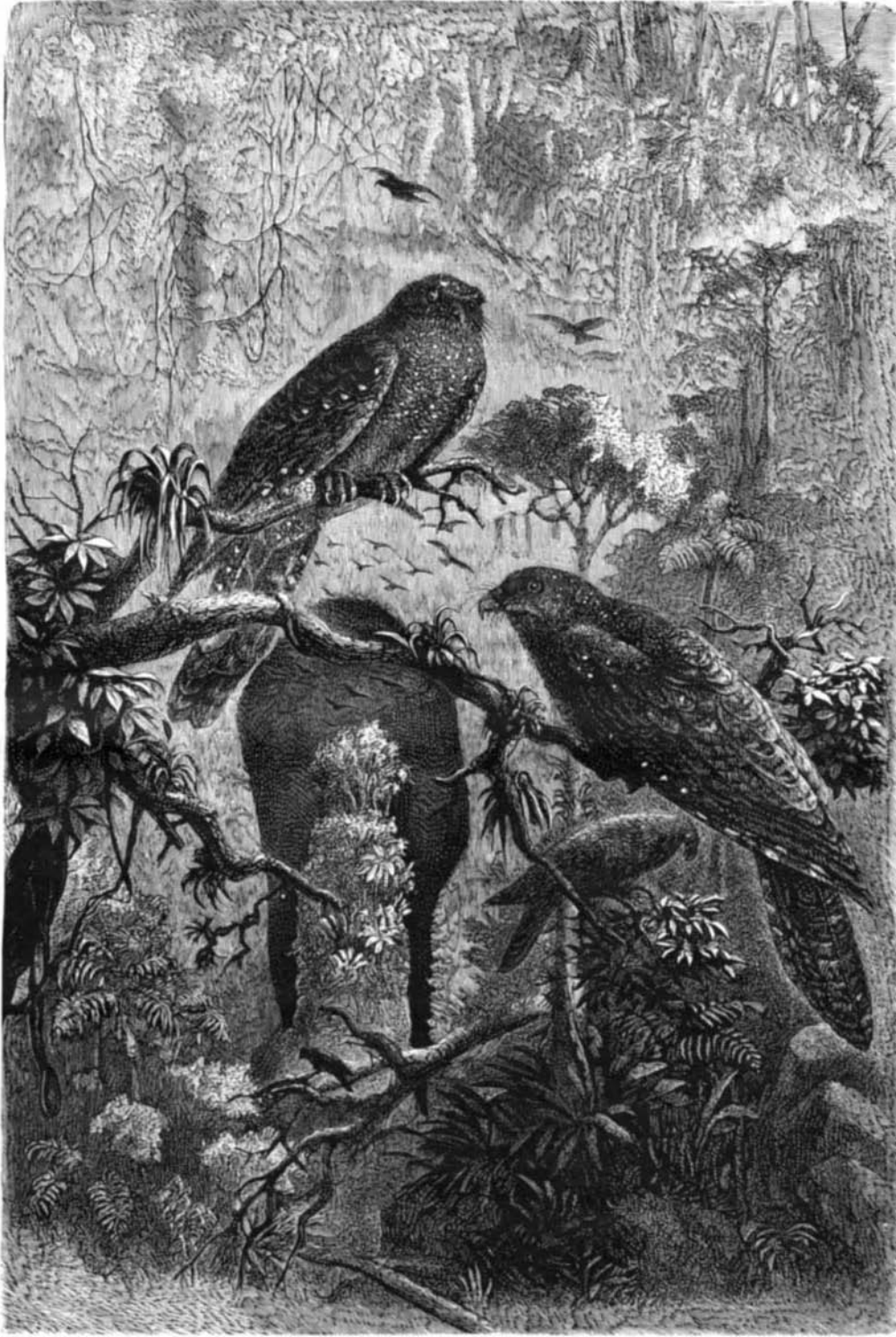
The Guacharo caverns open directly upon a perpendicular rocky wall. The entrance is turned to the south; there is an arch twenty-five meters broad and twenty-two meters high. Gigantic trees stand upon the rocks over the grotto. The mamei and the genipa tree, with broad glittering leaves, stretch their branches straight toward the heavens, while the courbaril and erythrina spread themselves out and form a thick green arch. Oxalis and orchids of rare species grow in the crevices of the rock, while climbing plants swinging in the wind twine themselves together before the entrance to the cavern.

But the growth of plants not only adorns the outside of the arches; they penetrate into the interior of the caverns. These plants extend into the caves of Caripe as in the deep rocky crevices of the Andes, and only cease thirty or forty paces from the entrance. We traveled a long distance before it was necessary to light the torches. The daylight penetrates so far because the caverns have only one passage, which extend from southeast to northwest. When

the light begins to disappear the hoarse cries of the nocturnal birds are heard. One can hardly conceive of the fearful noise which thousands of these birds produce in the depths of the caverns. The piercing, penetrating cries of the guacharos resound in the rocky arch, and from the depths of the cavern the echo comes back.

The Indians showed us the nests of these birds, while they fastened their torches to a long pole. The roof, twenty-three meters above our heads, with funnel-shaped perforations, swarms with the nests. The deeper one penetrates into the caverns the more birds are frightened up by the light of the torches, and the greater the tumult.

The guacharo leaves the cavern at the approach of night, especially when the moon shines. He eats very hard seeds and fruit; and the Indians assert that he never eats insects, and it is only necessary to compare the bills of the guacharo and the goat-suckers to see that their habits of life must be quite different.



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Every year, on St. John's or Midsummer's Day, the Indians enter the caves of the Guacharos, and with long poles strike down the nests, killing many of the young birds. The old ones, trying to defend their brood, fly about the heads of the Indians with fearful cries.

The young birds which fall to the ground are dressed upon the spot. The abdominal region is covered with fat, and a layer of fat runs from the under part of the body to the back part, and forms a kind of knob between the legs. These birds are not exposed to the daylight, and, using their muscles very little, become so fat that they remind us of the ancient experiments of cramming geese and cattle. It is well known that darkness and quiet promote the growth of fat.

The European nocturnal birds are lean, for they do not live upon seeds and fruit like the guacharos, but depend upon the scanty product of their chase.

At the time of the "fat harvest," as it is called in Caripe, the Indians build huts of palm leaves at the entrance to these caverns. Here the fat of the young freshly killed birds is tried out and poured into clay vessels. This fat is known by the name of guacharo fat or oil. It is semi-fluid, clear, and odorless, and so pure that it may be kept more than a year without becoming rancid. No other fat

is used in the kitchen of the monastery at Caripe, and the food does not receive any unpleasant taste or odor from its use.

The quantity of oil which the Indians prepare every year bears no proportion to the number of birds massacred. They obtain only about one hundred and fifty or sixty flasks of entirely pure oil. The oil remaining, which is not so clear, is preserved in earthen vessels.

The members of an Indian family descended from the first settlers in the valley declare themselves to be the rightful owners of the caverns, and lay claim to the exclusive right to the oil, but in consequence of the discipline of the monastery, their right is at the present time only a right of honor. The Indians furnish oil for the constant light in the church; the rest they declare should be purchased from them.

The guacharo family would have been long since extinct if several circumstances had not worked together for their preservation. The Indians do not venture far into the caverns on account of their superstitious fears. These birds also nest in neighboring caverns which are inaccessible to the Indians. Perhaps the large caverns are peopled again with settlers from the smaller nesting places, for the missionaries say that the number of birds have not perceptibly diminished.

Young guacharos have been carried into the harbor of Cumana, and have lived several days without eating when the seeds given them did not suit them. If the crop of the young bird is cut open it will be found to contain many kinds of hard dry seeds, which are called guacharo seeds. They are carefully collected by the Indians, and used medicinally as a remedy for fever.

It was with great difficulty that the Indians were induced to pass over the front part of the cavern, and it needed all the authority of the priests to prevail upon them to go as far as the place where the ground suddenly rises sixty degrees and the river forms a subterranean fall. The roof sinks down and the cries of the guacharos become so piercing that no persuasion could induce the Indians to penetrate further into the cavern, and we were obliged to give up to the cowardice of our guide and return.

These caverns of the nocturnal birds are horrible, mysterious places for the Indians. They believe that the souls of their ancestors hold their gloomy state in their innermost recesses, and, when they hear at night a loud wailing cry, set it down at once as proceeding from some wretched spirit longing to resume its body and lamenting its sad doom. To die is often called by the Indians "joining the guacharos."

The magicians and poison mixers hold their nightly juggleries at the entrance to the caverns in order to exorcise the chief of the evil spirits—Ivorokiamo. The caverns of Caripe are the Tartarus of the Greeks, and the guacharos that flutter with mournful cries over the water may be compared to the Stygian birds.

Grosz visited the ravine of Iconozzo, in New Granada, which passes through a sandstone rock, and a wild mountain stream rushes through it. He lowered himself by means of a rope, sat down on a narrow projection, and was immediately surrounded by a great number of these birds, who thought it necessary to attack him in order to defend their nests. The specter-like birds whizzed around so near the observer that they touched him with the points of their wings, and the cries of the hundreds and thousands of these birds were deafening. In flying they extend their wings and tail in the form of a fan. Every other movement seems to be clumsy. Their gait is a wretched creeping motion, and they use their wings to assist them. Grosz also states that their nourishment consists of hard dry fruits; they do not spit out the seeds, but they are thrown out with the excrement. The greedy young birds crowd around the nests, and by degrees dispose of the excrement and seeds, which sometimes reaches an enormous height.

The young are sadly misshapen, and are not able to move until their feathers are developed. If they are provoked they fall angrily upon one another, pecking with their bills whatever comes with their reach, even their own feet or wings, and if they once seize upon anything they let it go very unwillingly. Grosz attempted to rear one of the young birds, but was not in a position to give it its usual food, and

it died after a few days. The male and female brood in turn. The eggs, which are about the size of those of a house pigeon, differ from those of the real goat-uckers in form and coloring. The shell is moderately strong, chalky white, marked with brownish spots.—*Brehm's Animal Life*.

#### “Dragons in their Prime.”

In the latter part of June, Professor Samuel S. Lockwood, of New Jersey, discovered near Freehold, in that State, parts of the skeleton of a cretaceous sea serpent, which Professor Cope has named the *Oliudactes conodon*. Enough of the skeleton has been uncovered to show that its length must have been from sixty to eighty feet. Numbers of huge vertebrae, and a part of the lower jaw containing sixteen teeth, were first found, much to the astonishment of the country people. The teeth, especially the middle ones, have fore-and-aft cutting edges, and so perfect are they that the rich enamel is in as good a condition as if the creature had but yesterday been stranded on the beach. The remains of the monster have been sent by Prof. Lockwood to Prof. E. D. Cope, of Philadelphia, for examination; and to give an idea of the snake-like appearance of this monster, he says:

“To prevent their contortions from dislocating the vertebral column, they had an additional pair of articulations at each end, while their muscular strength is attested by the elegant striæ and other sculptures which appear on all their bones. A smaller species of elegant proportions has been called *C. toritor* (Cope). Its slenderness of body was remarkable, and the large head was long and lance-shaped. Its little movements brought many a fish to its knife-shaped teeth, which are more efficient and numerous than any of its relatives. It was found coiled up beneath a ledge of rock, with its skull lying undisturbed in the center.”

Its companions in the ancient sea, says a writer in the *Sun*, were not less wonderful, according to his examinations. The limbs were probably two pairs of paddles. In the best known species, twenty-two feet represent the neck in a total length of fifty feet. It is the *Elasmosaurus platyrus* (Cope), a carnivorous sea reptile, no doubt, adapted for deeper waters than many of the others. Like the snake bird of Florida, it probably often swam many feet below the surface, raising the head to the distant air for a breath, then withdrawing it and exploring the depths forty feet below without altering the position of its body. Judging from the localities in which the bones have been found, it must have wandered far from land; and that many kinds of fishes formed its food is shown by the teeth and scales found in the position of its stomach.

A second species of somewhat similar character and habits differed very much in some points of structure. The neck was drawn out to a wonderful degree of attenuation, while the tail was relatively very stout, as though to balance the anterior regions while capturing its food. It was a powerful swimmer, its paddles measuring four feet in length, with an expanse, therefore, of about eleven feet. It is known as *Polycotylus latipinnis* (Cope). Researches into their structure have shown that they were of wonderful elongation of form, especially of tail; that their heads were large, flat, and conic, with eyes directed partly upward; that they were furnished with two pairs of paddles, like the flippers of a whale, attached by short wide peduncles to the body. With these flippers and the eel-like strokes of their flattened tail they swam, some with less, others with greater speed. They were furnished, like snakes, with four rows of formidable teeth in the roof of the mouth. Though these were not designed for mastication, and without paws for grasping could have been little used for cutting, as weapons for seizing their prey they were very formidable.

Swallowing their prey entire, like snakes, they were without that wonderful expansibility of throat due in the latter to an arrangement of levers supporting the lower jaw. Instead of this, each half of that jaw was articulated, or jointed at a point nearly midway between the ear and the chin. It was of the ball-and-socket type, and enabled the jaw to make an angle outward, and thus widen the space inclosed between it and its fellow. The arrangement may be easily imitated by directing the arms forward, with the elbows turned outward, and the hands placed near together. The ends of these bones were in the *Pythonomorpha* as independent as in the serpents, being only bound by flexible ligaments. By turning the elbows outward and binding them, the space between the arms becomes diamond-shaped, and represents exactly the expansion seen in these reptiles to permit the passage of a large fish or other body. The arms, too, will represent the size of jaws attained by some of the smaller species. The outward movement of the basal half of the jaw necessarily twists in the same direction the column-like bone to which it is suspended. The peculiar shape of the joint by which the last bone is attached to the skull depends on the degree of twist to be permitted, and therefore to the degree of expansion of which the jaws were capable. As this differs much in the different species, they are readily distinguished by the column or “quadrate” bone when found. There are some curious consequences of this structure, and they are here explained as an instance of the mode of reconstruction of extinct animals.

The habit of swallowing large bodies between the branches of the under jaw necessitates the prolongation forward of the mouth of the gullet; hence the throat in the *Pythonomorpha* must have been loose and almost as baggy as a pelican's. Hence these creatures must have uttered no other

sound than a hiss, as do animals of the present day which have a similar structure, as, for instance, the snakes. The tongue must have been long and forked, because its position was still anterior to the glottis, so that there was no space for it except it were inclosed in a sheath beneath the windpipe when at rest, or thrown out beyond the jaws when in motion. Such is the arrangement in the nearest living forms, and it is always in these cases cylindrical and forked.

Another sea serpent that once roamed over New Jersey, and whose bones are now and then found by the farmers, is known to science as the *Mosasauros*; and if the reader can imagine a monster eel with a blunt head like a frog, and which if coiled up in Broadway would completely block the street, he can perhaps form something of an idea of this creature. On the possibility that some of these creatures may have outlived their era, as have other forms, the existence of the sea serpent of to-day depends. Agassiz was a firm believer in the fact, and a throng of trustworthy witnesses have attested to its appearance.

#### Additions to the Museum of Natural History, Manhattan Square.

By the liberality of Morris K. Jesup an economic department has lately been established in the Museum of Natural History. The first considerable contribution to this department is to be a botanical collection to illustrate the economic value of our forests. This will include specimens of all the woods used for any purpose in architecture, building, or the arts. The specimens will be trunks five feet high, transverse, longitudinal, and oblique sections of the wood, polished and unpolished, besides leaf, flower, and fruit, and photograph or colored drawing of a specimen of each species in its most perfect development. In addition to the label on each specimen, where examples of the same species occur in the park, their location will be indicated. This collection will be made under the direction of Professor C. S. Sargent, who is at the head of a corps of workers now preparing an elaborate census report on our forest wealth.

For the same department a collection of economic geology will be prepared under the supervision of Dr. George W. Hawes, who, with able assistants, is preparing for the tenth census a report on the quarries of ornamental and building stone. An exhaustive series of specimens of this character, together with maps, plans, and photographs, will be most instructive to artisans and pupils of the public schools. These census volumes will be distributed among the libraries and learned institutions all over the world, and they will be guides and catalogues to the illustrative specimens deposited in the Museum. The rapidity with which this costly collection is growing will make necessary the speedy erection of another section of the building.

The high value of the present contents of the Museum is shown by the following summary: (1.) A collection of mammals equal in extent and variety to all others in the country combined. (2.) A collection of birds more perfect in condition and mounted in more natural attitudes as a whole than any other in the world. (3.) A collection relating to the archæology of America, which, when the specimens here belonging to men working in the Museum and the specimens belonging to the Museum are taken together, is more complete than that under any one roof of the country. (4.) A collection illustrating the ethnology of the Pacific Islands, one of the most complete in the world. (5.) A palæozoic collection, mainly of fossils from America, better than anything of the kind in Europe. (6.) A collection of rocks, partly owned by the Museum and partly deposited here by the National Museum, comprising all the rocks gathered in the country. To these should be added the libraries on special subjects, noteworthy among which is that upon fishes, collected by J. Carson Brevoort, and presented by Robert L. Stuart. The next in value relates to shells. It was collected by Dr. John C. Jay and presented by Miss C. L. Wolfe.

#### Failure of Shad Hatching in Brackish Water.

Several experiments to test the feasibility of hatching shad in brackish water have been made by the Connecticut Fish Commission at Saybrook, the results being invariably negative. In only one instance did the eggs show signs of life. In that case, twelve hours or more after impregnation the eye spots of the little fish were visible under the microscope, and later the backbone. There was life, but it never advanced beyond this first stage. On examining these good eggs four hours after they were placed in the salt water, the microscope showed that they were covered with minute indentations, like pin pricks, and in seven hours these were more strongly marked. They continued to grow, and finally the eggs burst and only the shells were left. Thinking that this might be due to the agitation of the water on the surface, eggs were put in a tight covered box, which was sunk to the bottom, but no better success was attained. Pans were also taken to the shore, to avoid possible disturbance by the motion of the boat, but the result was the same. The Commissioners decide that shad cannot be hatched in salt or brackish water.

#### The Yellow Water Lily.

The first blooming of a yellow water lily (*Nymphaea flava*) in Cincinnati has called out in the *Commercial* the following facts with regard to the history of this recently rare plant:

“John James Audubon first discovered the yellow water lily in Florida, and mentioned it; but none of the botanists of the time could ever find it, and it was concluded that

Audubon must have been mistaken. A few years ago, however, Mrs. Mary B. Treat rediscovered the plant in Florida. Since then specimens of it have been sent to various parts of the world. It is, however, a rare plant, and until this summer has never been known to bloom away from its native home. There is another specimen now in bloom at the Kew Gardens, London. In shape this rare flower resembles the well known white water lily. It is smaller, however. The blossom is of a bright canary yellow, measuring nearly two inches in diameter. The leaves are very beautiful. They are heart-shaped and variegated in color. The top is green, flecked with purple, and the under side is bright purple red.”

Several blooms of the *Nymphaea flava* have recently been brought to this city from a near-by town on the Hudson, from which we infer that the *Commercial* overstates its rarity.

#### An Investigation of the Arid Regions.

The arid regions lying just to the east of the Rocky Mountains—the Great American Desert of our earlier geographers—is rapidly becoming of importance to agriculture through the encroachment of farms and the rapid development of stock raising. The region comprises the western portions of Dakota, Nebraska, and Kansas; the eastern portion of Montana, Wyoming, Colorado, and New Mexico; and about one-third of the State of Texas.

Last winter Congress appropriated \$15,000 to be used in procuring data touching the agricultural needs of this region; and recently the Commissioner of Agriculture has appointed two commissions, one to study the general conditions and agricultural capacities of the region, the other to select sites for an experimental system of artesian wells.

The first commission comprises Professor E. W. Hilgard, of California; ex-Governor Robert Furness, of Nebraska; and T. C. Jones, of Delaware, Ohio. They are to investigate and report upon the following subjects:

*First*—The grape culture and wine making of the Pacific coast as it now exists, and especially the inducements offered by the soil and climate of New Mexico for vine culture in reference to supplying the market with valuable grapes, wines, and raisins.

*Second*—The annual industry of that section of our country, its value, condition, and management generally, including horses, cattle, sheep, and wine.

*Third*—The agricultural methods prevailing in the region designated, including cereal crops, their value, amount in aggregate, and average yield per acre; the general management of land for horticultural as well as agricultural purposes, and the modes of fertilization.

The second commission mentioned is composed of Professor C. A. White, of Greeley, Colorado, and Professor Samuel Aughey, of Lincoln, Nebraska. The work will probably be begun in the southern portion of the arid area, near the Rio Grande. Professor Powell, of the Geological Survey, is quoted by Commissioner Loring as advising the selection of sites for wells on the eastern slope of the Rocky Mountains near enough to obtain the advantages of the dip in structure, and sufficiently far away, of course, to avoid faults and displacements by fracture. He thinks it probable that the water will be found in glacial and other quaternary deposits, and in tertiary deposits of the country. His reasons for selecting this area are these: First, it is the area of a large amount of stock raising, in which a water supply on the broad area lying between the streams is imperatively necessary. Again, in this area, the structure is more homogeneous than in any other portion of the United States, so that what is determined in this area would be of wide value, while what could be determined in any other portions of the United States would have only a local value.

Both commissions are expected to report results to the Department of Agriculture by the beginning of next year.

#### The Weakening of Steel by Heat.

Examples of the mysterious failure of steel are not uncommon, and although much of the mystery which used to attend the qualities of steel is disappearing before modern research, it cannot be said that increased knowledge always leads to better confidence. One of the peculiarities of spring and tool steel which has lately been investigated by several observers—Mr. Adamson among the number—is the known liability of steel that is very flexible when cold to break when at the blue annealing temperature. It has sometimes been supposed that only inferior metal is subject to this tendency; but the workers in Ural iron, which is remarkably pure in quality, have often observed the same action. Mr. Adamson has found that steel of this kind becomes actually “powdery” at a temperature of between 500° and 700° Fab., or the point at which willow twigs take fire; and he has decided that this is the point when the metal is at its weakest, possessing little or no coherence. This phenomenon, if it can be substantiated as universal or even frequent, is suggested as a possible explanation of a large number of accidents, such as the breaking of steel tires, shafts, and parts of machine tools which may be strong enough when cold, but being raised to the stated temperature by the effect of friction, etc., they are not able to withstand the slightest strain, and, in fact, drop into pieces by their own weight. The quickness with which broken parts of machinery or tools would, under ordinary circumstances, cool down, and therefore regain their strength, would naturally lead an ordinary observer away from the truth which Mr. Adamson claims to have discovered.