NATURAL HISTORY NOTES.

Ferns and their Uses.—The beautiful plants belonging to the order of ferns, although mostly collected and cultivated for ornamental purposes, have some economic and medicinal uses, although perhaps not very important ones. The male fern (*Aspidium filix mas*) and the marginal shield fern (*A. marginale*) are used as a valuable remedy for tape-worms; and an African species (*A. athamanticum*), as well as the female fern (*Asplenium filix fœmina*), the dwarf spleenwort (*A. trichomanes*), the wall-rue fern (*A. ruta-muraria*), the hart's-tongue (*Scolopendrium vulgare*), the common brake (*Pteris aquilina*), and a few others, are regarded as having the same properties, and have been used for the same purposes. The common polypody (*Polypodium vulgare*) was formerly regarded as a cholagogue, and was given in head diseases. The flowering fern and cinnamon fern (*Osmunda regalis* and *Cinnamomea*) are regarded as demulcent, sub-astringent, and tonic, and the former yields a fine mucilage useful in summer complaints.

Several species of moonworts (*Ophioglossum* and *Botrychium*) were formerly regarded as vulneraries. Some species of maidenhair (*Adiantum*) have feeble, aromatic, demulcent properties, and are used for forming the sirup called "capillaire." A Peruvian species of *Polypodium* has some reputation in fevers and other maladies; and the down from the stem of some *Cibotium* has been much recommended as a styptic, under the name of Penghawar Djambi—its action being probably merely mechanical, as chemical analysis has shown no active principle. A similar substance is gathered in Madeira from *Dicksonia culcita* to stuff cushions. The rhizome of *Phymatodes leiorhiza*, when dry, smells and tastes like licorice. A small species of *Grammites*, of Peru, is so odoriferous when dry that it is used by the Indian women as an agreeable perfume. The long creeping rhizome of a variety of the common brake (*Pteris aquilina*) was formerly much used for food in New Zealand. It abounds in starch and mucilage; but if this variety is no more palatable than our own, it is very undesirable food. The rhizome of our own variety of the brake when roasted has a slimy consistence and disagreeable taste and odor. If the rhizome, however, after being washed and peeled, is scraped so as to avoid including the hard walled tissue, and then mixed with a sufficient quantity of water, the mucilage will be dissolved, and after a few hours may be decanted. A little colorless, tasteless mucilage will pass off on a second washing, and the residue when baked is far from unpalatable, and must be very nutritious. It is in fact far better than cassava bread, and would not be despised in time of famine.

The large rhizome of *Marattia salicina* is eaten when prepared in the same way as the brake. The soft cellular substance of *Cyathea medullaris* affords a better article of food; and, for the same purpose, some other species are occasionally used. In a recent number of *La Nature* there is a note on this subject by M. P. Guyot, who says: "The majority of the ferns of our forests and woods contain starch and might be used as food. Still, it should be observed that when the plant has emerged from the soil it possesses an odor and taste which are repulsive, and which render its uses impossible. It is the same, however, with asparagus; and, like the latter, the stalks of ferns can only be directly eaten before they have grown above the soil and undergone the greening action of the sun's rays; in this state they are fleshy, white, and tender, and as to quality greatly resemble the shoots of asparagus. The principal edible species of our forest ferns is the male fern, and the commonest is the one that resembles a little palm tree. A well known landscape painter reckons among his claims to glory the invention of fern-shoot omelets. In France, however, the consumption of fern-shoots is very limited, and they are eaten only out of simple curiosity. Not so in Japan, for during the spring and summer season the inhabitants of the high clayey mountains derive almost the whole of their food supply from ferns, which they call warabi. In the spring they eat the young fronds, and later on they consume the starch that they extract from the rhizomes. The preparation of this is very simple. They begin by washing the roots to remove the earth, then crush them with a mallet, and afterward stir up the *débris* in water contained in reservoirs hollowed out of tree trunks. The water containing the starch is then drawn off into other reservoirs placed beneath and allowed to settle. By this means the amount of starch obtained is about 15 per cent of the weight of the rhizomes employed. Every hamlet has a special place assigned for this operation; and the products of these washings form large masses there that testify to the importance of this manufacture. It is to insure the reproduction of these ferns that the inhabitants, every two or three years, burn the herbs and underbrush, which spring up in the shade of the oaks and chestnuts."

Several ferns, when burnt, produce ashes useful for manure, or as crude matter for the chemists.

Simulation of Death by Insects.—In an interesting paper read not long ago before the Entomological Society of England, the simulation of death so freqently observed among insects was regarded not as an intentional stratagem to escape danger, but as a species of catalepsy due to terror, and was compared to the so-called fascination which certain birds and small mammals experience in presence of a snake. It would seem that the tendency to such simulation in different species is inversely as their locomotive powers. Thus, as far as the true insects are concerned, shamming death is most common among the coleoptera, the order whose locomotive faculties are upon the whole lowest. Looking again at the different groups of coleoptera, we find the tendency to simulate death absent, or at least very rare, among the tiger beetles, carabs, and the geodephaga generally; among the long-horns, which, when alarmed, rise in the air almost as readily as do bees or diptera; among the staphylini, which both fly, run, and fight well, and among the elateridæ, which escape danger by a sud den leap. On the other hand, the semblance of death is often put on by the lamellicornes, which are slow crawlers, blundering fliers, and are incapable of taking wing without some time for preparation. All these properties are still more decided in the genus *Byrrhus*, and here accordingly we find simulation at its height. At the mere sound or vibration caused by an approaching footstep, human or brute, one of the latter insects draws in its legs and assumes very effectively the appearance of a small stone or rounded clod of earth. Among spiders the same distinction may be traced. The slower and more sedentary forms, if in presence of a powerful enemy, roll themselves up in a ball, and may easily pass unobserved. On the contrary, the wandering ground spiders, such as the *Lycosæ*, which in warm weather bound with such rapidity that they are sometimes by careless observers supposed to fly, rarely resort to this stratagem except when very persistently teased and intercepted.

The Origin of our Domestic Animals.—Palæolithic man, who existed for so long a period in Western Europe during the quaternary age, was probably indigenous there. But at the commencement of the neolithic age a new civilization was suddenly introduced, and a new type of man appears upon the scene. Neolithic man, with his polished stone implements, brings with him a number of domestic animals—the dog, the goat, the sheep, the ox, the horse, and the pig. By studying the origin of these animals, and determining their ancestral home, light may obviously be thrown upon the source whence the neoliths emigrated. Such a study has been undertaken by Professor Gabriel de Mortillet, who has contributed an interesting paper on this subject to the current number of M. Cartailhac's "Materials for the History of Man." Neolithic man, according to the author, came from Asia Minor, from Armenia, and the Caucasus. These, in fact, are said to be the only countries which could have yielded the assemblage of domestic animals and cereals which the neoliths brought with them upon their invasion of Southwestern Europe during the Robenhausen period.

A Remarkable Spider's Web.—A writer in *Nature* says: A large spider, of a genus common all over Polynesia, and also in New Caledonia (where formerly much eaten by the aborigines) produces a very strong, thick web. On Sundays, generally, when no work is going on in the plantations, the imported Pacific Islanders amuse themselves by wandering about the bush, armed with a framework of cane in the shape of an elongated cone, affixed to a long stick. This they twist and twist, round and round in the spider's webs, till it is coated sometimes half an inch thick with the viscous fabric. They then untie the fastenings and draw out the strips of cane, when the bag becomes like a long old-pattern night-cap. I have one before me now, over a yard long, a foot across, and pretty thick, which does not weigh one ounce! It is yellow; the New Caledonian ones are usually gray. Some of the New Caledonian ones are stretched tight enough to resemble an Indian suspension "tom-tom," and really emit a slight sound on being tapped.

The Fertilization of Red Sea-Weeds.—The agency of insects in securing the due fertilization of many flowering plants has been much written about, and is now well understood. In a recent number of "Kosmos" Dr. Dodel Port, the eminent botanist of Zurich, has published the results of a series of observations made by him regarding the part played in the fertilization of a certain species of *Florideæ*, or red seaweed, viz., *Polysiphonia subulata*, by animalcules. He finds that certain wheel-animalcules, or *Vorticellæ*, which grow upon the sea weed, create, by means of the constant motion of their cilia, a current which bears the sperm cells—the representative of the pollen grains—from the male plant to the stigma-like end of the germ case of the female plant. The paper is of great biological importance, since it forms, so far as our knowledge extends, the first record of the participation of animals in the fertilization of cryptogams, which in itself is an interesting parallel to the relations existing between insects and phænogams.

The Correlation of Mutilation of Insect Larvæ with Deformity in the Imago.—In the *Comptes Rendus* of the Belgian Entomological Society for July, of the present year, there is a notice by M. Melise of experiments made by him to determine the effect produced on the perfect insect by mutilation of the larva. M. Melise operated upon ten selected silkworms by cutting off the right metathoracic leg of each. All went through their transformations, and the operation apparently caused little inconvenience, for they recommenced feeding again immediately afterward. The effect produced on the moths produced from these larvæ was as follows: One was deprived of three tarsal joints, but the claw was developed. Three had only the femur and tibia. One had the leg "amputated" in the middle of the femur. The two others had only a stump, scarcely a millimeter in length. The author adds that in not one of the moths was the leg absolutely absent, and that the variation in the amount of deformity probably resulted from the difficulty of performing the amputation in the larvæ at precisely the same place in each. In the case of insects with incomplete metamorphoses parallel experiments have often been made, and with similar results; but with lepidoptera they have been so few as to render confirmatory evidence of the statements of other experimenters of much value.

Macrobiotics and Eubanics.

The *Evening Post* makes a translation from a portion of an interesting little book in the German language published at Bonn, from the pen of Dr. Wilhelm Schmoele, well known in this country as a physician of eminent acquirements, which is likely to attract a good deal of attention. The work is entitled "Macrobiotics and Eubanics"—Macrobiotics being the art of prolonging life, and Eubanics being the art of walking well.

Dr. Schmoele explains, in that part of the book which relates to Macrobiotics, the germinal and progressive phenomena of human life from birth to death, and the organic and chemical nature of vital processes, seeking to discover inductively what physicians call the "indications" for treatment with a view to the checking of decay after middle life, when, as we all know, there is a constantly increasing excess of demand over supply in the matter of vitality. Dr. Schmoele is convinced that in addition to the influence of hygienic living, specific means may be profitably employed in checking this decline of vitality, postponing death from vital exhaustion, and especially adding vigor and efficiency to body and mind in advanced age. In common with physicians generally he holds that the infirmities of age come earlier and are greater than need be, and his effort has been to find in observed facts the reason and the remedy for this. He regards the free use of citric acid, in the form of lemon juice, and of lactic acid in the form of sour milk of every kind, as the remedies most plainly called for by the facts scientifically considered.

In considering the effect of certain abnormal influences in increasing the rapidity of decay, the author suggests some of the principles of a broader theory of diagnosis and treatment which it is his purpose to expound more fully to the profession in a future work, if life is spared to him.

In that part of the present treatise which relates to Eubanics a strong plea is made for systematic walking as a means of maintaining health. The abundance and the convenience of our means of transportation, the author believes, bring to modern life a serious danger in this respect. Unless we walk upon principle and in consequence of a conviction of the necessity of walking, we are liable to abandon the practice almost wholly in our haste and our self-indulgence. The author is convinced that there is danger here of serious race deterioration, and he very earnestly pleads for caution. Going further he seeks to remove the principal obstacle to the general practice of walking, namely its tendency to produce fatigue and to repel lovers of physical ease; he finds in certain rhythmic principles a means of learning to walk with the least possible fatigue, giving to the exercise something of the charm that dancing possesses. The system, which is fully explained in the book, is founded upon a study of the principles involved in dancing, and especially in the German waltz, which, as is well known, a good dancer may continue without fatigue much longer than most persons can walk with comfort, stepping with anything like equal rapidity.

Seeds.

At the last meeting of the British Association Sir John Lubbock read an interesting paper on seeds. He commenced by calling attention to the difference presented by seeds, some being large, some small, some covered with hooks, some provided with hairs, some smooth, some sticky, etc. He gave the reasons of these peculiarities, and then spoke of the modes of dispersion, by means of which seeds secured a sort of natural rotation of crops, and in other cases were enabled to rectify their frontiers. Some plants actually threw their seeds, some were transported by the wind, and many were provided with a wing which caught the wind. Dispersion was also effected by the agency of animals. This means was divided into two classes, where seeds adhered to animals by hooks, and where the same purpose was effected by sticky glands. The next point touched upon was, that seeds found themselves in spots suitable for growth. Most seeds germinated on the ground, but there were instances, as the mistletoe, where they were parasitic on trees. Such seeds were embedded in a viscid substance, so that if dropped by a bird on a bough they adhered to it. In some cases plants buried their own seeds, and in other instances the seeds buried themselves, the means by which these processes were effected being fully explained by Sir John, who, in conclusion, called attention to mimicking seeds, such as the scorpiurus, the pods of which did not open, but looked so exactly like worms that birds were induced to peck at them and thus free the seeds. That this was the purpose of the resemblance he would not assert, but he threw it out as a matter for consideration.

Alcohol by Electricity.

Berthelot's experiment was conducted as follows: "A battery of from six to eight Bunsen elements was arranged in connection with an oscillating commutator, so as to give alternately positive and negative currents twelve to fifteen times a second, to two cylinders of spongy platinum, acting as electrodes. These platinum cylinders were immersed in acidulated water, and the contacts were so arranged that neither oxygen nor hydrogen was disengaged, the water be ing reformed as soon as decomposed. Thus regulated, the electrodes of the apparatus were immersed in an aqueous solution of glucose." In this way alcohol was formed, although in very small quantities, but it is expected that when some improvements in the apparatus are made, the process will be much more rapid.

Openings for Industrial Enterprise in California.

The Baltimore *Sun* has in California a correspondent whose letters are always replete with practical information and good sense. In a recent communication he says: Millions for speculation, but not a dime for industry, is what is the matter with San Francisco. The leading commercial paper intimates that it is not the industry of the Chinese, but the laziness of the whites and the industrial abhorrence of capital, that causes the general prostration, and that is sure to retard our recuperation indefinitely. What California requires is a large accession of a more industrious race. We want men inclined to invest in manufactures· we want farmers, not mere wheat growers and soil robbers. But with these must come capital. There is immense overstock of capital here for gambling in stocks, cornering in merchandise, lot speculating, and for all purposes involving no industry. But for manufacturing not a dime. Our wool and hides we send 19,000 miles, via Cape Horn, to be made into cloth and shoes, and brought back to us. These, if we had New England industry and capital, we should be making at home. We send away furs and felting to be made into hats and wraps. Our agricultural machinery we import. Even soap and candles also. Though we have the best white vinegar and vegetables, we import pickles. Hogs runs wild, yet we buy hams, flitches, and lard abroad. Nearly all our coal oil is from Pennsylvania, yet we have twice as large a range of coal oil of our own. We buy vast quantities of hydraulic cement abroad, yet not excepting Portland, England, there are nowhere more nor finer materials for making it than at our Santa Cruz.

We buy all our iron and stock—an enormous amount—while iron ore, fuel, and lime are right at hand. Foreign beer and ale cost us extravagantly, while our hops and barley are far superior to all foreign growth. Even butter and cheese we import largely, to our shame. Cranberries, chiccory, hops, and oatmeal, crackers, olives, raisins, fruit-preserves, prunes, nuts, tobacco, and cotton we buy, while we have every facility for raising them here, always excepting industry Every bushel of grain we use and ship is packed in East India sacks, which we can cheaply make from our own wild textiles.

We even import foreign wines largely adulterated, while our country is covered with vineyards and our own wines are pure, wholesome, and well flavored. We could extend the list, but enough is given to show what a field there is here for profitable industry in the most genial climate in the world, and in a land literally flowing with milk and honey, and teeming with every variety of food to gladden the heart and tickle the bowels of the faithful. After this expose let no man say: "There is no chance for industry; everything is overdone." On the contrary, nowhere on this broad earth has any nation such inducements to offer to willing hands and hearts. . . . There are here mines of copper, antimony, manganese, and chrome that can be got for a song. Farmers can raise cotton, but we have no factories to buy it. Silk, also, but no reelers to buy the cocoons. Tea gardens would cover our hill lands, but there is no industry to manipulate and prepare the leaves. We have 20,000 idle hands waiting for something to turn up, grinning at all these waiting industries and wondering why other people do not go to work.

Cheiloangioscopy.

Among the most interesting sights to be viewed with the microscope is the circulation of the blood in a living frog's foot. The membrane is stretched by means of clips upon the stage of the instrument, and when the proper lenses are applied the movement of the blood may be observed rushing along with force like a mill stream.

Hitherto, says the *Nineteenth Century*, except in the case of Perkinje's experiment, in which an observer can see the circulation in his own retinal blood vessels, the evidence of circulation in the human subject has been entirely circumstantial, derived from the facts of structure of the circulatory organs, and from the manner in which the blood flows from several arteries and veins. But by means of a simple arrangement, invented by Dr. C. Hüter, of Greifswald, it is now possible to witness the actual flow of blood in the blood-vessels of another person, and that with sufficient accuracy to detect any abnormality in the circulation, and so to obtain invaluable assistance in the diagnosis of disease.

In Dr. Hüter's arrangement the patient's head is fixed in a frame, something like that used by photographers, on which is a contrivance for supporting a microscope and lamp. The lower lip is drawn out, and fixed, by means of clips, on the stage of the microscope, with its inner surface upward; a strong light is thrown on this surface by a condenser, and the microscope, provided with a low-power objective, is brought to bear upon the delicate network of vessels, which can be seen in the position indicated even with the naked eye.

The appearance presented is, at first, as if the vessels were filled with red injection. But by focusing a small superficial vessel the observer is soon able to distinguish the movement of the blood stream, rendered evident by the speck-like red corpuscles, the flow of which, in the corkscrew-like capillaries, is said by Hüter to be especially beautiful. The colorless corpuscles are distinguishable as minute white specks, occurring now and again in the course of the red stream. Besides the phenomena of the circulation, the cells of pavement-epithelium lining the lip, and their nuclei, can readily be distinguished, as well as the apertures of the mucous glands.

Besides the normal circulation, various pathological conditions can be observed By a pressure quite insufficient to cause pain, the phenomena of blood stagnation—the stoppage of the flow, and the gradual change in the color of the blood from bright red to purple—are seen. A momentary stoppage is also produced by touching the lip with ice, a more enduring stasis by certain reagents, such as glycerine or ammonia.

Hüter states that he has already proved the great use of "cheiloangioscopy," as he calls the new process, in his medical practice. The variation in the blood-flow and in the diameter of the vessels, the crowding together of the red corpuscles, the increase in number of the white corpuscles, occurring in certain diseases, all these may be observed readily and exactly. It will, indeed, be at once obvious how great is the importance of a method like this, by which an actual observation of the circulation is made possible, especially when it is borne in mind that even the rough and ready method of feeling the pulse affords a valuable indication of the state of health.

Balling's Saccharometer.

This is the instrument which is usually employed by continental brewers for testing the gravity of their worts and beers, and as it is often referred to in foreign technical papers quoted in our pages, we give a short explanation of its graduation. Balling's saccharometer is usually made of glass, with a well of mercury as a weight, in this respect resembling some of our English saccharometers; the graduation of the stem, however, is very different, as it is arranged to indicate the weight of sugar contained in 100 parts by weight of a pure sugar solution. For example, if Balling's saccharometer be placed in a solution of sugar and sink to the line marked 20, it indicates that 100 parts of the sugar solution contain 20 lb. of sugar, or, in other words, 20 per cent by weight. The degrees Balling are therefore the percentages by weight, and in this respect the instrument is very simple. In the following table we give the degrees Balling from 1 to 20, with the corresponding specific gravities of the solution, which may be useful for reference:

Degrees Balling.	Specific gravity.	Lb. per barrel.
1	1·0039	1·4
2	1·0078	2·8
3	1·0117	4·0
4	1·0157	5·5
5	1·0197	7·0
6	1·0237	8·5
7	1·0278	10·0
8	1·0319	11·5
9	1·0360	13·0
10	1·0401	14·5
11	1·0443	16·0
12	1·0485	17·5
13	1·0528	19·0
14	1·0570	20·5
15	1·0613	22·0
16	1·0657	23·5
17	1·0700	25·2
18	1·0744	26·8
19	1·0787	28·2
20	1·0832	30·0

In round numbers, each degree Balling corresponds to 1½ lb. per barrel; it must be borne in mind that the degrees Balling represent percentages of pure sugar, and not percentages of malt extract.—*Brewer's Guardian.*

Improvement in Silvering Glass.

The plan of coating mirrors with a thin film of silver, though superior to the old amalgamating process, has some drawbacks. The ordinary treatment is as follows: The glass is laid on a horizontal table of cast iron covered with a woolen cloth and heated to 40 deg. Centig. (104 deg. Fahr.) On the glass, previously well cleaned, are poured successively a solution of tartaric acid, and then another of ammoniacal nitrate of silver. Under the influence of the heat the organic acid reduces the metallic salt, and after about 20 minutes the silver is deposited on the glass in adherent layers; the whole operation does not occupy more than an hour. The mirror is then dried and the metal covered with a varnish sufficient to protect it from friction and the action of sulphur vapors, which blacken it. But silver deposited in this way often has an unpleasant yellowish reflection. M. Lenoir, of Paris, turned his attention to discovering a process which would obviate this drawback. He has succeeded by the following means. The glass, once silvered, is subjected to the action of a dilute solution of the double cyanide of mercury and potassium, when an amalgam of white and brilliant silver is formed, adhering strongly to the glass. To facilitate the operation and utilize all the silver employed, M. Lenoir, by a recent improvement, sprinkles the glass at the moment the mercurial solution is applied with a very fine powder of zinc, which precipitates the mercury and regulates the amalgamation. Mirrors thus treated no longer give, it is said, the yellowish images of the silver used alone, but the white and brilliant reflection of the old process, without the emanation of vapors which would be injurious to the men employed upon the operation.

HOW TO MEDICATE A PIG.—At a recent meeting of an English farmers' club, Prof. McBride spoke of the difficulty of administering medicine to a pig. He said: To dose a pig, which you are sure to choke if you attempt to make him drink while squealing, halter him as you would for execution, and tie the rope end to a stake. He will pull back until the rope is tightly strained. When he has ceased his uproar and begins to reflect, approach him, and between the back part of his jaws insert an old shoe, from which you have cut the toe leather. This he will at once begin to suck and chew. Through it pour medicine, and he will swallow any quantity you please.

Some Facts about Cotton.

In a recent letter Mr. Edward Atkinson, of Boston, shows by comparison of results the enormous economic superiority of free labor over slave labor, in the cultivation of cotton. The crop of cotton of 1878 and 1879 was the largest ever raised. The ten crops of 1852 to 1861, inclusive, being the last crop raised by slave labor, numbered 34,995,440 bales. The ten crops of 1870 to 1879, inclusive, being the ten last crops raised by free labor, numbered 41,454,743 bales. The excess of the ten years of free labor amounts to 6,459,303 bales. The value of the ten last crops, of which about two thirds have been exported, has been not less than $2,500,000,000, and has probably amounted to $3,000,000,000. The increase is progressive, the excess of the five last crops over the five crops immediately preceding the war has been 3,932,415 bales. . . .

The world's crop of cotton is now equal to ten to twelve million bales of the average weight of American cotton, probably the latter. Of this quantity five million bales are raised in the United States, and between six and seven million bales are spun and woven upon machinery contained in large factories in Europe and America. The rest is spun and woven by hand, and there is probably a larger portion of the population of the globe still insufficiently clothed in hand-made goods than are clothed in those furnished by the factories of Europe and America combined. The average work of one operative working one year in Lowell will supply the annual wants of 1,600 fully clothed Chinese or 3,000 partly clothed East Indians. No country in the world, except Egypt, produces any substantial quantity of cotton so well adapted to work upon modern machinery as that of the Southern States. Nearly one half the world remains to be conquered by cotton and commerce. To the cotton fields and factories of the United States will not the increase surely come as commerce slowly but surely opens the way?

The whole cotton crop of the world could be raised on a section of Texas less than one twelfth of its area; or could be divided between any two of the other principal cotton States without exhausting one half of their good lands, or it could all be raised on less than one half the Indian Territory that is not yet occupied at all.

Touching the cost of raising cotton in the South, Mr. Atkinson suggests the opinion that if the cost of labor be measured by its effectiveness as well as by the measure of the money with which it is paid, there is no place in the world where so effective an amount of manual labor can be procured at so little cost as in the employment of negroes upon our Southern cotton fields. The price of bacon and corn gauges the cost of cotton. Eaten together they are digestible and nutritious—eaten separately quite otherwise. They constitute the food that the negro field hand freely chooses. Three and one half pounds of bacon, one peck of meal, and one quart of molasses or sirup constitute the week's ration of an adult man or woman. This ration has been lately and can now be supplied at a cost of thirty-eight to forty-two cents per week, or six cents or less per day. The plat of sweet potatoes and fish from the ponds and rivers serve for the rest.

The Chicago Stock Yards.

In a report on the treatment of live stock on the railways, made by Mr. Zadok Street, to the American Humane Association, at its recent meeting, we find the following facts relative to the great stock yards at Chicago. These are the most extensive in America, probably in the world.

They have 1,000 cattle pens, 1,200 hog and sheep pens, and stabling for 1,200 horses. Fifteen hundred cars of stock can be unloaded and cared for daily. The system of railways extending into different parts of the Western States, thousands of miles, center there. They occupy 350 acres of land, and cost nearly $5,000,000. Their repairs cost about $150,000 annually, and it requires 700 men constantly employed in and about the yards to do the work required. They will accommodate about 10,000 cattle, 120,000 hogs, 5,000 sheep, and 1,000 horses at one time. The pens for hogs and sheep are covered; those for cattle are not covered.

The Way to Health.

The only true way to health is that which common sense dictates to man. Live within the bounds of reason. Eat moderately, drink temperately, sleep regularly, avoid excess in anything, and preserve a conscience "void of offense." Some men eat themselves to death, some drink themselves to death, some wear out their lives by indolence, and some by over exertion, others are killed by the doctors, while not a few sink into the grave under the effects of vicious and beastly practices. All the medicines in creation are not worth a farthing to a man who is constantly and habitually violating the laws of his own nature. All the medical science in the world cannot save him from a premature grave. With a suicidal course of conduct, he is planting the seeds of decay in his own constitution, and accelerating the destruction of his own life.

ADULTERATION OF GERANIUM OILS.—The author detects fatty oils, gum resins, and other liquid hydrocarbons as follows: Into a test glass are poured 5 c.c. alcohol at 70 per cent, and 6 drops of the oil in question, and the whole is well shaken up. If the oil is pure it remains bright and clear, while sophisticated specimens turn milky. This process is of course not available for the detection of cheaper ethereal oils.—*M. Jaillard, in Wochenschrift Oel und Fett Handel.*

Remarkable Snow Storms in India.

Some interesting details of the extraordinary snowfall in Cashmere in 1877-78 are given in a paper in the just issued number of the Journal of the Asiatic Society of Bengal by Mr. Lydekker. Early in the month of October, 1877, snow commenced to fall in the valley and mountains of Cashmere, and from that time up to May, 1878, there seems to have been an almost incessant snowfall in the higher mountains and valleys; indeed, in places it frequently snowed without intermission for upwards of ten days at a time. At Dras, which has an elevation of 10,000 feet, Mr. Lydekker estimated the snowfall from the native account, as having been from 30 feet to 40 feet thick. The effects of this enormous snowfall were to be seen throughout the country. At Dras the well built travelers' bungalow, which had stood some thirty years, was entirely crushed down by the weight of the snow which fell upon it. In almost every village of the neighboring mountains more or less of the log houses had likewise fallen, while at Gulmarg and Sonamarg, where no attempt was made to remove the snow, almost all the huts of the European visitors were utterly broken down by it. In the higher mountains whole hillsides have been denuded of vegetation and soil by the enormous avalanches which swept down them, leaving vast gaps in the primeval forests and choking the valleys below with the *débris* of rocks and trees. As an instance of the amount of snow which must have fallen in the higher levels, Mr. Lydekker mentions the Zogi Pass, leading from Cashmere to Dras, which has an elevation of 11,300 feet. He crossed this early in August last year, and he then found that the whole of the ravine leading up to the pass from the Cashmere side was still filled with snow, which he estimated in places to be at least 150 feet thick. In ordinary seasons this road in the Zogi Pass is clear from snow some time during the month of June. As another instance of the great snowfall, Mr. Lydekker takes the valley leading from the town of Dras up to the pass separating that place from the valley of the Kishengunga River. About the middle of August almost the whole of the first mentioned valley, at an elevation of 12,000 feet, was completely choked with snow, which in places was at least 200 feet thick. In the same district all passes over 13,000 feet were still deep in snow at the same season of the year. Mr. Lydekker gives other instances of snow lying in places in September, where no snow had ever before been observed after June. As to the destruction of animal life, in the Upper Wardwan Valley large numbers of ibex were seen embedded in snow; in one place upwards of 60 heads were counted, and in another not less than 100. The most convincing proof, however, of the havoc caused among the wild animals by the great snowfall is the fact that scarcely any ibex were seen during last summer in those portions of the Wardwan and Tilail Valleys which are ordinarily considered as sure finds. So also the red bear and the marmot were far less numerous than usual. Mr. Lydekker estimates that the destruction to animal life caused by the snow has far exceeded any slaughter which could be inflicted by sportsmen during a period of at least five or six years.

Women and Girls in English Mines.

It is a somewhat startling fact that there are still nearly 5,000 women and girls employed about the coal mines of Great Britain. In the official summary of persons employed in and about the mines, under the Coal Mines Act, it is stated that 21 females under the age of 13 years are employed. Of girls between the ages of 13 and 16 there are 433 employed; of young women above the age of 16 there are no less than 4,502 employed. In the mines registered under the Metalliferous Mines Act there is a larger proportionate employment of females. At the tender age of between 8 and 13 years, there are 96 girls employed, chiefly in the Cornwall district; between the ages of 13 and 18, there are 981 girls employed above these mines, Cornwall and the North Wales district employing the bulk; and there are also 1,741 females above the age of 18 employed, Cornwall, North Wales, and Ireland employing all these except 20; and of this score, somewhat singularly, the chief part are employed in the North of England, which has been remarkably free from women's work in the unfit employment of mining. The proportion of women employed is said to be decreasing; but the fact that girls of such tender ages are put to mining operations, or to work "above ground" at the mines, is a sign that the unsatisfactory symptom is not likely to entirely die out.

The Deepest Well in the World.

The sinking of the deep artesian well near Buda Pesth, Hungary, is now completed; the works were commenced as far back as 1868, and during their progress many interesting facts relating to geology and underground temperature have been brought to light. The total depth is 3,200 feet, and the temperature of the water it yields is nearly 165° Fahr. The temperature of the mud brought up by the borer was taken every day, and was found to increase rapidly, in spite of the loss of heat during its ascent, down to a depth of 2,300 to 2,700 feet. Beyond this point the increase was not so marked. At a depth of 3,000 feet the temperature was 177° Fahr., giving an average increase of 1 for every 23 feet bored. Water first commenced to well up at a depth of 3,070 feet; here its temperature was 110° Fahr., and from this point onward it rapidly increased both in quantity and temperature. Thus, at 3,092 feet, its temperature had already risen to 150° Fahr., and the yield in 24 hours from 9,500 to 44,000 gallons. Finally, when the boring had reached 3,200 feet, at which point it was stopped, the temperature of the water, as it burst from the orifice of the tube, was 165° Fahr., and the volumetric yield 272,000 gallons in the 24 hours. This yield was afterward reduced to 167,200 gallons, in consequence of the bore being lined with wooden tubes, which reduced its diameter. The water obtained disengages carbonic acid in abundance, and also contains nitrogen and a little sulphureted hydrogen, and 80 grains per gallon of fixed matters, chiefly sulphates and carbonates of potash, soda, lime, and magnesia.

Ocean Telegraph Cables.

In a recent lecture by Mr. Wm. H. Preece, he says: The deep sea portion of the Cape cable, while it differs to a certain extent from the Atlantic types, is still deficient in that absolute durability which all cables ought to have. In fact there is room for invention in this direction. Generally, one notices that, where there is a want, some one will spring up with an invention to meet that want. Here is a want that has existed for many years, but no one has invented a cable which can be said to be perfectly adapted for its purposes; so that, if any one here is of an inventive turn, let me recommend him to try his hand at inventing a cable which will give us all the requirements needed.

This cable to the Cape has one peculiarity in which it differs from any others. Now, among the various accidents to which cables are subject, there is one due to the existence of life at the bottom of the sea. We know that in different seas there are certain little insects, sometimes *Teredos*, sometimes *Xylophaga*, sometimes *Limnoria*, and others of very hard names, which have a peculiar liking for gutta percha. These little *teredos* attack us on sea as well as on land, and the trouble they cause us is sometimes immense. We suffer from them very much on the Irish coast, where the little wretches have found their way to the gutta percha, and have there scored and figured it in a very curious way, samples of which you will see on the table.

To put a check to their boring instinct, the Telegraph Construction and Maintenance Company, who made the cable which is being laid to the Cape, but which was originally intended for Australia, have surrounded the gutta percha with a wrapping of brass; and if any of these boring insects abound in any portion of the line where this brass wrapping is used, I have no doubt that the brass will be too much for them, and that they will find themselves terribly beaten in making any attempts to get at the gutta percha.

It is found that these little animals do not exist at greater depths than 100 fathoms, and, therefore, in the deep sea portion of this cable the brass wrapping will not be found.

There are a great many accidents to which submarine cables are subject. One of the principal is that of a ship's anchor, and it was the disturbing element of a ship's anchor that prevented me from having the pleasure of being before you last Monday. On the table is a piece of cable which has been taken out of that crossing the River Humber. The cable which crosses this river is one of the most important that we possess, and for that reason one of the strongest kind of cable ever made was laid down. In the Postal Telegraph Department we have no less than 62 cables, and their aggregate length of 1,224 miles contains a total of 3,809 miles of wire. To cross rapid streams and important rivers strong cables are used, and to cross the Humber, which during spring tides runs at the rate of six to seven knots an hour, a cable of the strongest type was used; yet it had not been down six weeks when a ship got hold of it, and the cable was caught by its anchor. The heavily laden schooner rid ing on a strong tide, with its anchor attached to the cable, brought to bear an enormous force, and, perhaps owing to the construction of the cable, this force would not be equally divided among the outside protecting wires, and thus one wire, bearing the greater strain, gave way, followed by the snapping of a second, and so on till the whole cable was severed in the straggling and tangled manner that you see, which is very different from its symmetrical form when first laid. This break occurred in a very nasty stream, where the cable was so buried in mud that I could not find it; and I was despairing of being able to give even a second lecture here, when a happy thought occurred to me. I had spent a whole day in grappling after this cable, trying over and over again, and yet never getting near it, when it suddenly came into my mind that Shakespeare makes Bassanio say: "In my school days, when I had lost one shaft, I shot his fellow of the self-same flight, the self-same way, with more advised watch, to find the other forth; and, by adventuring both, I oft found both." So, knowing that a ship had dropped its anchor over the cable, I thought we would drop our anchor too, and we did, and waited a whole tide, and when we hauled the anchor up there was the cable.

The chief cause of accidents to cables, next to that of anchors, is probably due to abrasion of the cables on rocky bottoms. The bottom of the sea is frequently of an undulatory nature, and the cable remains suspended from point to point, and at such points the wire becomes chafed and worn away, and speedily decays. I am sorry to see that the time at my disposal has gone so rapidly that I cannot particularize to you many of the different causes that lead to the destruction of cables, not only abrasion, not only accidents in paying out, but accidents that exist afterward; for instance, a whale once caught a cable in the Persian Gulf and broke it; a shark's tooth has been found embedded in a cable, and a sinking ship has caused damage to a cable.

Sometimes the cables rest on corrosive stones, copper ores, and ironstone, when corrosion sets in and causes the cable to speedily fail. Volcanic action sometimes damages cables, as also rock slips. In the Bay of Biscay, which is crossed by the Direct Spanish Company's cable, there is no doubt that such a cause has interfered with the cable on two occasions, curiously enough, interrupting the wire each time on the same day of the year. There is a peculiar shelving of the rock, and slips exactly equivalent to our landslips take place at intervals.

Icebergs, too, from the North Atlantic, frequently carry large pieces of rock, which fall to the bottom when the iceberg thaws, and in their descent are liable to fall across a cable and damage it.

There are also faults due to imperfect joints, due to accidents that pass inspection during the process of manufacture, but which slowly develop themselves after submersion or lapse of time.

Lightning, earth currents, and things of that kind affect cables, but, nevertheless, the eye of the telegraph engineer is constantly watching these circumstances as they happen, and he tries to bring to bear upon them all the power and thought he possesses; and the result is that, by slow experience, the cable of the present day is very superior to that used in the early days, and the improvement has been equal to the advance, which, I hope I have been able to show you, has been made as regards the insulators and iron wire.

ENGINEERING INVENTIONS.

Mr. Alexander T. Wilson, of Fairfield, Ill., has patented a cheap and simple device for securing and connecting the ends of rails, by the use of which fish plates and nuts and bolts may be dispensed with, and the necessity of punching holes in the rails be obviated. It consists, essentially, of a doubly slotted block of iron or steel, the top of which conforms to the thread of a rail, and whose bottom is flush with the foot of the rail, and which may be set between the rail, so that their ends may be fixed in the slots and held fast.

Mr. Felix S. Prendergast, of Savannah, Ga., has patented an improved gauge for determining the distance apart of the rails of a railroad track. It is so constructed as to give the correct gauge distance, even when the gauge board may not be at right angles with the rails. It consists in a track gauge formed of a gauge board having a segment of a circle attached to it near one end, and a segment of a circle or equivalent knife edge attached to it near the other end.

Mr. Cornelius R. Van Ruyven, of Deventer, Netherlands, has patented a simple and efficient apparatus for regulating and correcting the position of switches, the apparatus being under the control of the engine driver, so that should the switch stand wrong it can be shifted from the engine. This invention is an improvement in the class of switches whose operation is controlled by the engineer or engine driver, the movable rails being shifted or adjusted in position by means of devices on the locomotive.

An improved machine for opening ditches to receive tiles has been patented by Mr. Guernsey Smith, of Rochester, Ill. It is simple in construction, convenient, reliable, and will remove the soil and deposit it at the side of the ditch, and leave the ditch in proper condition to receive the tiles.

The Immensity of the Stars.

We take from *Le Monde de la Science* the following interesting "Considerations on the Stars," by Professor J. Vinot:

"It is known that the stars are true suns, that some of them are larger than our own sun, and that around these enormous centers of heat and light revolve planets on which life certainly exists. Our sun is distant from us 38,000,000 leagues, but these stars are distant at least 500,000 times as far—a distance that in fact is incommensurable and unimaginable for us. Viewed with the unaided eye the stars and the planets look alike; that is, appear to have the same diameter. But, viewed through the telescope, while the planets are seen to possess clearly appreciable diameters, the stars are still only mere luminous points. The most powerful of existing telescopes, that of Melbourne, which magnifies 8,000 times, gives us an image of one of our planets possessing an apparent diameter of several degrees. Jupiter, for instance, which, seen with the naked eye, appears as a star of the first magnitude, with a diameter of 45" at the most, will in this telescope have its diameter multiplied 8,000 times, and will be seen as if it occupied in the heavens an angle of 100°. Meanwhile a star alongside of Jupiter, and which to the eye is as bright as that planet, will still be a simple dimensionless point. Nevertheless that star is thousands of times more voluminous than the planet!

"Divide the distance between us and a planet by 8,000, and you have for result a distance relatively very small; but divide by 8,000 the enormous number of leagues which represents the distance of a star, and there still remain a number of leagues too great to permit of the stars being seen by us in a perceptible form. In considering Jupiter, or any of the planets, we are filled with wonder at the thought that this little luminous point might hide not only all the visible stars, but a number 5,000 fold greater—for of stars visible to our eyes there are only about 5,000. All the stars of these many constellations, as the Great Bear, Cassiopeia, Orion, Andromeda, all the stars of the zodiac, even all the stars which are visible only from the earth's southern hemisphere, might be set in one plane, side by side, with no one overlapping another, even without the slightest contact between star and star, and yet they would occupy so small a space that, were it to be multiplied 5,000 fold, that space would be entirely covered by the disk of Jupiter, albeit that disk to us seems to be an inappreciable point."