"The Irish, Swedish, and Germans have the highest percentage of affections; the English, French, Scotch, and Americans, the lowest percentage. Out of the whole number examined, 1,162 were girls and 878 boys; 458 had some ametropia (some anomaly of refraction). Of the 1,162 girls, 290, or 24.9 per cent, were ametropic; of the 878 boys, 168, or 19.1 per cent, were ametropic; being a larger per cent of affection among the girls than among the boys.

"Out of the 2,040 pupils, 13, or 0.6 per cent, had strabismus; 94, or 4.6 per cent, were myopic; 202, or 9.9 per cent, were hypermetropic; 42, or 2.06 per cent, were astigmatic; 99, or 4.8 per cent, had spasm of accommodation; and 63, or 3.1 per cent, had latent hypermetropia.

"We find that hypermetropia predominates. If we add latent hypermetropia and spasm of accommodation, saying nothing of astigmatism, of which the majority was hypermetropic, we have 364 hypermetropes to 94 myopes, or nearly four times as many hypermetropes as myopes, or over twice as many as all the other affections taken together. In the table, as seen, all the grades, from the primary through the grammar school, high school, normal school, and university, are represented; but in no instance, excepting the Kansas State University, is there any thing like a gradual increase of myopia or any of the anomalies simply or collectively. In nearly all of the schools there seems to be a higher per cent of affection in the first years; then, a little later in the course, a marked diminution; and then again an increase. Probably many of those having some trouble after remaining in school for a short time drop out, which would account for the diminution; and then spasm of accommodation and latent hypermetropia becoming manifest later on, or perhaps developing into myopia, would account for the increase in this affection.

"School-life, however, as stated above, so far as I can gather by these examinations, has little or nothing to do in the development of these anomalies. That they exist, however, in a much greater degree than is generally supposed, is very evident; and that continuous use of the eyes having these errors of refraction, whether in the school-room or out of it, if not corrected, is sure to have its evil consequences. The importance of a recognition of the existence of these anomalies, of their extreme frequency, and of detecting and correcting them, is obvious enough. We should take into consideration that spasm of accommodation and latent hypermetropia frequently exist, and that these affections often develop into myopia; and if recognized early, and timely treated by rest and glasses, much suffering and irremediable troubles are averted. Cohn and others may have been able, twenty years ago, to trace the development of myopia to badly appointed school-rooms; but here in America our school-rooms are so carefully arranged as to light, seats, desks, ventilation, etc., that we can scarcely attribute to the work in the school-room the cause of anomalies. In a very great degree these errors of refraction are congenital, frequently they are latent, and, if the eyes were not overtaxed by near work, they would never become manifest. The evil arising from work in the school-room is that these errors of refraction are not perceived, and hence not corrected. If the teacher could be made to understand that the little pupils complaining of headache, pain through the temples, and weakness of the eyes, or dimness of vision, arose neither from stupidity nor desire to avoid study, but that these complaints were symptoms of some defect of the organ of vision, or, what would be better still, let a competent oculist carefully examine each child as he enters upon each year of study in the school-work, and his anomaly, if he have any, corrected, anomalies would gradually diminish."

COMMERCIAL GEOGRAPHY.

The Neglect of Native Fruit-Plants in California.

SINCE the settlement of California, its fruit-growing interests have rapidly gained great importance. It is remarkable, that, notwithstanding the economic value of this industry, hardly any attempts have been made to utilize the native fruit-plants; and Mr. H. Semler, who is so well conversant with the flora of California, has done good service in calling attention to the numerous plants that appear well worth being cultivated, and promise to become a source of considerable revenue. He states, that except the seeds of the nut-pine, which are sometimes used as a dessert, only one or two species of blueberry (*Vaccinium*) are sold, although they are not cultivated. Hardly any attempts have been made to cultivate the numerous native berries. In a recent number of *Petermann's Mitteilungen* he draws attention to a number of these plants.

There is a good Californian raspberry (*Rubus leucodermis*). The European raspberry is cultivated with limited success only in the valley of the Hudson and in New Jersey, although its culture is made difficult by the extreme cold of winter. For this reason attempts were made to cultivate *Rubus strigosus* and *Rubus Occidentalis* (the red raspberry and the thimble-berry). By breeding and crossing these species, the raspberries now in use were obtained. These have been introduced into California, while the native raspberry of that State is neglected, although, even in its wild state, it has a better taste than the wild eastern berries.

In the same way the eastern blackberries and dewberries have been introduced, although two excellent species are native to the Pacific coast. Since the discovery of the 'Lawton' or 'New Rochelle,' numerous varieties of *Rubus villosus* have been cultivated, and plantations of great extent and value are found in California. No attempts, however, have been made at developing *Rubus ursinus*, a native of the Californian coast, which is used by farmers for making jams and jellies; nor has *Rubus pedatus* of the Sierra Nevada, which has small and sweet jet-black berries, attracted any attention.

Gooseberry-culture has so far been a failure in North America. The European varieties degenerate and perish after a few years. A few years since, *Ribes aureum*, a native of Missouri, was cultivated and used as a stock for the European great-fruited varieties. The Californian *Ribes divaricatum* seems still better adapted to this purpose, and with proper culture it will undoubtedly produce fruits that will equal the European varieties in every respect.

The salmon-berry (*Rubus spectabilis*) and the Pacific thimble-berry (*Rubus Nutkanus*) are admirably adapted for making jams. Both have a peculiarly sweet and aromatic taste and very small seeds. They do not keep any length of time, and cannot be transported on account of their softness, but may be preserved, as is now extensively done by settlers in the woods of Oregon and British Columbia. The young sprouts of the salmon-berry are boiled, and are said to be better than spinach.

Besides these, we mention the large currant, *Ribes bracteosum*, which would probably prove a valuable shrub; the *Leña amarilla*, one of the four Californian barberries, which is frequently used in Mexico, but has not attracted the attention of horticulturists; and the Californian vine, *Vitis Californica*, which might be developed just as well as the eastern species of *Vitis æstivalis* and *V. riparia*, which have become the stock of renowned eastern vines.

It would be well if Californian horticulturists would not only direct their attention to foreign products and to endeavors to introduce them into California, but also attempt to cultivate the native plants of their State, many of which might become sources of important industries.

ELECTRICAL SCIENCE.

Improvements in Methods of Manufacturing Storage-Batteries.

MR. MADDEN, in the *Electrical World*, describes some recent improvements in the methods of manufacturing secondary batteries of the grid type. The plates of which these batteries are composed have been made heretofore by pasting by hand a mixture of red lead and sulphuric acid into hourglass-shaped holes in a cast-lead frame. Hand-labor in such work has two objections: it is expensive, and it does not give uniform results. The life of the cell, and its freedom from expensive depreciation, depend to a great extent on a perfect uniformity of condition all over the plate. To attain this, Mr. Madden has devised a machine that pastes the plate automatically, giving a uniform density to the red lead in each hole.

The red lead, mixed with the proper amount of dilute sulphuric acid, is fed to a mixing-screw of varying pitch, working in a cylindrical casing. The pitch of the screw is such that the mass is compressed as it nears an opening which has a length equal to

that of the grid to be pasted. The grids are passed across the opening by rolls, have their cavities filled with the red lead which is being forced out, and then pass between wheels whose distance apart is equal to their thickness, where they are polished, the grids coming from the machine with their perforations filled with paste of an equal density at every point. The different rolls and wheels, and the screw, are geared together, so that their relative speeds are invariable.

The method of manufacturing the support plates, or 'grids,' has also been improved upon. The old method was simply to cast them; and, although the process was a cheap one, yet the plates lacked in strength and density. Mr. Madden has devised a press by which they are formed by hydraulic pressure. Besides the advantages of greater density and homogeneity, giving an improved strength and conductivity, the process allows smaller holes and thinner partitions than can be obtained by casting.

These improvements in manufacture should result in a greatly reduced cost, and in an increased efficiency and length of life. Storage-batteries are just at the point of becoming economical for many purposes, and a moderate reduction in cost and depreciation will turn the balance.

NEW STREET-CAR MOTOR OF THE SPRAGUE COMPANY. — Since the beginning of the year, the Sprague Electric Railway and Motor Company has equipped a number of street-railways with electric-motor cars, some of the installations having been difficult and important. The result of the year's experience has been the adoption of a motor differing considerably in type from that heretofore used, which has been described in this journal. In the new form a single magnetic circuit is used, as in the Edison dynamos, the axle of the car passing through bearings on the yoke. At the other end the poll-pieces are suspended from a cross-piece on the truck by a heavy spiral spring. Another spring below prevents the motor from rising when the motion of the car reverses. The motion is transmitted from the armature to the wheele-axle by two pairs of gears, — one on each side of the car, — one of the wheels in each case being of fibre to deaden all noise. The reduction is 12 to 1. There are two commutators on each armature, — one at each end, — with a single brush for each. The object of this is to have all the brushes on top, where they can be easily adjusted and inspected. It also decreases the wear. The old form of brush consisted of a number of strips of copper riveted together, and set at a slight angle with the commutator bars. This allowed the direction of rotation to be reversed; but there was more or less wear, especially when the armature revolved against the brushes. In the new brush a number of thin laminæ of copper are strung on a rod in a bevelled holder, and bear almost straight down on the commutator. inclining slightly in the direction of motion. When the machine is reversed, the strips are first carried up to the vertical, and then a little past it in the new direction of rotation, until brought up by the inclined sides of the holder. The motors are controlled as formerly, by switches on the two platforms of the car, and the cars are intended to travel in both directions. The whole arrangement is compact, and should be extremely efficient. It is an improvement on the old type of motor, which has been very successfully used.

ELECTRICITY FOR TEMPERING STEEL. — Electricity has been successfully applied for tempering watch-springs and other forms of spring steel, whether in the form of ribbon or wire. The steel is wound on a spool, whence it passes down through a bath of oil. An electric current is sent through the wire, of such strength as to keep it at the proper redness to answer the desired requirements of temper. As the heating is not done in contact with the air, but is entirely beneath the surface of the oil, there is no trouble from blistering, as in the ordinary methods. The final temper is drawn in the same manner, and the wire or ribbon is finished by means of rolls. The process is also applied to a number of springs besides those for watches, including piano-wires. In all cases the process can be controlled to a nicety, both as to the exact temper and its uniformity through the wire.

STANDARDS OF LIGHT. — The committee of the British Association, of which Prof. Vernon Harcourt is chairman, has submitted a report on comparative tests of standards of light. These tests, made on six classes of standards, have been carried on for four years, and as a result the committee recommends the pentane lamps. Ordinary sperm candles vary, because the sperm is not a definite chemical compound; and the luminosity varies with the composition, and the locality and length of the wick. The flame is also liable to fluctuate. It is difficult to obtain sperm candles perfectly free from oil. Perfectly dry sperm has a comparatively high melting-point, and candles made of such material require a thicker wick; so that candles of the same size made of this material give less light than those formerly accepted as standards. The amylacetate lamps are constant, but their reddish light is against them. The pentane standard is reliable: it has no wick, and the light does not alter with slight variations in the specific gravity of the pentane. In a special series of comparative tests as to the merits of the amylacetate lamp, the pentane standard, and the pentane lamp, the pentane lamp was found almost as good as the pentane standard. Three observers recorded the results, and changed their positions after each set of simultaneous observations. The pentane lamps differed, in a total of 1,118 tests, by 1 per cent in 86 cases, by 2 per cent in 57 cases, by 5 per cent in 19 cases, and in a few instances by 10 per cent. Other tests were made to reduce the platinum unit of M. Viole — the light given off by a square centimetre of platinum at its melting-point — to a practical shape. Platinum-foil with a surface of a quarter of a square inch was stretched over rollers and heated to its melting-point, but the results were too variable to be of value. When wound over steel rollers, the heat was conducted away too rapidly. Experiments with platinum fused by the blowpipe were equally unsatisfactory. The heating of a platinum strip by the current of eight or ten accumulators gave better results, but the platinum is apt to buckle. Other lamps and flames were also tried. Carbon filaments waste, nor would the action of photographic rays on sensitive-plates lend itself to standard tests. The committee therefore recommends the pentane standard and also the pentane lamp.

EFFECT OF ELECTRIC CURRENTS ON PLANTS. — Prof. E. Wollny of Münich has experimented on the effect of electric currents of different intensities and characters on the growth of plants. Small plats of about four metres square were provided, and were separated by plates penetrating twenty-five centimetres into the soil. On the two sides of one of these beds, plates of zinc were sunk, the dimensions being thirty centimetres by two metres. They were connected by an insulated wire, with five Meidinger cells in the circuit. Another enclosure had an alternating current constantly sent across it, while in a third there were simply buried a copper and zinc plate connected above the earth by an insulated wire. The three enclosures were therefore subjected to different conditions,— to a weak direct current, to a comparatively strong direct current, and to an alternating current. Several specimens of grain, potatoes, carrots, etc., were planted, and were subjected to the action of the currents until they reached maturity. Comparing them with plants grown under ordinary conditions, the result to which Professor Wollny is led is, that electricity, whether under the form of continuous currents of different intensities or of alternating currents, exerts no influence on the vegetation of plants.

HEALTH MATTERS.

Depressed Areas as Health-Resorts.

DR. WALTER LINDLEY of Los Angeles, Cal., contributes to the *New York Medical Record* an interesting paper on the effect upon invalids and others of compressed air below the sea-level. He says that in the eastern part of San Diego County, about one hundred miles from Los Angeles, is a depression traversed by the Southern Pacific Railroad, known to geographers as the San Felipe Sink, but commonly called, on account of the innumerable shells spread over its surface, the Conchilla Valley. This basin is about one hundred and thirty miles in length by thirty miles in average width. The deepest point is about three hundred and sixty feet below sea-level.

In this valley live about four hundred of the Cohuilla Indians. This is an interesting tribe. Dr. Stephen Bowers, in a paper read before the Ventura County Society of Natural History, March 5,