CODFISH AS FOOD FOR MAN, BEAST, AND VEGETABLE.

[From Stewart's Quarterly].

The Cod fishery is the staple industry of Newfoundland. This splendid fish, which graces the table of the noble, and in its dried and salted condition supplies a wholesome food for the poor man, is found in perfection around the shores of Newfoundland. Its chosen home is on the Great Banks, six hundred miles in length and two hundred in breadth. Here the aristocracy of the great race are found, the quality and size of Bank fish being superior to that caught near the shore, averaging thirty to the quintal when dried. The enormous colonies of fish on these Banks may be judged of from the fact that more than three hundred and sixty years of fishing, on an immense scale, have apparently made no impression on them in the way of reducing their numbers. It is questionable whether the smaller banks near the shores, where the dimensions of the fish colonies are but limited, are not suffering from over fishing. It is certain that there are localities where the fish are not nearly so plentiful as formerly, and some have been abandoned altogether. Since the day when the Red Indian lay over the rocks and transfixed the codfish with his spear, till now, when 70,000 men with the most ingenious instruments of capture, are constantly at work, what myriads of codfish have been drawn from those seas, and as yet there is no sensible diminution in the supply! Cuvier tells us that "almost all parts of the cod are adapted for the nourishment of man and animals, or for some other purpose of domestic economy. The tongue, for instance, whether fresh or salted, is a great delicacy; the gills are carefully preserved to be employed as baits in fishing; the liver, which is large and good for eating, also furnishes an enormous quantity of oil, which is an excellent substitute for that of the whale, and applicable to all the same purposes; the swimming bladder furnishes an isinglass not inferior to that yielded by the sturgeon; the head, in places where the cod is taken, supplies the fishermen and their families with food. The Norwegians give it with marine plants to their cows, for the purpose of producing a greater proportion of milk. The vertebræ, the ribs, and the bones in general, are given to their cattle by the Icelanders, and by the Kamtschatkadales to their dogs." These same parts, properly dried, are also employed as fuel, in the desolate steppes of the shores of the Icy Sea. Even their intestines and their eggs contribute to the luxury of the table. Since Cuvier's day, cod-liver oil has become world-renowned for its medicinal properties. The best is made without boiling, by applying to the livers a slight degree of heat, and straining through thin flannel or similar texture. When carefully prepared it is quite pure, nearly inodorous and of a crystalline transparency. The article however is largely adulterated in England and France. The common cod oil, made by the putrifying process, which deprives it of its iodine and consequently of its medicinal virtues, is refined by charcoal, filtered, and sold as the genuine article, by dishonest dealers. It is much to be regretted that means are not adopted in Newfoundland, such as a seal or label, to be affixed by a responsible officer on each bottle or vessel, so as to attest the genuine article. To invalids, who wish to get cod-liver oil pure, this would be an inestimable boon. It has now become a valuable remedy in that wide-spread, formidable disease, consumption. The result of an extended trial of this medicine, in the hospital, at London, for the treatment of consumptive patients, shows that about seventy per cent gain strength and weight and improve in health, while taking the cod-liver oil; and the good effect, with a great many, is permanent. Skate liver oil is also coming into use for medicinal purposes. The quantity of common cod oil extracted from the fish caught on the banks and shores of Newfoundland is estimated at 12,500 tuns, the value of which, at £30 a tun, is £375,000.

It is well known that the cod is most prolific in the perpetuation of its race. A cod-roe has more than once been found to be half the gross weight of the fish; and specimens of the female have been caught with upward of eight millions of eggs. Were all these to come to maturity a pair of cod would, in a few years, fill the ocean; but of course, in the great waste of waters, only a portion of the eggs are fertilized, and only a small per centage of the fish ever arrives at maturity. The cod spawns in the mid winter, but its habits have not been observed with sufficient accuracy to determine when it becomes reproductive. The best authorities hold that the cod is an animal of slow growth, and that it is at least three years old before it is able to repeat the story of its birth. A question of great interest to Newfoundland is, whether it is possible, by over fishing, to exhaust her cod fisheries, either partially or entirely? As yet no serious impression appears to have been made on the Bank fishery, after three and a half centuries of ceaseless fishing. The same, however, cannot be asserted in regard to the shore fishery, at least at certain points; and the frequent complaints of late years of the scarcity of fish in certain bays, as compared with former times, and the numerous failures in the summer fishery awaken the suspicion that the perpetual drafts, year after year, without any interval for recruiting, have seriously reduced the number of codfish, in certain localities. The scarcity of cod in Conception and Trinity bays, and other places, of late years, as compared with "the good old times," is generally allowed; and the bulk of the population of these bays now proceed to the Labrador for their summer fishing. The theory of the migration of fish, once a general notion, is now known to be a popular delusion, and has been abandoned by all scientific naturalists. The migratory instinct in fish is ascertained to be very limited, merely leading them to move about a little from their feeding ground to their spawning ground—from deep to shallow water. In fact there are, in the world of waters, great fish colonies, as there are great seats of population on land; and these colonies are stationary, having, comparatively speaking, but a limited range of water in which to live and die. All around the shores of Newfoundland are numerous banks, or submarine elevations, of greater or less extent, which constitute the feeding and breeding grounds of the cod; and each of these has its own fish colony that live and die within a limited range from their own *habitat*. They do not intermingle with other colonies or invade their domains. This is proved by the well known fact that the cod of different localities are marked by distinctive features and qualities—the cod, for example, of Placentia bay being quite distinguishable from that taken in Bonavista bay. So, too, the vast fish colonies of the Great Banks, at a considerable distance from the shores, differ from shore fish, being larger and finer, and, except a few adventurous individuals that roam from home, are not found at any distance from the place of their birth. It is a favorite theory with Newfoundland fishermen that, were it not for the Frenchmen fishing on the Great Banks, and covering miles of the ocean with their *bultows*, the fine bank fish would come in on the shores, and swarm in every bay and creek. This is merely a popular fallacy. The bank and shore fish keep to their respective homes. If heavy drafts are made on the smaller colonies around the shores and in the bays, in the course of years, these will become seriously diminished in numbers. Facts seem to indicate that this is the case in many localities at present. The average catch of codfish now is not greater than it was fifty years ago, though many thousands more hands are now engaged in fishing.

There is one other economic purpose for which the codfish are available, but which is yet undreamed of in Newfoundland. I refer to the manufacture of fish-guano from fish offal. The French have invented a process by which the offal of all fish, and the coarse fish that are useless for food, can be converted into a fish-powder nearly as rich as the best Peruvian guano, equally transportable and possessed of the same fecundatory properties when employed in agriculture. The process is simple—the offal or fish are boiled—then subjected to pressure, in screw-presses, to extract as much as possible of the water and oil; then dried and reduced to powder, which is found on analysis to contain 12 per cent of nitrogen and 14 per cent of bone earth. In fertilizing qualities, when applied to land, it competes advantageously with Peruvian guano. There are several large factories, for the manufacture of this fish-guano in France—the most extensive being at Concarneau, between Lorient and Brest, in the department of Finisterre, a fishing village, where the catching and preparation of Sardine are carried on. The success of this branch of industry has been great and decisive, and is now placed beyond the possibility of doubt. In the locality in which it is manufactured in France this fish-guano fetches eight shillings per cwt., and is eagerly sought by the farmers; while the oil, which constitutes about 2½ per cent of the raw fish, is worth three shillings and four pence per gallon. These figures show that the manufacture must be highly profitable. The establishment at Concarneau, where only six men and ten boys are employed, produces 2,000 tuns of manure annually, which, at the rate of three cwt. per statute acre, would suffice to manure 13,000 acres of land, and would represent, at 22 per cent of dried manure, a fishing of 9,000 or 10,000 tuns. The quantity of coal used in the manufacture is about two cwt. to one tun of manure. The French have had one of these factories in operation for some years, at Quirpon, near the strait of Belle-Isle, on the northeast coast of Newfoundland; but its existence is all but unknown to Newfoundlanders, few if any of whom are aware of the invention, and the immense field of industry which it opens up. This establishment at Quirpon furnishes from 8,000 to 10,000 tuns of manure annually; and possibly there may be other factories at work along the "French Shore" of which we have no information.

A new and vast field of enterprise in Newfoundland might be opened up, in this manufacture, were persons possessed of skill and capital to enter on it. The cod, previous to being salted and dried, is deprived of its head, its intestines, and the backbone, which together make about one-half of its total weight. With the exception of the trifling portion of this offal that is mixed with bog and applied to the land in Newfoundland, the whole is lost without utility, or is thrown into the sea. Hundreds of thousands of tuns of offal are thus lost which might be turned to profitable account, to say nothing of the immense quantities of common fish which might be taken for this manufacture. I believe the sources, whence the supply of guano is now drawn, are becoming exhausted; so that the manufacture of an artificial guano will, in the future, become more remunerative. The worn-out soils of the densely populated countries of Europe seem destined to be renovated in this way from the inexhaustible wealth of the ocean. In the month of June each year, the shores of Newfoundland are visited by enormous shoals of caplin, for the purpose of spawning. The masses of them, in the various bays and harbors, are so great that two men with a small landing net will fill a boat in a couple of hours. They cover the surface of the ocean for miles and are devoured by the voracious cod by myriads. So little account is made of this delicious little fish that it is largely employed in manuring the fields and gardens. Enormous quantities of herring too are at times lost from want of proper appliances for curing. These two sources of supply, for the material of fish-guano, might be added to those already named, so that the stock could never fall short. He would be a benefactor to Newfoundland, who would introduce this important branch of industry.

EXTRACTS of medicinal plants are now made with the bi sulphide of carbon by M. Lefort.

Nathan Read, the Inventor of the Multi-Tubular Boiler.

Nathan Read was a native of Warren (formerly Western), Worcester County, Mass., born July 2, 1759. His ancestors originally came from Newcastle-upon-Tyne; they then settled in the County of Kent, where they lived for several generations. From thence they emigrated to America at an early day, about 1632, and settled in the vicinity of Boston, where they resided for many years. His grandfather—when the country was new, and but few settlements in that section of the State—purchased a large tract of land in Warren, upon which he settled, and where he spent the remainder of his life in the improvement of his lands. His father, Major Reuben Read, was an officer in the Revolutionary service; and his mother, whose maiden name was Tamison Eastman, was first cousin to Major-General Nathaniel Greene, of Rhode Island. His father was an only son, and resided upon the homestead during his life. At the age of fifteen years, Nathan commenced his preparatory studies for College, and at the close of the summer vacation of 1777, entered Harvard University. His parents were desirous that he should qualify himself for the ministry, and he attended Professor Sewall's Lectures on the Hebrew Language. He acquired a good knowledge of the language, and by appointment, gave a Hebrew Oration at a public exhibition of the University; and during the interval between the death of Professor Sewall and the appointment of his successor, Mr. Parsons, he was engaged to instruct the class in Hebrew. He graduated in 1781, on which occasion he was selected to deliver the valedictory address. He was distinguished as a scholar, and left College with the respect of officers and students. After graduating he was engaged in teaching in Beverly and Salem, until 1783, at which time he was elected a tutor in Harvard University, where he continued his labors as such until the commencement of 1787. He then resigned his place as tutor, and entered upon the study of medicine with Dr. Edward A. Holyoke of Salem, until October, 1788, when he gave up the idea of following medicine as a profession, relinquished its study, and opened an apothecary store in Salem.

While engaged in the study of medicine with Dr. Holyoke, and also while in his store, he devoted himself, more or less, to study and experiment in the mechanic arts, which indeed held a higher place in his mind than his medical studies or merchandise. It was during this period of time that he invented and constructed his models of a steamboat and locomotive carriage.

In October, 1790, he was married to Miss Elizabeth Jeffrey, daughter of William Jeffrey, Esq., Clerk of the County of Essex, and granddaughter of Joseph Bowdish—August 24th, 1791, he was elected a member of the American Academy of Arts and Sciences—April 4th, 1795, he removed to his farm in Danvers, and built a permanent structure across Water's River, which served the double purpose of a dam and bridge. In 1796, he and his associates erected and put in operation the Salem Iron Factory, for the manufacture of chain-cables, anchors, and other materials of iron, for ship-building, he having the chief superintendence of the work. While thus engaged, he invented and put in operation in the factory, designed for its own special use and benefit, with a view to the saving of labor and other economical purposes, a nail machine, since extensively used for cutting and heading nails at one operation, for which he received a patent, as the original inventor, from the United States Government, on the 8th of January, A. D. 1798. This highly important invention obviated the very great labor and expense of the manufacture of these articles by hand.

In October, 1800, he was appointed a member of Congress for Essex South District, to fill the vacancy occasioned by the death of Judge Sewall, then late member from that district; and in November, 1800, he was elected by the people of the district, a member of the succeeding Congress, for two years from and after March 4th, 1801; and was a member during the severe contest in the House of Representatives for the Presidency, between Jefferson and Burr.

In February 1802, while a resident of Danvers, he was appointed by Governor Strong a special Justice of the Court of Common Pleas for the County of Essex; and after his removal from Danvers to Belfast in Maine, which was in 1807, he presided as Chief Justice of the Court in Hancock County for many successive years. In 1815, he was elected an honorary member of the Linnæan Society of New England.

After removing to Belfast, Judge Read gave most of his time to agricultural pursuits; but he often indulged himself in new inventions in the mechanic arts and trying experiments therein; and during his whole life these and the natural sciences were his favorite study. He invented several useful agricultural implements, for some of which he took a patent; but constructed them mainly because he had use for them on his farm. His farm consisted of some four hundred acres of land, finely situated near the head of Belfast Bay, lying upon the shore just south of the city of Belfast. His residence overlooked the bay, with its attractive scenery; and here he spent the remainder of his life, ever taking a lively interest in all matters of a public character, especially such as were designed to improve the moral condition, and advance the intellectual and social improvement of the people among whom he lived. He regarded the cause of education as involving one of his highest duties; and at an early day, when the town was comparatively new, he was instrumental in establishing a high school in Belfast, that the youth of the place might be educated at home—the beneficial effects of which have long been appreciated.

He died at his residence in Belfast, January 20th, 1849, in the ninetieth year of his age, and in the full possession of his intellectual powers, except a few days at the close of his last sickness. He possessed a strong constitution, and a strong and highly cultivated mind; his aims were high, and he soared above the sordid interests of the world. He never sought to make himself conspicuous, or to give publicity to his attainments or labors, but chose rather unobtrusive retirement. His deportment was always gentlemanly; his form fine, and his countenance highly intellectual. His conversation was ever interesting and instructive; and he lived and died with the respect and esteem of all who knew him. He was the last surviving member of his college class; and with two exceptions—Judge Farrar and James Lovell—the oldest living graduate of Harvard University.

As early as 1788, as already noticed, while a resident of Salem, he became especially interested in the purpose of applying steam-power to the practical end of propelling boats and land carriages. He foresaw the importance of attaining such a purpose, and set himself to work to contrive the necessary machinery to effect it, which at that time was felt by all intelligent men who had given their attention to the subject, to be a *desideratum*—a work yet to be accomplished. The idea as applied to boats was not new; various experiments had been tried, but were mainly directed to the mode of propulsion, without so much attention to the motive power; and all the experiments hitherto tried had proved a failure.

THE WIRE ROPE TRAMWAY AT BRIGHTON, ENGLAND.

[Condensed from Scientific Opinion.]

The wire-rope transport system may be described as consisting of an endless wire rope running over a series of pulleys carried by substantial posts which are ordinarily about 200 feet apart. This rope passes at one end of the line round a drum, driven by either steam, water, or even horse power, in small farming operations, at a speed of from four to eight miles per hour. The boxes in which the load is carried are hung on the rope at the loading end by a wooden Λ-shaped saddle, about 14 inches long, lined with leather, and having four small wheels, with a curved pendant, which maintains the box in perfect equilibrium while traveling, and most ingeniously, but simply, enables it to pass the supporting posts and pulleys. By a sliding-ring arrangement the boxes or buckets are easily emptied by tilting, without unshipping the saddle from the rope. The boxes can be made to carry from 1 cwt. to 10 cwt., and the proportions of the line and the loading and discharging arrangements can be varied to suit any particular requirement, ranging from 10 tuns to 1,000 tuns per diem. At each end of the line are rails placed to catch the small wheels attached to the saddles of the boxes, by which means the weight, having acquired momentum, is lifted from the rope, and, thus suspended from a fixed rail or platform, can be run to any point for loading or emptying, and again run on to the rope for transport, the succession being continuous and the rope never requiring to be stopped for loading and unloading.

Curves of sharp radius are easily passed, as well as steep inclines, and its applicability to cross rivers, streams, and mountains, or hilly districts, will be apparent at a glance, as the cost of construction increases but little under such circumstances, whilst that of a road or railroad is, perhaps, increased tenfold, and the daily working cost doubled or trebled. The rope being continuous, no power is lost on undulating ground, as the descending loads help those ascending.

In the case of lines for heavy traffic, where a series of loads, necessarily not less than 5 cwt. to 10 cwt. each, must be carried, a pair of stationary supporting ropes, with an endless running rope for the motive power, will be employed, but the method of supporting, and the peculiar advantage of crossing almost any nature of country with a goods line without much more engineering work or space than is necessary for fixing an electric telegraph, without bridges, without embankments, and without masonry, exists equally in both branches of the system.

In the minor applications, such as short transport from mines to railways, the landing or shipping of goods in harbors and roadsteads, and the carriage of agricultural produce on farms, some peculiar features of the system render it specially advantageous. Amongst these are the facility with which power can be transmitted by the rope and taken off at any required point for mining or other purposes. In lines terminating on the seaboard, or on great rivers, a manifest advantage is secured in the facility for taking goods direct to or from ships in harbor or roadstead without transhipment into lighters.

Seen from a distance, the posts which carry the tramway wires at Brighton, might be mistaken for telegraph poles, but a nearer inspection reveals a second line of wires on the same level, and upon these two wire-rope lines, supported on standards at intervals varying from 300 feet to 1,000 feet apart—according to the requirements of the ground—are suspended iron boxes for the carriage of the goods, which boxes pass on noiselessly and steadily, carried forward by the rope at the uniform rate of five miles an hour—the time required for performing the entire circuit of the line.

In laying out these five miles at Brighton the opportunity has been taken of exemplifying the working of the system under every variety of difficulty that could possibly present itself; thus we have at one part an incline of 1 in 6, up and down which the rope and boxes work with perfect facility, the descending weights assisting those which are ascending; then there are, besides several bends less acute, two instances of absolutely right-angles which are passed with the greatest ease; in some instances the standards are carried to the hight of 70 feet, to meet inequalities of the ground, undulating and hilly country being more trying to this system than craggy and mountainous—such as that for which this plant is designed, and where, from the long reaches taken, fewer posts will be required.

The line is rather over five miles long; there are 112 posts, or standards, in the whole length; these standards can either be made of light angle and band iron neatly put together, as in the present case, or of wood. The rope is made of charcoal iron, is two inches in circumference, each strand as well as the center of the rope having a hempen core, to secure ductility. The power employed to drive the rope is a portable 16-horse power engine.

Some of the spans are 600 feet and 900 feet in length, and ingenuity has been shown in devising every possible mode of testing the merits of this system of transport; and we are bound to record that all difficulties have been overcome with complete success. The line is capable of delivering 240 tuns per day of ten hours, *i. e.*, 120 tuns in each direction.

This tramway has been erected by Mr. Hodgson the inventor, at the request of some gentlemen with whom he was in negotiation, for the supply of materials for a line sixty miles in length in Ceylon.

It is intended to divide the proposed Ceylon line of 60 miles into 5-mile sections such as the one described—one engine working every two sections, and the boxes passing each section by shunting arrangements, similar to those used at the termini, from one section to anothor. The line in work will be open daily to public inspection during the month of April, and is well worth a visit. It is hardly likely that so efficient and economical a means of transport will be for long exclusively confined, as at present, to the conveyance of goods. For ourselves, we venture to confidently predict an early adaptation of the principle of this ingenious system to passenger traffic.

FURROWING AND PITTING IN LOCOMOTIVE BOILERS.

BY JOHN G. WINTON.

Some theorists attribute furrowing to the expansion and contraction of the boiler, inducing a bending and unbending of the plates; if so, then the outside of the plates would show an abrasion similar to the end plates of the smoke-box, as with inside cylinders, or simply to a straight strip of iron bent and unbent by the hand. These furrows are observed with lap joints, with butt joints having inside strips, but when the strips are outside no furrowing takes place. Now, with this statement, I hold this theory of bending and unbending of a circular boiler to be perfectly erroneous, and look to natural laws for an explanation of the furrowing and pitting of steam boilers.

Mountain torrents very rapidly wear the bed of a river of the most compact material, and it is well known that the bilge-water in a ship rapidly wears off the rivet heads, by the mere friction of the water rolling forwards and backwards. Were water allowed to drop on an iron plate, drop by drop, pitting would follow, corrosion taking place, and the impact of the falling water washing away the rust as it formed—thus eating into the iron very quickly, more especially on soft spots of the surface.

Now, what is the mechanical action of the water in a locomotive boiler? I take it to be a racing of the particles from the fire-box to the smoke-box end, and as the steam is generated from the tubes, a partial explosion takes place in all directions, carrying the particles of water along with it. I am not so certain that the impact of the water propelled by the steam generated by the tubes acting on the surface of the boiler does not, in a great measure, account for pitting. When corrosion takes place, the incessant impact of the water on the soft spots of the iron must wash off the rust as it forms, leaving the surface always raw, as it were (assisted in some cases by galvanic action). The boilers generally show the center of the furrow about one inch from the lap joint. I will endeavor to give an explanation of this. Noticing pieces of wood floating on the surface of our silent Thames when the river had attained its greatest downward velocity, I was quite struck by observing at the piers of the bridges that the pieces of wood never came in contact with the pier, but invariably took a rapid current about one foot from the pier, and were carried away more rapidly than in the center water-way. How is this to be explained? I take it that the water flowing against the pier is repelled, the same as the sea dashing against a breakwater is thrown back again, and being met with a downward current, and the meeting of the waters, I will say, induces a rapid current one foot from the pier. Those interested can make this observation for themselves by simply looking over, say, Westminster Bridge, and observing materials floating on the surface. I am just going to state that this phenomenon is the cause of the furrowing of locomotive boilers. Where a boiler is made perfectly cylindrical, with butt joints and the strips outside, no furrowing is observed; with the strips inside, or with lap joints, furrowing takes place. Now, in my opinion, the strips and lap joints are the obstructions, as in the piers of a bridge, causing these furrows; the steam generated from the tubes, shooting the water against the edges of the plates, is repelled, and the racing of the water from the fire-box end causes a rapid current to flow parallel with the joints, this upward and repelling and onward action of the confined water inducing more friction, and, consequently, keeping this part of the boiler in a raw state, making it more subject to corrosion and galvanic influence. With these opinions I consider, when the edges of the plates are placed downwards, they are more liable to form furrows. Some bevel the edges of the plates, which I consider will tend to lessen this evil, but cannot imagine it would be easily calked, as it is very difficult to calk a knife-edge. The best cure is by making outside strips strong enough with butt joints and a proper form of rivet, which I maintain is a double counterlap; thus we shall have as strong a boiler with no furrowing, which must tend, in a great measure, to reduce the number of boiler explosions. The following shows the rivet I would adopt for lap and butt joints. A curved countersink is, I consider, the strongest form, as the iron is less distorted. Part of the head of the rivet is retained to resist the force of impact from the riveting hammers; and it is evident that if the head is reduced by corrosion the countersink will hold good. This is not a bending and unbending theory, neither is it a bulging one, as in some cases these theories may hold good; but at the same time the mechanical action of the water in either case I consider rapidly deteriorates the boiler.

Girdling Fruit Trees to Make them Bear.

A correspondent of the *Boston Journal of Chemistry* states that there is no doubt that the girdling of fruit trees is a cause of abundant fruitage, but it by no means follows from this fact that a general principle can be deduced, that trees would be improved, or the crop increased for a series of years, by such treatment. It is well known that gardeners frequently girdle a branch, by removing a narrow ring of bark around it, when they wish to increase the size and beauty of the fruit; but it is done at the expense of its vitality, and, unless the operation is skillfully performed, will invariably destroy it before the season of bearing the next year.

The crude sap, taken up from the soil by the roots of the tree, ascends principally through the vascular tissue of the alburnum or sap-wood to the leaves of the branches, and there both this and the carbon of the carbonic acid, absorbed from the air by the leaves, are organized into the proper substance for the growth of the wood and fruit. It then descends on the outside, principally through the sieve tissue of the cambium layer, forming a new layer of wood and bark; while a part also goes to the nourishment of the fruit. If there is no obstruction of the elaborated sap in its downward course, it is equally distributed to the branches, fruit, stem, and roots; but, if the bark and cambium layer are removed by girdling, it is stopped in its descent, and consequently received into the branches and fruit in excess, and they are thus increased at the expense of the part below. In this way we account for the increase of the fruit by girdling.

Professor John Lindley, when speaking of this subject in his late treatise on horticulture, quotes Mr. T. A. Knight approvingly, as follows: "When the course of the descending current is intercepted, that naturally stagnates, and accumulates above the decorticated space, whence it is repulsed and carried upward, to be expended in an increased production of blossoms and fruit." This theory is adopted by the best physiologists of the present time, and can be demonstrated with almost mathematical certainty. Therefore, this unnatural development of fruit, instead of indicating an improvement of the trees, must be looked upon as a premonitory symptom of disordered physical action, and of premature death.

If the bark and the cambium layer have been removed by girdling, as seems to be the case with the trees, the downward circulatory connection on the outside between the upper and the lower part is destroyed, and the upper part at least must die. If, however, the cambium layer has not been destroyed, and has been so covered by wax and bandages as to prevent evaporation and drying of the surface of the decorticated part, there is a chance for some of them to live. It is true that some few cases are recorded of trees which have lived several years after the bark and cambium layer have been removed, but they are of very doubtful authority.

M. Ernest Faivre, a French physiologist, gives a statement of his recent investigations on this subject, published in the *Gardener's Chronicle*, about two months ago, in which he says: "In mulberry trees, as in all trees deprived of latex, annular incisions generally produce the following manifestations: 1. Formation of a swelling, or tissue restorer, at the upper lip of the wound. 2. Diametrical growth of the parts above the zone of bark taken off. 3. Hardening of the wood in that region. 4. Stationary condition of the parts below, if they are deprived of leaves and buds; or, if not, vigorous shoots from below the lower lip of the wound. 5. More easy, more early, and more abundant flowering and fructification. 6. Destruction, after a variable time, of all the parts above the annulation."

From the foregoing observations it appears that girdling trees in any form is ruinous, and almost always fatal; therefore I heartily concur in the advice given in the *Journal* that orchardists should not experiment on their trees too freely before they see what the final result will be with those already girdled.

Speed of Electric Signals.

Professor Gould has found that the velocity of the electric waves through the Atlantic cables is from 7,000 to 8,000 miles per second, and depends somewhat upon whether the circuit is formed by the two cables or by one cable and the earth.

Telegraph wires upon poles in the air conduct the electric waves with a velocity a little more than double this, and it is remarked, as a curious fact, that the rapidity of the transmission increases with the distance between the wire and the earth, or the hight of the support. Wires buried in the earth likewise transmit slowly, like submarine cables. Wires placed upon poles, but slightly elevated, transmit signals with a velocity of 12 000 miles per second, while those at a considerable hight give a velocity of 16,000 or 20,000 miles.—*Journal des Telegraphes.*

THE Boston *Journal of Chemistry* recommends a mixture of equal parts of dry white lead and red lead mixed into a paste with mastic varnish, and used as soon as made, as a cement for aquariums.