from various points of view with great trouble and at much personal risk.

The picture represents the canyon at the head of Diamond Creek, where the vast rocky walls rise abruptly to the hight of from 3,000 to 6,000 feet. At the bottom of this gloomy and terrible abyss flows a stream of dark water, flecked here and there with foam. In the background is a line of lofty bluffs, many of them crowned with masses of rock of enormous size and fantastic shapes, in which domes, towers, spires, and minarets are faintly outlined.

REAR-HORSES.

General Engelmann, of Illinois, has found by experience, that the best way to get rid of the grasshoppers in a vineyard is to raise rear-horses there, which are also known as devil's horses, *alias* praying nuns, *alias* intelligence bugs, *alias* devil's riding-horses, but the correct English name of which is "camel cricket."

Fig. I.

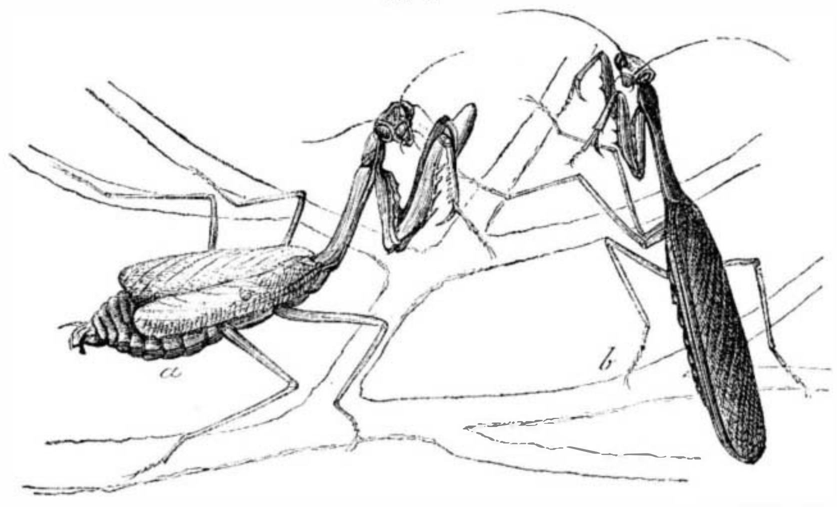


Fig. 1 gives a very good view of the sexes of this insect, *b* representing the male, which is of a brown color, and *a* the female, which is of a green color. The female has such short wings that she is incapable of flight; but the male flies as readily and as strongly as an ordinary grasshopper. The General's mode of colonizing this insect in his vineyard, is to collect the masses of eggs in the dead of the year and place them upon his grape vines. Fig. 2 will enable the reader to recognize these singular egg masses whenever he may happen to meet with them. Persons are very generally ignorant of their real nature, and on the principle that "everything that is unknown must be something hateful and destructive," are apt to cut them off and throw them into the fire. They should, under no circumstances, be destroyed. As a general rule camel crickets are only found in the central and southern parts of Missouri, in the southern part of Illinois, and in other southerly regions. But Mr. D. B. Wier is domesticating them at Lacon, on the Illinois river; and on one occasion one of their egg masses was found as far north as Lee county, Northern Illinois. We are inclined to believe that, with a little care and attention they may be acclimated at points further north than these.—*American Entomologist.*

TRANSMISSION OF POWER.

BY WILLIAM S. AUCHINCLOSS, HONORARY COMMISSIONER TO THE PARIS EXPOSITION 1867.

LEATHER BELTING.

An examination of the different leather departments, and the varieties of belting in actual use, reveal a tendency on the part of manufacturers to improve the quality of wide belts by securing 2-inch strips along their edges. Specimens of this character are exhibited by Messrs. Webb & Son, Stowmarket, England; Mr. William Ruland, of Bonn, Prussia; H. Lemaistre & Co., Brussels, Belgium; Placide Peltereau, 32 Rue d'Hauteville, Paris; Poullain Brothers, 99 Rue de Flandre, Paris; and others of less note. The material forming these strips is (with a single exception) leather of the same quality as the belt. The methods of attachment are variable, as laces, threads, rivets, eyelets, and brass screws, The English use the threads, Prussians the laces, and the French all the varieties enumerated. Mr. P. Peltereau, proprietor of one of the largest houses in France, makes a remarkable display, not only of belts and their mountings, but of different kinds of leather; such as tanned elephant hide, varying in thickness from one fourth to one half an inch, and hippopotamus hide, from one inch to one and a half inches in thickness. His 8-inch and 10-inch belts have leather facings two inches wide on their edges. Each of these facings is attached by two leather laces, whose stitches have three fourths of an inch span, and run in parallel lines, separated by one and one fourth inch.

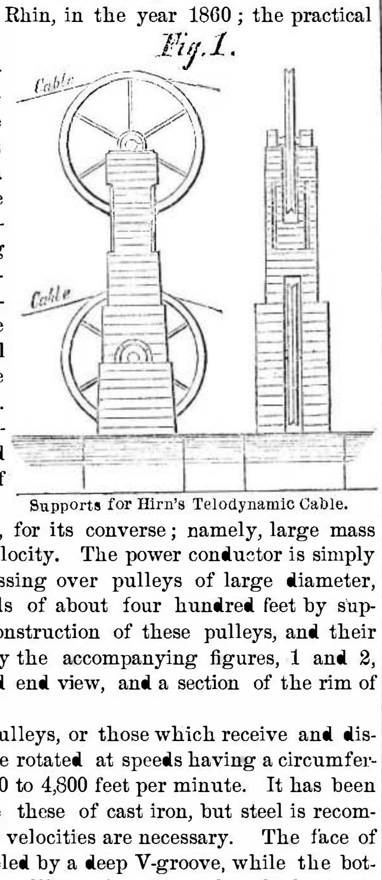
The "inextensible belt," for which, at a previous exposition, he received a gold medal, has steel instead of leather edging strips. These strips, for a 10-inch belt, are two inches wide by one sixty-fourth of an inch in thickness, and attached by two riveted rows of copper tacks. These tacks are one eighth of an inch in diameter, and placed three and one half inches between centers.

Messrs. Poullain Brothers join their single, and compound their double belts with headless one eighth of an inch brass screws. This is accomplished with a very ingenious machine, of which there are several types in the French department. It carries a coil of plain brass wire, which, while being fed to the work, passes through a die of twenty-eight threads to the inch. The screw thus formed enters the belt at a point closely clamped by a foot-lever, and, having passed through, is cut off. Finally, the belt being placed on a surface plate, the points of all the screws are slightly riveted. The most compact and expeditious of these machines is the invention of Mr. Cabourg, 74 Rue St. Honoré, Paris.

Mr. E. Scellos, of 74 Boulevard du Prince Eugene, exhibits what he terms a "homogeneous belt," for 150-horse power. This belt is nineteen and one half inches wide by three fourths of an inch in thickness. It is composed of 104 leather strips three fourths of an inch in width, laid longitudinally with reference to the belt, and laced transversely; the distance between laces is one and one fourth inch, and diameter of lace equals three sixteenths of an inch. The advantage of edge-bound wide belts, where frequent shipping is an essential, we think will be readily conceded; and to what extent they can supplant double belts, is a subject worthy of experimental inquiry. The use of very wide belts is seldom resorted to in the machinery department. One of the stationaries has two central ribbed pulley rims bolted to the arms of its fly wheel; on these run four belts six inches in width; another has two 12-inch edged belts, and so on—the inclination was always to increase the number rather than the width of the belts.

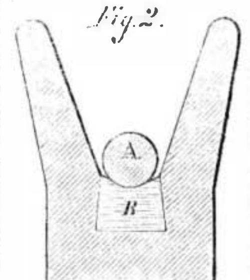
TRANSMISSION OF POWER TO GREAT DISTANCES.

For the transmission of power to great distances, leather and rubber belts are rendered useless by their extreme elasticity, and the expensive character of their intermediate supports; while shafting with bevel gears consumes the applied power in excessive friction, elasticity, etc. These difficulties were studiously met and successfully solved by Mr. C. F. Hirn, of Colmar, Haut Rhin, in the year 1860; the practical working of his invention was partially displayed at the exhibition of 1862. In the park of the present Exposition, his system is clearly shown by the operation of a centrifugal pump, deriving its power from a stationary engine, working on the opposite side of the artificial lake, and distant some 500 ft. from the pump. This so-called "telodynamic system is based on the substitution of a high velocity devel oped in a small mass, for its converse; namely, large mass moving with small velocity. The power conductor is simply a light wire rope, passing over pulleys of large diameter, and upheld at intervals of about four hundred feet by support-pulleys. The construction of these pulleys, and their supports, is shown by the accompanying figures, 1 and 2, giving a side view and end view, and a section of the rim of the pulley.



Supports for Hirn's Telodynamic Cable.

The two extreme pulleys, or those which receive and distribute the power, are rotated at speeds having a circumferential velocity of 1,800 to 4,800 feet per minute. It has been the practice to make these of cast iron, but steel is recommended where higher velocities are necessary. The face of the pulley is channeled by a deep V-groove, while the bottom of the latter has a filling of gutta-percha which adapts itself more and more perfectly to the rope and entirely prevents slip and wear. Fig. 2 is a section of the rim of the support pulley, showing the cable A, resting upon the gutta-percha cushion, B. Herein lies the secret of its practical success; a result only attained after most discouraging experiments upon pulleys constructed successively of copper, wood, cast iron, etc., with facings of leather, india-rubber, horn, lignumvitæ, and boxwood. Experience has proved that the loss of power by the telodynamic system is quite trifling, and arises mainly from the resistance of the air to the arms of the pulleys, the friction of their axles, as well as the rigidity of the rope in its passage over the pulleys.



It has been found that two pulleys, twelve feet in diameter, making 100 revolutions per minute, with a cable of seven sixteenths of an inch diameter, can, by means of a circumferential velocity of 4,000 feet per minute, transmit 120-horse power (to distances less than 400 feet) without sustaining a loss of more than two and one half per cent. If this limit is exceeded, it will become necessary to introduce support pulleys of seven feet diameter, and for these there should be estimated a mechanical loss of about one per cent per 3,300 feet of distance traveled. The pecuniary expense, independent of the ground rent, amounted to $1,000 (gold) per 3,300 feet, plus $600 for the receiving and distributing pulleys, with their respective shafts and supports. It is evident that this system cannot be limited in its application by rectilinear transmission, but is susceptible of all the changes in direction which inclined pulleys can command. There are already between 400 and 500 instances of its employment in connection with the manufacturing interests of the continent. Its advantages in respect to our own country can hardly be overestimated.

CADMIUM AND ITS USES.

BY PROF. C. A. JOY, OF COLUMBIA COLLEGE.

Seven cities dispute the right of having given birth to the immortal Homer, and seven men claim the honor of having discovered cadmium. A learned German has tried to show that Homer was a myth. Cadmium was named after the mythical *cadmia,* but is, nevertheless, a reality.

Fig. 2.

It was in 1818, just fifty years ago, that the attention of chemists was called to some samples of zinc that were sold for medicinal purposes; they gave, when in solution, a suspiciously yellow color with sulphureted hydrogen, and hence were condemned as containing arsenic. A number of chemists were furnished with specimens for examination, and several of them got on track of a new metal at the same time.

Frederick Stromeyer, who was born in Gœttingen, in 1778, and was for many years professor of chemistry at the University in his native city, until his death in 1835, was the first to publish a full account of investigations into the properties of the new substance in September, 1818, and he gave to the metal the name of cadmium.

Karsten simultaneously proposed to call it melinium, from the quince-yellow color of one of its compounds; Gilbert gave it the name of junonium, from the planet Juno, and John christened it klaprothium, after a famous chemist; but all of these strange appellations have been eliminated from our nomenclature, and cadmium is the only one recognized in modern times.

The discovery of cadmium forms an era in the line of scientific research. It was the first metal found in a compound and not in an ore, and it could not have been detected until chemical analysis had reached an advanced state of accuracy. Traces of it were soon found in zinc ores, but it was not until after the lapse of twenty years from the time of Stromeyer's publication, that an ore of cadmium was discovered. Lord Greenock, at that time, described a mineral which had been picked up on his estate, and which proved to be a cadmium blende, analogous to zinc blende, or to galena. The new ore was called greenockite, and since that time it has been found in various localities; it is, however, a very rare mineral.

For commercial purposes, we obtain the metal from zinc ores and furnace deposits. By subjecting zinc to downward distillation, the first portions that come over often contain cadmium. The pure metal is obtained by dissolving the regulus in sulphuric acid, and converting it into a sulphide, by means of sulphureted hydrogen, then re-dissolving and reprecipitating, by carbonate of ammonia, and reducing with a proper flux. As thus obtained, it is a white, soft, malleable, ductile metal, eight and one half times heavier than water. It leaves a mark upon paper the same as lead, and when bent gives out a creaking sound, similar to that known as the "tin cry." It can be distilled the same as zinc, but unlike zinc, when it is set on fire and burns, it gives a brown oxide. It sometimes happens that zinc-white is contaminated by this brown powder and rendered worthless as a paint. Cadmium melts at about 440° Fah., and when alloyed with other metals, causes them to fuse at a lower temperature; a very little of it renders copper very brittle. Seventy-eight parts of cadmium, and twenty-two parts of mercury, was, for a long time, used for plugging teeth, but, as the amalgam oxidizes easily and turns yellow, and the mercury proves injurious to health, this application is pretty much abandoned. Mr. Abel has proposed an alloy for jewelers' use, which is said to be very malleable and ductile, and to possess a fine color. It is composed of 750 parts of gold, 166 parts of silver, and 84 parts of cadmium. We had occasion, when giving an account of the properties of bismuth, to speak of the very fusible alloys composed of bismuth, tin, lead, and cadmium; they melt at a point much lower than cadmium itself.

It is as a yellow paint that cadmium compounds are the most highly prized. By mixing a solution of gum arabic, chloride of cadmium and hyposulphite of soda together, we obtain a fine yellow paint, which is one of the most durable known to artists. There are other ways of making it, and the purity of color depends very much upon the absence of metals that turn black when mixed with sulphur, and the care with which it is dried. The very property that led to the condemnation of zinc-white, and which ultimately brought about its discovery, is the yellow color, now most frequently turned to valuable account.

The keeping properties of the collodion, made sensitive by the iodide and bromide of cadmium, have made these salts great favorites with photographers, and a new use for cadmium has sprung up of late years in this direction.

Manufacturers are getting more into the habit of saving the furnace and flue dust of zinc works, and of separating the cadmium from them, and in this way the supply of the metal is increasing. Salts of cadmium find application in medicine. The sulphate is applied to the eyes to remove specks from the cornea, the nitrate produces violent vomiting and purging, and, in general, when taken internally, the salts can only be employed in very small doses, as recent experiments of Monsieur Marme have shown them to be violent poisons. The best antitode is the carbonate of soda and the white of an egg.

The following mixture burns with a brilliant white flame, surrounded by a magnificent blue border: Salpeter, 20 parts; sulphur, 5 parts; sulphide of cadmium, 4 parts; lamp black, 1 part.

This can be moistened and made up into balls or candles, and ignited after the manner of a fuse.

We have thus given the history and prominent applications of the rare metal, cadmium.

Correspondence.

The Editors are not responsible for the Opinions expressed by their Correspondents.

Improved Apparatus for Extinguishing Fire Wanted.

MESSRS. EDITORS:—I have read with interest your recent article regarding losses by fire from steam heating apparatus. Last winter we had a hot house, the property of Denn s Bowen, Esq., of this city, destroyed by fire. I gave it my opinion that the cause of it was from their heating pipes, which were directly under the wooden platform where the fire first appeared, but those who claim to be competent judges scouted the idea.

It seems to me that the sprinkler apparatus used in the woolen mills, alluded to in your paper, week before last, would be an excellent thing to use in our elevators in this city, which invariably burn up, when they catch fire, owing to the combustible material of which they are made, and the draft caused by the bins running from the top to the bottom of the elevator. I wish you would wake up some of the scientific men to making improvements in the manner and machinery of extinguishing fires, it seems to be the most neglected of all the branches of business. To be sure there has been considerable improvement made, such as the steam fire engines, fire alarm, telegraph, etc., etc. But don't you think that there is still further improvement to be made? It seems to me that a fire engine can be made which does not weigh over three thousand pounds, and still be as effective as the ones which are now used that weigh seven thousand pounds.

I have taken great pleasure in reading your valuable paper, and I hope it may long continue in its field of usefulness. PETER C. DOYLE.

Buffalo, N. Y.

Purifying Drinking Water.

MESSRS. EDITORS:—Your correspondent in No. 9, present volume, suggests a very good remedy for keeping water pure; but it is at the cost of extra care, and manual labor, and expense of an air pump which requires close attention to operate successfully for any length of time.

My remedy is to use a pump that will give a slight agitation to the water every time the pump is used. I used in a large cistern a Joyce submerged pump, which consists of a semicircular cylinder, with arms extending out each side, and operating on a pivot to force the two plungers back and forth in the cylinder. These arms were connected by rods to a double handle at the top to give motion. This plunger with the two rods produced an agitation that kept the cistern water sweet for years. The pump was located a few inches from the bottom, and it never produced roiling.

As the pump was used from twenty to fifty times a day, I think it was more efficient than would be an air pump, with the great liability of neglect. There are similar pumps in use, but I can speak from experience of this one only.

Omaha, Nebraska. J. M. G.

Boiler Test Proposed.

MESSRS. EDITORS:—I would suggest through your valuable paper that at the coming exhibition of the American Institute this fall, a test of steam boilers should be made to ascertain what boiler will produce the most steam power with a given consumption of fuel.

The proper way to test them would be to have a tank full of water in which a propeller wheel of coarse pitch connected to a 40-horse power engine is arranged to work. The boiler that gets the greatest number of turns out of the wheel with least consumption of fuel should be pronounced the champion boiler.

If a test of this kind takes place, I, for one, will furnish a 40-horse power boiler of my patent.

HUGH LESLIE.

Jersey City, N. J.

[Our correspondent is perfectly safe in this challenge. The American Institute will not commit themselves, we understand, to any test of boilers this year; but if they would do so, they would scarcely permit so unscientific and unsatisfactory a method as our correspondent proposes. We have asserted and reasserted over and over again that the only reliable test of a boiler is its evaporative power compared with the fuel it consumes, and yet our readers will persist in complicating the problem by saddling some other condition upon it. As well might it be proposed to test a boiler by running an engine and a cotton mill with it as an engine and propeller wheel. Believe us, friends, an engine and boiler are two distinct animals. They don't belong even to the same genus, let alone species. To test the speed of a horse we do not tie an elephant to his tail and run the two together.—EDS.

AS FAR as man can go back in time, says Dumas, as far as man can reach by observation in space, the concrete elements of matter present the same character as Lavoisier's elements.

POOR TIME.—HOW TO DOCTOR DISABLED CLOCKS.

WRITTEN FOR THE SCIENTIFIC AMERICAN BY F. P. WARREN.

As the worm is to fruit, making it deformed and one-sided, so are poor timepieces to our lives, making them unsteady and irregular. We can plainly see that there is much loss of time in being too early, or too late for meals, for trains, and for engagements, or that the broken rest, taxing the mind with the rising hour, and standing in the cold waiting for the train, will affect the health; but we little realize the unconscious influence that living by a poor timepiece has in forming unsteady and irregular habits in a family. It is a secret enemy, and as such, should be conquered, and trained a trusty servant, or destroyed like the vermin of the house, or the weeds of the garden. And on every mantle, be it palace or mansion, cottage or hovel, should stand a clock that can be depended upon.

WHAT IS THE MATTER WITH THE OLD CLOCKS?

Resinous dust mixes with the oil on clock pivots and forms a wax, which, when thick enough, will stop the clock. As a grinding tool can be made with diamond dust embedded in brass, which will continue to cut till no brass remains to hold the dust; so sand and gritty dust is caught by oiled clock pivots and ground into the brass, where it remains embedded, even after the most thorough cleaning. The particles of grit, together with bits of steel, ground from the pivots, can be plainly seen with a good microscope. Grit grinds the pivots of clocks rough, and often grains of sand are embedded in flaws and rough places. Such pivots will soon cut out new bushing.

THE REMEDY.

Scrape the bearings and polish the pivots.

PIVOT POLISHING.

This may be done by means of a very simple lathe made of a piece of board, cut something like a boot-jack, the hole about two inches square, with a wood center or plug in one ear, holding one pivot, the other ear cut off even with the plug and notched to receive the pivot to be polished; a small bow, with a violin string, running on the pinion or arbor, turns the wheel, while a few strokes of the pivot file on the pivot, will polish like glass. It requires a little practice to get used to working the bow, and the pivot file, in opposite directions, at the same time, but, when familiar with the operation, pivots are easily and speedily polished. There should be two holes in the end of the plug, and two corresponding notches in the end of the short ear, to receive both large and small pivots. The plug should be held with a thumb screw so that it can be easily varied to suit the different lengthed arbors. A common wood screw, with the head altered, will answer.

This "board lathe" can be held upright in a vise, or otherwise conveniently fastened. The common "verge lathe," with wood centers, will work well with small wheels, but there is not swing enough for the large ones, which often need polishing the most.

TO MAKE A PIVOT FILE.

Grind a common flat file perfectly smooth, roughen with emery paper, and always use with oil.

TO BUSH.

Bend sheet brass into a tube with the hole the size of the pivot; ream the unworn side of the hole in the clock plate till the hole is round, then ream equally to the size of the tube, beveling the edges; swedge the tube in, and dress to the proper size.

The common way of bushing is to close the hole with a punch, but this, closing only near the edge, leaves a poor bearing. A better way is to cut a hole through the plate about one-eighth of an inch from the pivot hole, with a narrow chisel. The pivot hole will close as the chisel hole is enlarged, and can be reamed out to make a good bearing. The chisel should be about one-twelfth of an inch wide, gradually enlarging back from the edge.

CLEANING CLOCKS—HOW NOT TO CLEAN A CLOCK.

Forget to let the springs down; bend the escape wheel points awkwardly, working at the pin underneath; raise the upper plate a little, and the clock will come to pieces itself. Go around the room and pick up the wheels, not noticing the bent cogs and pivots, and lay them together, where the boys can play with them while you are cleaning. Wipe the plates with an old, greasy, sticky chamois skin or rag, clean the holes with a dirty string, and, if the boys' fingers are quite dirty (and what boys are not who are always handling things?) let them hold and hand you the wheels, when you find a place for them. If the clock does not go together good, loose your temper and make it; if the wires are in the way, bend them out, and when the clock is together, bend them again to make it strike right. After handling the verge and touching the escape wheel points with your sticky fingers, oil the whole clock profusely—get your pay—and then, if it don't run till "taken home," or till you get "around the corner," tell the owner it is worn out and advise him to buy a new one.

HOW TO CLEAN A CLOCK.

Touch watch oil to the pivots, and run the wheels to loosen the dirt; too deep and too shallow gear notice, and mark the holes that need bushing; tie the springs with strong cord, loosen the click spring, and let them down steadily by the key turning in the palm of the hand. If the two largest wheels of the trains are alike, mark the strike side, that there may be no mistake in putting together. Wipe thoroughly every part of the works with a clean rag. Clean the cogs with a pack of cards riveted together. If the clock is old, scrape them with a sharp knife; polish the pivots if at all rough or worn, and clean with a fresh rag pressed well against the shoulder with the thumb nail. The pivot holes, if the pivots are worn rough, should be lightly scraped with a sharp reamer, and cleaned with a pine stick till they no longer blacken it.

PUTTING UP CLOCKS.

Always work slow, and pin as you go, using shoemakers zinc nails.

Time train wheels are always plain; the wheels of the striking train have something attached to them, either plates, pins, or wires.

If you bear in mind that larger wheels gear into the pinions of smaller, you can hardly place them wrong; but the strike wheels must so gear, that the wire with a poker crook will drop into its notch at the same instant of the bell hammer stroke, and the crank of the fly wheel, when at rest, should be opposite to the wire which catches it before striking. The drop of the escape wheel on the verge being lost power, they should be as near together as possible, and allow the sure escape of the teeth; but, as the escape wheel is held from the verge by the power, it should be pressed toward it during a trial of one revolution, or the teeth will catch whenever the power is slack, as on cold nights.

Oil freely, with the best watch oil, the different bearing parts of the verge; other parts will run longer and wear less without.

Wooden clocks can be made as good as new by returning the pivots and bushing the bearings with brass. The balance pivots of marine levers, when worn, should be re-turned and re-tempered.

A clock cannot be well regulated with the pendulum loose at the point of suspension.

Chemical Discovery in the Past Year.

In the inaugural address of Professor Stokes, President of the British Association, made at the opening of the annual meeting, held this year, at Exeter, England, he made the following remarks on the progress of chemical discoveries: In chemistry I do not believe that any great step has been made within the last year; but perhaps there is no science in which an earnest worker is so sure of being rewarded by making some substantial acquisition to our knowledge, though it may not be of the nature of one of those grand discoveries which from time to time stamp their impress on different branches of science. I may be permitted to refer to one or two discoveries which are exceedingly curious, and some of which may prove of considerable practical importance.

The Turaco, or plantain-eater of the Cape of Good Hope, is celebrated for its beautiful plumage. A portion of the wings is of a fine red color. This red coloring matter has been investigated by Professor Church, who finds it to contain nearly six per cent of copper, which cannot be distinguished by the ordinary tests, nor removed from the coloring matter without destroying it. The coloring matter is, in fact, a natural organic compound, of which copper is one of the essential constituents. Traces of this metal had previously been found in animals, for example, in oysters, to the cost of those who partook of them. But in these cases the presence of the copper was merely accidental; thus oysters that lived near the mouths of streams which came down from copper mines, assimilated a portion of the copper salt, without apparently its doing them either good or harm. But in the Turaco, the existence of the red coloring matter which belongs to their normal plumage, is dependent upon copper, which, obtained in minute quantities with the food, is stored up in this strange manner in the system of the animal. Thus in the very same feather, partly red and partly black, copper was found in abundance in the red parts, but none or only the merest trace in the black.

This example warns us against taking too utilitarian a view of the plan of creation. Here we have a chemical substance elaborated which is perfectly unique in its nature, and contains a metal the salts of which are ordinarily regarded as poisonous to animals; and the sole purpose to which, so far as we know, it is subservient in the animal economy is one of pure decoration. Thus a pair of the birds which were kept in captivity lost their fine red color in the course of a few days, in consequence of washing in the water which was left them to drink, the red coloring matter, which is soluble in water, being thus washed out; but except as to the loss of their beauty it does not appear that the birds were the worse for it.

A large part of the calicoes which are produced in this country in such enormous quantities are sent out into the market in the printed form. Although other substances are employed, the place which madder occupies among dye stuffs with the calico printer, is compared by Mr. Schunck, to that which iron occupies among metals with the engineer. It appears from the public returns that upwards of 10,000 tuns of madder are imported annually into the United Kingdom. The colors which madder yields to mordanted cloth, are due to two substances, alizarine, and purpurine, derived from the root. Of these alizarine is deemed the more important, as producing faster colors, and yielding finer violets. In studying the transformations of alizarine under the action of chemical reagents, MM. Graebe and Liebermann were led to connect it with anthracene, one of the coal tar series of bodies, and to devise a mode of forming it artificially. The discovery is still too recent to allow us to judge of the cost with which it can be obtained by artificial formation, which must decide the question of its commercial employment. But assuming it to be thus obtained at a sufficiently cheap rate, what a remarkable example does the discovery afford of the way in which the philosopher quietly working in his laboratory may obtain results which revolutionize the industry of nations! To the calico printer, indeed, it may make no very important difference whether he continues to use madder, or replaces it by the artificial substance; but what a sweeping change is made in the madder-growing interest! What hundreds of acres hitherto employed in the madder cultivation are set free for