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ERIODICTYON GLUTINOSUM.

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Contribution from the Microscopical Laboratory of the Philadelphia College of Pharmacy.

Eriodictyon, or Yerba Santa, as it is more commonly known, is an indigenous shrub, which grows abundantly upon dry hills in the western and southern portions of California. It is a member of the water-leaf family, or natural order Hydrophyllacese. The genus Eriodictyon to which it belongs, is a very small one, both as to the number of species and the area of distribution. There are only four species known. The generic name Eriodictyon is derived from two Greek words, namely, *erion*, wool, and *diktyon*, a net; hence, so called from the finely netted or reticulated veinlets which are conspicuous on a fine woolly ground upon the lower surface. The specific name glutinosum has reference to the viscid character of its upper surface. Eriodictyon glutinosum grows to the height of from three to five feet. The leaves are alternate, and from three to six inches in length. Their general outline is oblong lanceolate, the base tapering into more or less of a petiole. The apex is acute, and the margin is irregularly serrate and beset with rigid teeth. Sometimes the margin is entire. The upper surface is green, smooth and glutinous, which is due to a resinous exudation; the lower surface is whitened between the reticulations by closely matted hairs. The texture is leathery and rigid, the venation pinnate and finely reticulate. The principal veins, which extend from the midrib toward the margin, are mostly alternate from each side of the midrib and near the margin anastomose, forming a rather distinct, wavy, sub-marginal vein. From this, short veins are continued to the margin, terminating at the apex of the rigid teeth. The margin of the dried leaf is slightly revolute, especially near the base.

Eriodictyon glutinosum was formerly known as *Eriodictyon Californicum*, and this latter name is still preferred by some botanists. The corolla is tubular funnel-form, half an inch long, thrice the length of the

sparsely and slightly hairy calyx.

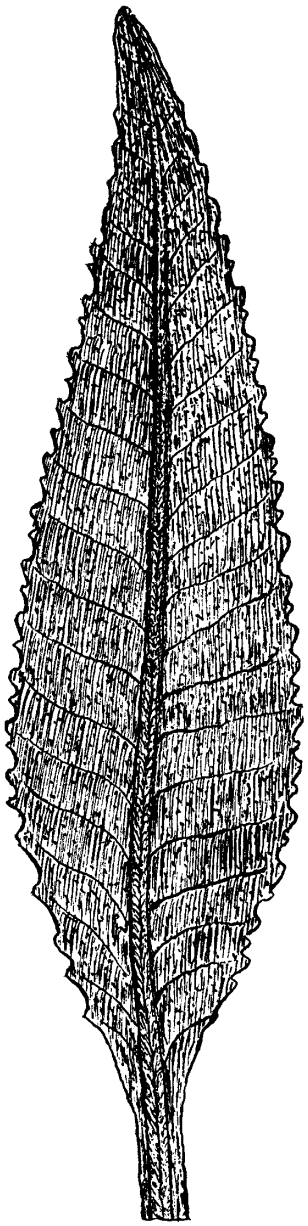

FIG. 1.

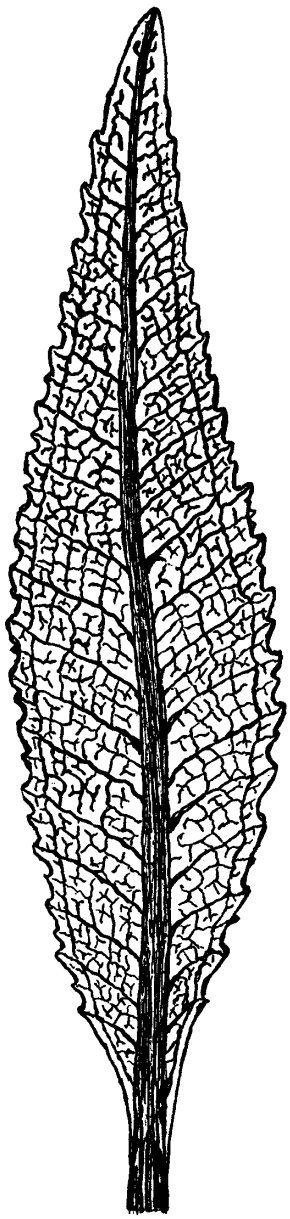

FIG. 2.

The plant is popularly known under various synonyms, among which may be mentioned consumptive's weed, mountain balm, saint herb^ bear's weed and mountain peach. The leaves were made official in the U. S. P. of 1890. The fluid extract, which is the only official preparation, is made by percolating the leaves, reduced to a No. 60 powder, with a menstruum consisting of 4 parts of alcohol and 1 part of water. This

preparation is given in doses of 1/2 to 1 fluid drachm (1.8 to 3.7 c.c.). An aromatic syrup and an aromatic elixir, both made from the fluid extract, have been used for some time to disguise the taste of quinine and other bitter substances. The former is known as *syrupus corrigens*. Yerba Santa is often smoked like tobacco, the smoke being inhaled and giving relief in asthma. The fluid extract is also said to afford relief in the same complaint. The natives of the Pacific Coast have long esteemed it as endowed with rare value in all diseases of the respiratory organs. It has also been used in the form of a tea, and a solid extract has been prepared. One of the most remarkable properties of the drug is its power of completely destroying the bitter taste of quinine, and it is very often prescribed with reference to this property. The leaves have an aromatic odor, and a balsamic and sweetish taste.

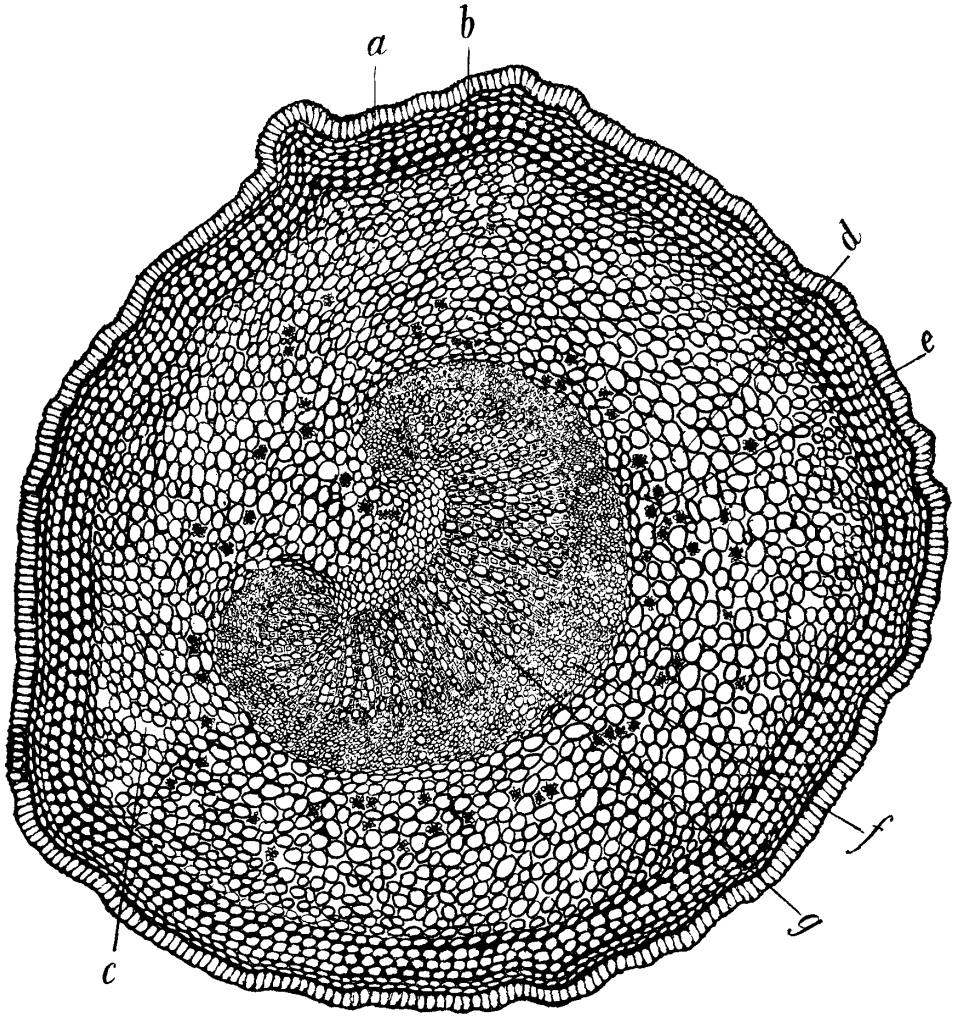

FIG. 3.

The medicinal virtues of the drug are supposed to be due to its resinous matters, in which it is exceedingly rich. One investigator separated the following constituents from the drug : Two resins, one soluble in alcohol and one in ether;, a bitter principle, soluble in water, and partly so in alcohol; gum; tannin; a fixed and a volatile oil; a peculiar saccharine principle and a crystalline principle, which latter was deposited from a concentrated fluid extract.

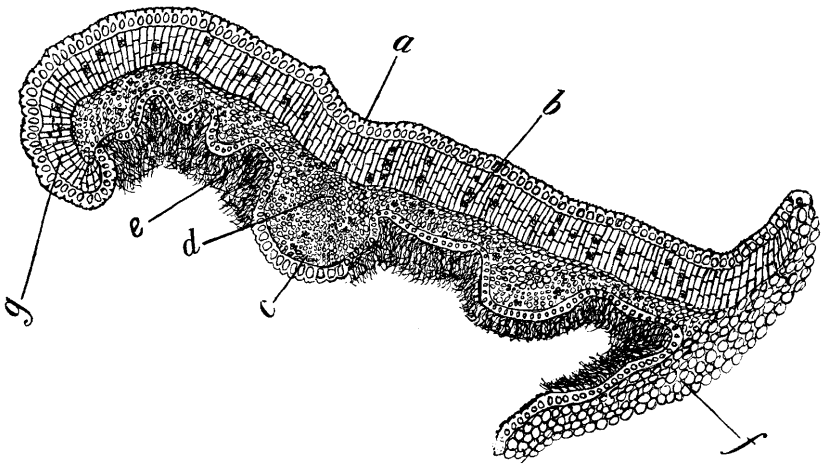

FIG. 4.

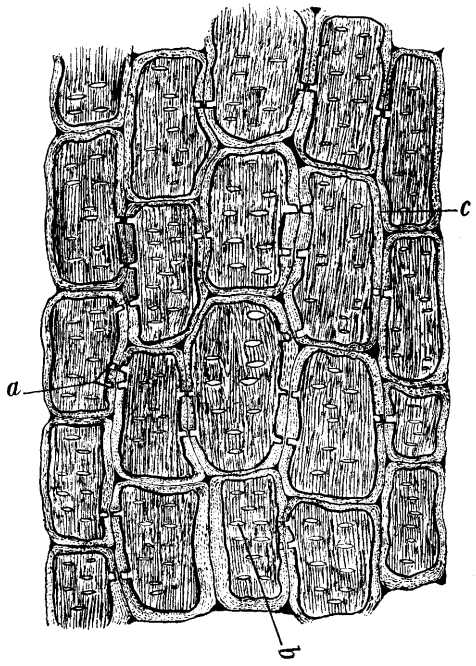

FIG. 5.

The object of this thesis, however, is not so much to describe the chemical constituents, physiological action, and preparations of the drug, as to describe the macroscopical and microscopical characters of tlie leaf, which is the medicinal part of the plant. The structure of the leaf is indicated in the drawings and descriptions which follow :

LIST OF DRAWINGS.

Fig. 1.—Upper surface of leaf, twice the natural size.

Fig. 2.—Lower surface of leaf, twice the natural size.

Fig. 3.— Transverse section of the petiole, magnified 30 diameters. *a*, the epidermis of the petiole, composed of a single layer of cells which are thickened and slightly cutinized upon their exterior surface, and presenting a fringed appearance; *b*, several layers of collenchyma or thick angled cells underlying the epidermis; *c*, intercellular spaces in the parenchyma; *d*, parenchyma tissue surrounding the vasal bundle; *e*, crystals of calcium oxalate in the parenchyma cells closely encircling the vasal bundle; *f*, phloem portion of the vasal bundle facing the lower surface of the leaf; *g*, xylem portion of vasal bundle showing the radial arrangements of ducts.

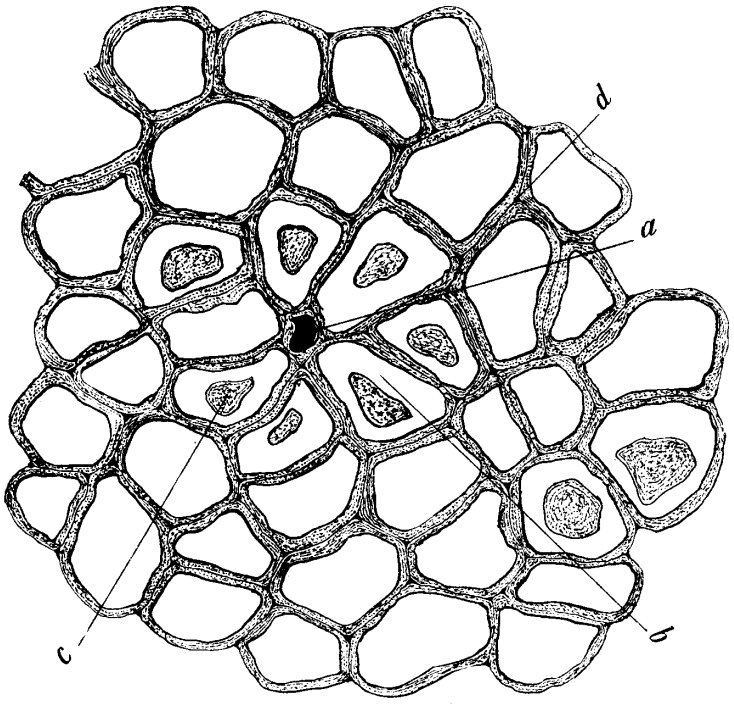

FIG. 6.

Fig..4.—Transverse section of a portion of lamina adjoining midrib, magnification, 50 diameters; *a*. epidermal cells arranged in a single layer, cells very thick-walled; *b*, layers of palisade parenchyma composed of several rows of cells and containing crystals of calcium oxalate; *c*, spongy parenchyma adjoining lower epidermis of leaf; *d*, transverse section through lateral vein, showing small vasal bundle; *e*, long, matted hairs upon lower surface; *f*, portion of adjoining midrib; *g*, slightly revolute margin.

Fig. 5.—Longitudinal section of parenchyma cells of midrib, magnification, 250 diameters; a, pit in parenchyma cells as seen in section; b, pits in parenchyma cells face view, longitudinal section of cells; c, middle lamella.

Fig. 6.—Small portion of under epidermis magnified 250 diameters; *a*, base of long woolly hair; *c*, cell contents shrunken from walls, due to treatment with alcohol; *d*, middle lamella.

Fig- 7.—Longitudinal section through the midrib; *a*, ducts of the vasal bundle, showing spirals; *b*, adjoining phloem tissue in longitudinal section; *c*, ends of ducts as seen when focus is slightly changed.

Fig. 8.—Various forms of hairs from the leaf, magnified 250 diameters; *a*, short multicellular glandular hair found upon upper surface of blade and also upon midrib; *b*, an unusual form of hair observed upon the petiole; *c*, one of the long woolly hairs which abound upon the lower surface of leaf, and which give to it its characteristic whitish appearance.

The microscopic mounts from which the drawings were made were prepared in the following manner: The sections were made by means of the "Student's Microtome," bleached with Labarraque's solution, washed, stained with iodine green, dehydrated with alcohol and absolute alcohol, then saturated with eosin in oil of cloves and mounted in balsam.

The drawings were made by the aid of the camera lucida and the magnification determined by means of the stage micrometer.

In conclusion, I take pleasure in acknowledging the kindness of Messrs. Parke, Davis & Co., of New York, and Prof. E. L. Greene, of the

University of California, in providing me with the excellent specimens from which these studies have been made.

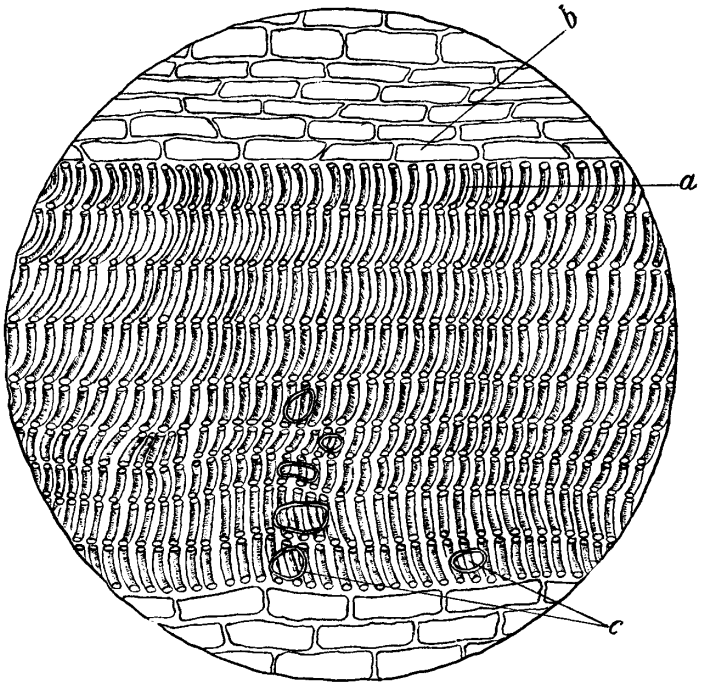

FIG. 7.

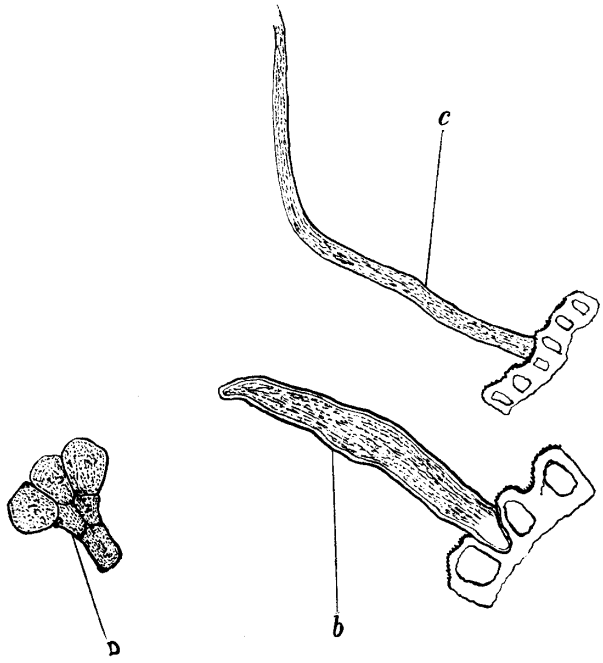

FIG. 8.

CULTIVATION OF THE COCO-NUT.[1]

Soil and Climate.—A moist, tropical climate, with good and somewhat sandy soil, near the sea, is the best for the growth of the coconut palm. If the tide rises so that the sea may flow in daily over the plantation, so much the better, but drains must then be made, so as to allow the water to run off freely.

Sowing.—Ripe, dry nuts only should be used, and the very largest that can be obtained. Nuts for seed should be gathered from trees that are mature, but not too old, and kept dry for five or six weeks before planting. The nursery bed should be made under slight shade, such as that of the coco-nut palm ; it should be thoroughly dug to a depth of two feet, and the soil well mixed up with ashes and coarse salt. At the beginning of the season's rains the nuts are put into this seed-bed on their side, at a distance of one foot apart, and so that about two inches appear above the surface. The nursery-bed should be kept damp, but not too wet. It is a good plan to transplant them into other beds at two feet apart when they are from two to six months old.

Transplanting.—When the seedlings are from six months to two years old they may be transplanted to their permanent positions in the plantation, at distances from each other of twenty feet. Pits should be dug for them, as large as three feet every way in poor soil; ashes and salt.are useful additions to any soil, and it may be necessary to give also a top-dressing of manure, which should not be dug in. They should be shaded by bananas or plantains for two years.

Tillage and Manuring.—The Jamaica nuts are very small, and do not give much "meat" as compared with those from Central America, India and Ceylon. This may be due partly to unfavorable conditions of soil, climate, etc.; but much might be done to improve the fruit by careful selection of nuts for seed, and a liberal treatment of the trees in the plantation by tillage and manuring. It is calculated that in India there are 480,000 acres under the coco-nut, and the cultivation is attended to carefully. In Bombay, for instance, after the seedlings are planted out, they are watered every day or two for the first year, every two or three days for the second and third years, and every third day for the fourth and fifth years. “During the rains, from its fifth to its tenth year, a ditch is dug round the palm and its roots cut, and little sand-banks are raised

1 From the Bulletin of the Botanical Department, Jamaica, 2, 182.

round the tree to keep the rain-water from running off. In the ditch round the tree, 22 pounds of powdered dry fish manure is sprinkled and covered with earth, and watered if there is no rain at the time. Besides fish manure the palms get salt-mud covered with the leaves of the croton-oil plant, and after five or six days with a layer of earth ; or they get a mixture of cow-dung and wood ashes covered with earth, or night-soil, which, on the whole, is the best manure." (Watt's Diet.)

In the tropics of the old world generally, it is customary, when the plant is one year old, to dig round the roots and apply ashes once a month; when the tree is two years old, to open up every year, at the beginning of the rains, the roots to a distance of four to six feet from the stem, to apply ashes and dry manure to the roots, and leave the opening until the end of the rainy season ; then to fill in again the soil which has been removed, and level the ground. During the time the roots are exposed, the older worn-out rootlets may be cut away and the roots of other plants removed. Cattle should on no account be allowed in the plantation, as it is most hurtful to the tree to have the leaves bitten, and if the unfolded leaf is injured the tree dies.

Yield.—A tree in good condition yields from fifty to one hundred nuts every year, but good climate, soil and cultivation may bring the yield up to as many as 200 nuts.

REVIEWS AND BIBLIOGRAPHICAL NOTICES.

ETIDORHPA, OR THE END OF THE EARTH. The strange history of a mysterious being and the account of a remarkable journey, as communicated in manuscript to Llewellyn Drury, who promised to print the same, but finally evaded the responsibility, which was assumed by John Uri Lloyd, with many illustrations byJ. Augustus Knapp. Author's edition, limited. Published by John Uri Lloyd, Cincinnati, O., 1895.

If it be asked what pharmacy has to do with a volume having the foregoing title, the answer may be given that it contains many scientific matters woven into the thread of the story in a way to make it especially attractive to all thinking pharmacists; then, too, Professor Lloyd, whom we may designate as the sponsor, if not the writer, of the volume, is, or has been, associated with pharmacy in all its phases. He has most creditably prepared his part of the work, and produced a book which will be externally, as well as internally, an ornament to any library.

The body of the work is a manuscript which was communicated to one Llewellyn Drury, of Cincinnati, thirty years ago, who for some reason failed to make it public, and the duty has devolved upon Professor Lloyd. The manuscript details the wanderings of a man who was abducted from his home for publishing the secrets of the society to which he belonged, and who was taken on a long journey into the mysterious regions of the earth's centre. We are told that the story has more truth than fiction in it, and the ingenious selection for its principal character bears this out, for many will recognize him as William Morgan, of Freemason fame, who was abducted at Batavia, N. Y., in 1826.

The story, interesting as it is, must take second place in considering the value of the work, for so much science and philosophy have been moulded into. it as to make it worthy of a reading for these alone. Since we have nothing more than the most superficial knowledge of what constitutes the interior of our globe, a journey to its interior recesses furnishes room for the widest kind of speculation, and we return from the voyage with the belief that all our knowledge of everything is as superficial and unsubstantial as the mere film of the earth's crust, which has been explored by man.

There has never been any book like this one written. If it be said to resemble some of Jules Verne's works, the distinction may be drawn that "Etidorhpa" is logical; no miracles were performed to extricate the traveller from the numerous perilous positions in which he found himself, but, on the contrary, he was always released by what appeared to be perfectly rational methods. The physical phenomena described are apparently without a flaw, and some new principles, notably the diffusion of liquids of different densities through porous media, are enunciated, and will stand the test of actual experiment, as the writer of this review knows from having tried them. The chemistry of the work is faultless—so different from that to which we are treated by most literary writers, who usually disgust one with their bad nomenclature and impossible chemical reactions.

The subjects treated are such as require the most careful handling, for many of them border on the unknowable, and it is only by the most acute reasoning that the author prevents the story from becoming "top heavy," but he has succeeded by the most plausible methods.

Materialists will derive little consolation from the book, and spiritualists will find but little more comfort, for both are treated to a mild vein of sarcasm that is all the more searching because of its freedom from bitterness.

The author has ventured to discuss many things which few writers in the past have dared to undertake. We are told that "matter is retarded motion," and this is demonstrated by the most acute process of reasoning. He also dares to denounce the hypothetical ether which scientists have invented to account for the transmission of heat, light, etc., and declares there is no need for it. It is impossible, in a review, to give the details of how these ends are attained, but the book itself must be studiously read, not once, but twice or thrice. The vivid description of the drunkard's den, and the masterly portrayal of the effects of certain narcotics are the products from a writer of extraordinary resources.

In the words of the author, we may say "to many this manuscript will prove a passing romance, to others an enigma, to others still it will be a pleasing study," and we might add that those who get anything out of it will be required to study it. The author is at once a scientist and a philosopher; he has also shown himself to be a master of a peculiarly beautiful literary style which, in some chapters, may be termed word-painting of the highest order ; in fact, the book is full of figurative gems like the following: "As all the bubbles in a glass shrink and vanish when the first collapses, so the troupe of fairy-like forms before me disintegrated and were gone." We have no authority for making the statement, but, in our opinion, there is but one name possible in connection With the authorship of this mysterious book, and that is John Uri Lloyd.