THE OSTRICH.

Among the earlier references to this singular bird we may place with some interest the statement made in Xenophon's Anabasis, that there were on the Mesopotamian plains "all sorts of beasts, very many wild asses, and many ostriches." They could then, as now, only be secured by strategy, for the same ancient writer avers that "those of the horsemen who pursued them quickly stopped, for escaping they drew far off, using their feet in running and their wings, raising them like to a sail." Herodotus speaks of the ostrich, and Aristotle refers to the ostrich in numerous places.

Though remarked and studied for so many centuries that it might be supposed that its habits and traits were among the most familiar incidents in natural history, yet the ostrich to-day is not in all the details of its life fully understood, so difficult does it seem to penetrate the domestic economy of our common animals. The ostrich enjoyed a much wider range in the past than it does to-day. It then was found in Syria, in Persia, and pushed the northern limits of its distribution up into Belochistan and Turkestan. The attacks of man have virtually circumscribed its home within the borders of Africa, and here upon the broad inland plains, the skirts of the Sahara, and the edges of Barbary it may yet be found, herding with the antelopes, mingled promiscuously among them, or in separate bunches, dotting the level land with its singular and plume covered forms. Sclater has remarked of the group of the *Struthionidæ*, to which the ostrich belongs, that it forms an eccentric and unique family, and, with a common expression, diverges so widely in its members that whereas the true ostrich (*Struthio camelus*) approaches among birds most nearly to a mammal, the apteryx or *kiwi* at the other extremity of the line suggests and possesses reptilian affinities. To this struthioid group belong also the American emus and the Ceramese cassowary. The ostrich lives upon fruits, vegetable products, succulent herbs and grass; the eggs of the hen are deposited in a circular cavity scraped in the sand, where, exposed to the heat of the sun, they are hatched, and, covered by the cock during the night, are protected against the depredations of prowling jackals. The bird is voracious and eats indifferently solid objects, stones and dirt, mingled with its customary food. Eggs scattered about the outside limits of their nests are said to be intended for the sustenance of the young, as they emerge upon incubation, since their tender stomachs would fail to digest the more refractory substances eaten by the large birds. The ostrich in Africa has been separated into two species, that of the north, with smooth eggs and flesh colored skin, and that of the south, with pitted eggs and a bluish colored skin, and this distinction has been finally fully accepted.

The Rev. Dr. Samuel Houghton has paid especial attention to the muscular mechanism of the leg of the ostrich, and has revealed the construction of that powerful member in a paper published in 1865 in the "Annals and Magazine of Natural History." The extraordinary speed attained by the ostrich, and the well known vigor which it can impart to its kicks, have made this portion of its anatomy of peculiar interest. Dr. Houghton regards the leg of the ostrich as a long rod, bent at four distinct points, which is suddenly straightened or elongated by the simultaneous contraction of all the muscles. The bird is thus thrown forward with a formidable impetus, and while the body of the bird is thus launched into the air, the complementary muscles that restore the flexed condition of the leg instantly reassert themselves, and, in conjunction with certain contrivances in the heel joint, fold the leg again, preparatory, as it touches the ground, at the next step, to another erection of the whole leg, with the effect of again hurling the great bulk of the bird forward in its projection through the air.

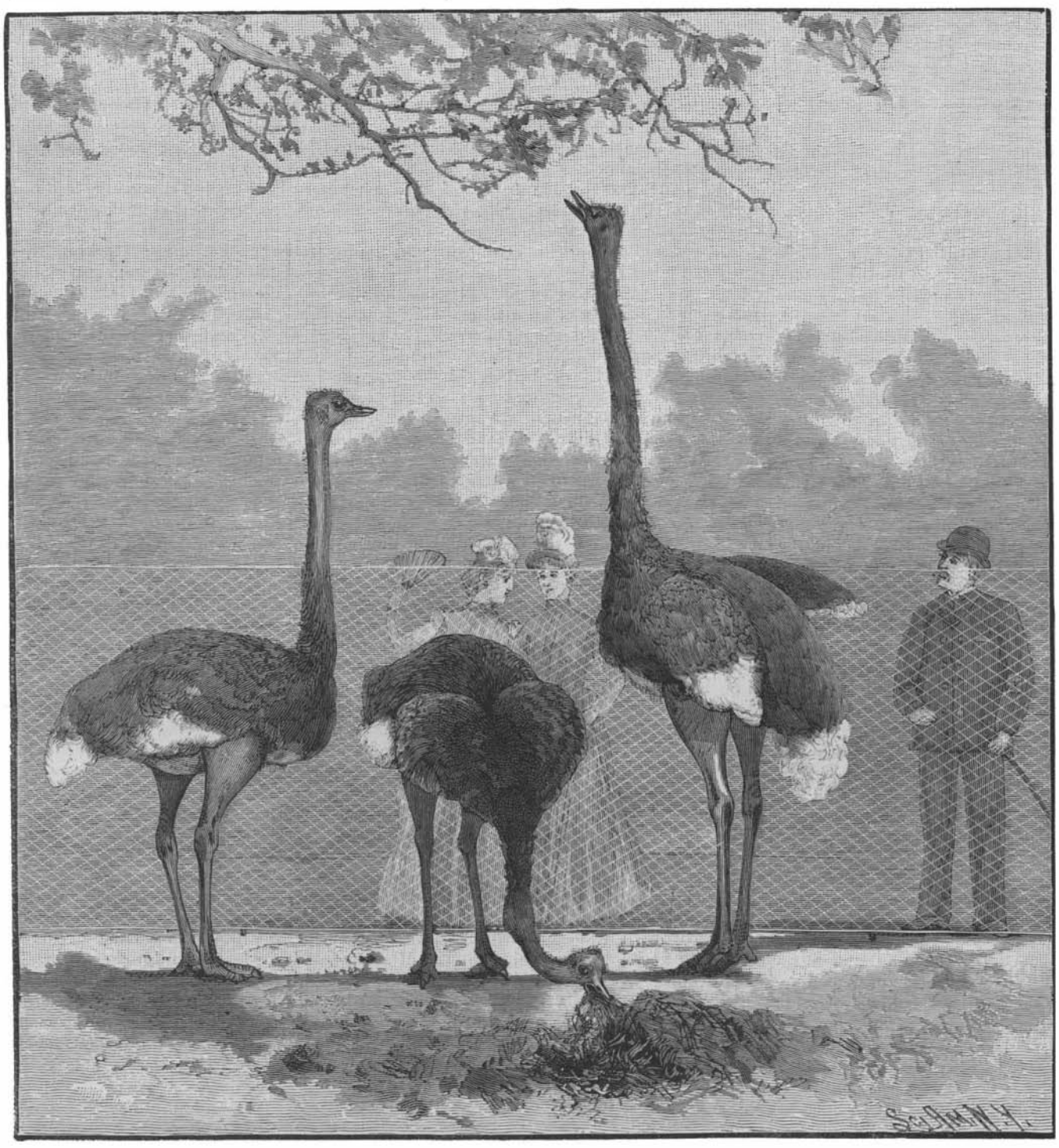
The gait of the ostrich emu, cassowary, or rhea in confinement appears particularly awkward, and suggests the limping effect of "string halt" in horses. "This unpleasing impression," says Dr. Houghton, "would be rapidly converted into admiration if one could see the bird in rapid motion over rough ground, springing from foot to foot, and bending, with the rapidity of lightning, the foot as it left the ground, avoiding skillfully and without an apparent effort the dangers of the rough soil." The ostrich, in its singular and effective progression, appears to touch the ground alternately on each side, and in a series of oscillating springs, whose rapidity causes its motion to appear direct, leaps with ease over rocks and shrubs of moderate dimensions.

The domestication of the ostrich in South Africa is only of some twenty-one years' standing. There was at first much opposition, and it was thought that the feathers of the domesticated birds would turn out to be inferior to the natural plume. In 1883, in South Africa, there were more than one hundred thousand tame ostriches. In 1880, $40,000,000 of capital was engaged in this business, and one hundred and sixty-three pounds of feathers were exported from the Cape, worth nearly $4,200,000. The birds are kept in inclosures, which, in a natural state, must be twenty or thirty acres in extent per pair. They breed at the age of four years, but produce plumes after their first year. The feathers are classed according to their character as wing feathers, white; female feathers, white; tail feathers, fancy feathers, black and white; black feathers, long, medium, and short; and, lastly, gray feathers.

The Cape plumes formerly took the sixth rank, after those of Aleppo, Barbary, Senegal, Egypt, and Mogodon. Now they rank very high. In 1882 a pair of breeders sold for $1,200, but in 1884 they could be bought for $200 to $250. Properly kept, a bird produces $50 worth of plumes per annum, to which must be added the value of the eggs and chicks. The ostrich lays a minimum of forty, a maximum of sixty eggs in a season, each weighing three pounds.

In America the raising of ostriches for industrial purposes began in southern California, at Anaheim, and has since expanded, but has scarcely reached a stage of assured success.

Our illustration strikingly shows a characteristic attitude of the ostrich in feeding. It is a study from life of some handsome specimens of this bird now in confinement at the menagerie in Central Park.



THE OSTRICHES AT THE CENTRAL PARK MENAGERIE, NEW YORK.

Test of Fireproof Materials.

A test of fireproof materials was conducted in Boston, on October 15, in the presence of a large number of persons especially interested. A building was constructed for the purpose in a vacant lot, the interior being divided into seven rooms, each about 5×15 feet in area, and lined with fireproof material. The material was put on by a number of manufacturers, each of whom protected the interior of one of the rooms according to his ideas of fire-proof construction, some using plaster, others fireproof paper, others specialties of their own make. The entrance to each room was protected by a fire door, tinned on one side and the edges. There was also an opening in the roof of each room. Inside of each there were suspended four links, one of lead, melting at 626° F.; one of antimony, melting at 842°; one of aluminum alloy at 1,292°, and one of brass melting at 1,850° F. The experiments were under the supervision of C. J. H. Woodbury, C. H. Goddard, O. S. Lord, and C. H. Rutan. About a quarter of a cord of dry hickory wood was placed in each room, and about half a cord in an effective position near the building. This wood was soaked with oil and the fires lighted. The fire burned nearly an hour before the building itself began to be consumed. By this time three of the links in each room had melted, showing that the temperature in each had risen above 1,292°. Later all the links melted, except one brass link in one of the rooms. In one hour and forty minutes after the fire was started the hose was turned on, and when the fire was wholly extinguished an examination of the building was made. It was found that all of the fire-proof materials used in the test had stood the experiment very well, but that some of the plastering had fallen, in cases due to the wooden backing being charred and thus leaving the plaster without support. —*Railway Review.*

ONE or more belts running independently on the top of another will add much to the transmission of power.

Beet Sugar in Utah.

Among the new enterprises in Utah is the great beet sugar establishment at Lehi, with a capital of $1,000,000. It has proved a great success. The *Irrigation Age* says:

The main building is three stories high, 180 feet long, and has an average width of 84 feet. The annex, which contains the boilers, bone black house, and lime kiln, is 180 feet long and about 40 feet wide. Both of these large buildings are substantially built of brick. There are six beet sheds, 500 feet by 24, with a capacity of 14,000 tons of beets. The company has erected a boarding house, which is 30 by 65, with an annex 24 by 60, and furnishes accommodations for fifty people. There are four pulp silos, 180 feet long, 24 feet wide, and 10 feet deep. The coal bins are 48 by 250 feet. These figures throw considerable light on the magnitude of the enterprise to the average mind. The water supply of the factory is the lake, fed by natural springs, with a capacity of 4,000,000 gallons in twenty-four hours. Besides this there are eight artesian wells, from 60 to 135 feet deep, which furnish soft, pure water, and have a capacity of 500 gallons per minute. After examining the works the government decided to locate the internal revenue inspector and weigher on the grounds, and for their accommodation the company has erected a four-room building to serve as a laboratory and office.

HOW BEETS ARE MADE INTO SUGAR.

When the farmer brings the result of his season's toil in the beet fields to the factory, the beets are first weighed and then stored in the long sheds, which have been made frostproof by a double wall, filled with cinders and a roof covered with earth. As the beets are required at the factory they are thrown into a shallow sluiceway, which runs from the sheds to the factory and enables the beets to float from the point where they are received to the place where they are needed. They are taken from the sluiceway by a wheel elevator and dropped into a washer, which is a trough-shaped contrivance, with revolving arms. The beets are then thrown out automatically into a bucket elevator, which conveys them to the top of the building, where the cutter is located. This machine cuts the beets into slices about one-eighth of an inch thick, three-eighths of an inch wide and of various lengths. The sliced beets now pass from the cutter through a revolving chute into the great circular diffusion battery. This consists of twelve wrought iron cells, each holding about 126 cubic feet, and having an open manhole on top with swinging cover. The bottom is arranged to open and close by hydraulic pressure.

It is in this diffusion battery that the interesting process of separating the saccharine matter from the beet is performed. This is done by the use of water heated to a certain degree, from which it must not vary. As the water pours through the cells for the first time it carries with it about one-half of the saccharine matter, while the other half is left in the beet. The hot water is turned on ten times in succession, each time taking more of the sugar, until at last it has extracted all but about one-eighth of 1 per cent of the sweetness which the summer's sunshine has stored in the beet. The juice now flows to an automatic register, which registers the quantity and temperature of the juice and draws out a sample for use in the laboratory. From the register it passes to a heater, which is heated to 90° centigrade, and it then passes into the carbonators or clarifying pans, where a portion of the impurities are removed from the juice by the application of lime. Fortunately a majority of the impurities combine with this substance and settle at the bottom of the pan. The surate of lime is decomposed by pumping carbolic acid gas through the liquid, which forms the excess of lime into carbonate of lime. When this operation is completed, the whole contents of the carbonator, 180 cubic feet of juice, or 1,350 gallons, is pumped by means of a plunger pump, having a capacity of 8,000 gallons per hour, through a mammoth filter press. This removes the residue of the clarification, the juice being treated twice with carbonic acid and once with sulphurous acid. In the last process all of the lime is removed.

The diluted liquid is now concentrated in a quadruple effect evaporator to a 50 per cent solution. From here there are two operations. To make the very finest quality of sugar it is necessary to run it over bone black, which removes impurities that cannot be taken out any other way. After this process the liquor is as clear as water, and the juice is then boiled into sugar in a vacuum strike pan. This is a closed kettle, 10 feet and 6 inches in diameter and 23 feet high, and holds 35 tons of sugar. In this kettle the sugar is granulated, and forms a product technically termed melada, a mixture of molasses and sugar, 75 per cent of the latter. The sugar is then dropped into a mixer, which holds the entire contents of the kettle. The next step is to remove the sirup, which is done with Weston centrifugals. The sugar is then partially moist, and the moisture is removed by passing the product through a Hersey sugar drier. It then passes perfectly dry into the sacks, each of which holds exact 100 pounds. Here samples are taken, weighed, and marked by the internal revenue officials, and then at last we have the finished product of the Utah Sugar Company.

It has taken exactly thirty-six hours from the time the beet left the shed until the sugar is ready to sweeten your coffee.

Wherever any good industry like a beet sugar factory is located it greatly benefits the surrounding community, especially the farmers. Among the direct benefits which Lehi has received is the erection of a $10,000 hotel, a $7,000 bank building, and a number of residences and stores. Real estate has appreciated in value perhaps 50 per cent, and the town has gained 600 population in six months. Another good result has been the establishment of a local newspaper, and many other improvements are in prospect, such as a creamery, a new opera house, electric lights, and general town improvements. The creamery enterprise contemplates an investment of $50,000. On many pay days the company has distributed $10,000 in this community, and will soon pay out something like $180,000 to the farmers for beets. We have already brought here 1,000 tons of machinery, and we shall have to haul 4,000 tons of coal and coke from Pleasant Valley, Rock Springs, and points in Colorado. We shall also bring a great deal of bone black, or animal charcoal, from Eastern cities. Our shipments of sugar will be very heavy, and the railroads have already built three miles of new track in Lehi. Mr. Granger, our agricultural superintendent, will tell you how the industry has benefited the farmers. The factory has doubled the capacity of farmers to make a living. It increased the value of their land.

This is the first factory equipped with machinery made in the United States. All other beet sugar machinery is the product of European workshops. This is the product of American faith, American brains, and American labor.

The man who raises sugar beets has an absolute guarantee in advance of his market and his price. Contracts are made with the farmers in the spring, by which they agree to plant a certain acreage of beets from imported seed furnished by the company and to cultivate the crop according to a plan laid down, and then the company agrees to buy their crop for cash, at a certain price per ton. When the farmer understands the cultivation of this crop, he will get from fifteen to thirty tons per acre, which will give him from $75 to $135 per acre, at $4.50 per ton. The beet crop can be handled, including every expense, from time of planting to the time when the beets are laid down at the factory, for $40 per acre. After the first thinning, one man can take care of from ten to fifteen acres. For the first thinning a man must devote four or five days to an acre.

With irrigation the Utah sugar beet will stand first in the world—first in amount of saccharine matter, first in purity, first in tonnage to the acre. There are some things, however, it seems, difficult to make the farmer understand. The chief difficulty is his disposition to raise big beets. Now, the beet that contains the most sugar is the one that weighs from ¾ pound to 1½ pounds. Above that it ceases to increase in sugar in proportion to its size. A good average beet of this size will go 14 per cent in sugar and 80 per cent in purity. Beets weighing 4 to 10 pounds will show not more than 3 to 6 per cent of sugar and 45 to 55 per cent in purity.

These beets are of no earthly use to any factory, and yet almost every day some farmer comes to me triumphantly with a beet nearly as large as a parlor stove, and he thinks it contains a barrel of sugar. He has forced the growth of this beet by giving it lots of water, and by every other possible means, and he has raised a beet that we cannot afford to undertake to make into sugar.

Beets do not impoverish the land much. The constituents of the soil go largely into the leaves and crown of the beet, which are left on the ground after the harvest and subsequently plowed in. So that the farmer really returns to the soil in plowing the strength that has been drawn out of it by the growth of the beet.

World's Fair Notes.

The exposition attractions in the vicinity of the main lagoon entrance, just south of the great manufacturers building, are to be quite different from those originally planned. In place of the latter there will be a peristyle, 60 ft. wide and 500 ft. long, extending north and south and spanning the lagoon entrance by a grand arch. Ranged along this peristyle will be emblematic columns representing all of the States and Territories. At the north end of the peristyle will be placed the music hall, which for a time it was thought would have to be put on the wooded island. It will measure 140 by 200 ft., and will have an auditorium large enough to seat 2,000 people, with an orchestra of 75 pieces and a chorus of 300 persons. It will also have a rehearsal hall 50 by 80 ft., capable of seating 600 people. This music hall is designed to be used by musical talent and connoisseurs of the art rather than by the mass of people who will visit Jackson Park. It is intended that here shall gather the fine singers and instrumentalists who may wish to be heard and criticised by the best representatives of their art or profession.

The grand choruses and band concerts—the popular musical entertainments—will be held in an amphitheater accommodating 15,000 people or more. This will be in the extreme southern part of the park and, after the close of the projected musical programme, will be transformed into a live stock show ring.

The pier, extending 1,000 ft. into the lake, is already completed. At its extremity, in place of the casino, will be erected a tower 250 ft. high. This will be of iron, covered with staff, and will resemble a lighthouse in appearance. From its summit electrical displays of exceeding brilliancy will be made, and by means of electric "search lights" the grounds, or any particular portion of them, can be flooded with light on fete nights.

How the Other Half Does Live.

When it is pointed out that an alleged half of the world doesn't know how the other half lives, the speaker is apt to wear a wiseacre air characteristic of the thoughtful person. What is always meant by the remark is that the speaker himself professes not to know much of the daily life of the very poor or the socially predaceous. But there remains still a full half of the world of whose life it is safe to say that the supercilious fragment knows even less than it does of that of the very poor. This remaining half is so astonishing in its activity that a glance at it can scarcely fail to minister to the pleasure of the *Evening Sun's* readers.

Sweeping this active half of the world, then, with a glance, we perceive it engaged in figuring up the piston surface for a pumping engine and the diameter of an aqueduct pipe; tracking the bug to his lair and destroying his egg, exterminating mosquitoes and measuring earthquakes; making new probes to pull things out of folks' ears with; modeling creatures in clay and carving them in stone; designing World's Fair buildings for Chicago, and other buildings for Madison and uncounted other squares, and cathedrals for New York; measuring the women's diaphragms to show why their noses are red.

Disinfecting sewage and disengaging aluminum; intercepting the floating germ and setting him to slay the innocent rabbit; finding drugs whose tremendous potency mocks even the purple fluid in the apothecary's shop window; ridden by nightmares and fashioning women's garments after the vision; speeding house elevators and testing timber trees; determining the course, S.E. and by S., ½ S., which Sirius was sailing nine years ago when the light we get today set out from him; trying new crosses of blood for racehorses and fantail pigeons; painting impressionist pictures and composing music of the future and telegraphic cipher codes while mad-houses and suicides' graves multiply on every hand; applying liquid fuel and improving screw propulsion; identifying Sing-a-Song-of-Sixpence with the funeral chant over the body of Patroclus.

Finding out how cold the moon is, why water feeds the flame of burning oil, and observing the effect of electric light on trees, keeping them awake; photographing a wink and tracing the history of rain gauges; devising apparatus to test the adulteration of wine, and adulterants to beat the apparatus; devising better material for underclothing, new models of yachts, binnacles and oil-serving swabs to still storm waves, and improved methods of brewing beer; devising dynamite guns, mill worker's homes, and glue that doesn't unstick; determining the apex of the sun's way near Lyra and *not* Hercules; trisecting an angle and recording the chemical life history of Jerusalem artichokes.

Sounding the sea, hatching fish and finding out what kills the oysters; making butter out of petroleum and honey out of shingles, with by-products which smell like a cow's breath and blow up with forty thousand horse-power; identifying the rheumatism microbe and subcutaneously injecting heart juice for heart failure; poisoning marine worms, propelling bicycles by electricity and making submarine torpedoes out of paper; making folks wash themselves; proving by mathematic demonstration that the vortex atom is the one thing in the universe that really does exist, when along comes Edison, saying the atom knows good and evil, just like folks.

Raising ghosts and ghostesses, inventing chess problems for gain, and getting real money for treatises on grammar, on the immortality of the soul, on the moral purpose of Shakespeare's plays and of Walt Whitman's style, and diagnoses of Byron's club foot and Richard III.'s abnormal spine.

These are some few, and very few, of the ways by which that stirring half of the world, which is neither very poor nor thoughtful, actually lives. Is it to be doubted that the fragment which titters to confess it doesn't know how the poor half does live, commonly knows even less about how this ingenious half is living and what it is living for?—*N. Y. Sun.*

DEPOSITS of tin, very promising in value, have been found on the eastern slope of Laguna Mountain, near San Diego, Cal.