THE "ARROW WEED" AND MEXICAN "JUMPING BEANS."

It has long been known that the Indians in Mexico make a powerful poison from some native plant, which poison, in a milder form, is also used as a cathartic. It has also long been known that seeds possessing the curious power of jumping are produced upon the same plant in Mexico and are sent to other parts of the world, forming quite an article of commerce. The exact nature of this plant, however, has hitherto remained a mystery. At a recent meeting of the Washington Entomological Society, Professor C. V. Riley read an interesting paper on the determination of the plant upon which these "jumping seeds" are produced. In the Transactions of the St. Louis Academy of Science for 1875, in an account of *Carpocapsa saltitans*, Westwood, the insect which causes the saltations of the "beans," he had called attention to the fact that the particular euphorbiaceous plant upon which these seeds are produced was not determined. Westwood in his original description of *Carpocapsa saltitans* states that the plant is known to the Mexicans as *Colliguaja*, and in a recent letter to Professor Riley from M. Chretien, of the French Entomological Society, the plant was referred to as a Mexican euphorbiaceous plant called *Colliguaja odorifera*, Moline. About this time Mr. J. M. Rose, of the botanical division, brought to Professor Riley specimens of plants recently collected by Dr. Edward Palmer, who sent with the plants specimens of the capsules, thus rendering it certain that the jumping bean occurs on this particular plant. It turned out to be undescribed, has been referred to the genus *Sebastiania*, and will be described by Mr. Rose as *S. palmeri*. Professor Riley decides that the reference given by M. Chretien is erroneous, as Bentham and Hooker give *Colliguaja odorifera* as from South America, and there is no record of it as from Mexico. Comparison of the specimens in the Department herbarium showed that while evidently closely allied, *Colliguaja* is quite distinct from *Sebastiania*, which renders it rather remarkable that the name given by the Mexicans to the plant should be identical with that adopted for the South American genus. The name seems to be of Chilean origin, and was doubtless introduced into Mexico by the Spaniards. It is doubtless applied to various euphorbiaceous species having the same poisonous attribute, whether occurring in Mexico or south of the equator.

A closely allied species of *Sebastiania* from the same localities (as yet undescribed, but which Professor Watson will describe as *S. pringlei*) also shows evidence of being infested with *Carpocapsa saltitans*, and a third species (*S. biloculatis*, Watson) is infested by an allied larva of a moth which Professor Riley describes by the name of *Grapholitha sebatianiae*. There is therefore good evidence that the insect causing the saltations of the "beans" develops in the capsules of as least two different species of the genus *Sebastiania*. The young larva doubtless hatches from an egg laid externally on the capsule, and penetrates the same while quite young, very much as in the case of the common pea weevil. Dr. Palmer found *S. palmeri* only in certain canons near Alamos, where it is popularly known as *palo de la flecha cuero de las simellas*, *brincaderos* (arrow tree which produces the jumping beans). The plant exudes a good deal of milky juice, which is what the Indians use on their arrow heads. It is a loose-growing shrub, from 5 to 8 feet high, the wood very hard, and the milky juice readily crystallizing into a clear, white, brittle substance. In the appearance of the wood it reminds one somewhat of our witch hazel, and in the leaf of a broad-leaved willow. As in the case of other Euphorbiaceæ, the carpels, or each of the three parts of the capsule, dehisce, or suddenly split when ripe, but when the larva inhabits the same, the parts fail to separate, being kept together by the carpet of silk which the larva spins on the inside. The peculiar jumping motions of the carpel are thus produced, as first described by Professor Riley in the Transactions of the St. Louis Academy aforementioned. The full grown larva, by its holding fast to the silken lining by its anal and two hind pair of abdominal pro-legs, which have very strong hooks, then draws back the head and forebody, the thoracic parts swelling and the thoracic legs being withdrawn. The contracted parts being then suddenly released, the larva vigorously taps the wall of its cell with the head, sometimes thrown from side to side but more often brought directly down, as in the motion of a woodpecker when tapping for insects. The seed will thus move whenever warmed for several months during the winter, because, as with most tortricid larvæ, this one remains a long time in the larval state after coming to its growth and before pupating.

Remarkable as are the movements of this seed, Prof. Riley remarked that they are thrown into the shade by a little jumping gall produced on the leaves of our post oak and other oaks. This is a little spherical seed-like gall, and the insect within, and which produces the fly known as *Cynips saltatorius*, can make it bound twenty times its own length. Here the motion is imparted by the insect in the pupa and not in the larva state.

THE MANUFACTURE OF BIRCH OIL.

A profitable industry, and one of which but little is known to the world at large, is carried on among the hills of New England. It is the manufacture of birch oil, and five years ago it was an industry that paid the limited number of men engaged in it a very handsome return for their labor, but the placing upon the market of an adulterated oil has cut down the price of the pure article, and now the manufacturer fails to realize the liberal reward for his labor that he did formerly.

Birch oil has a market value as a flavor. It is used largely in the manufacture of confectionery and is sold, almost invariably, under a label that calls for the essence or extract of wintergreen. Pure extract or essence of wintergreen does not exist, nor is there any need of it, for the clarified oil of birch gives one a perfect wintergreen flavor, and it is so pungent that the smallest drop placed upon the tongue will blister it.

The manufacture of pure birch oil is now confined to the State of Connecticut, where there are eight mills now in operation. Ten years ago the industry was known only in Pennsylvania, and all the birch oil marketed passed through the hands of one wholesale drug firm in Philadelphia. The increased demand for the oil resulted in its adulteration, and in the manufacture by a company of German chemists in Philadelphia of what is known to the trade as a synthetic oil.

Ten years ago hardly anything was known of the manufacture of birch oil outside of Pennsylvania, and the secret of clarifying the oil was known to only a very few. About that time Rev. Tom Dickerson, of Essex, Connecticut, saw an opportunity to turn the vast forests of birch that crown the hills of New England into profitable use, and he sent his son to Pennsylvania for the purpose of learning the process of manufacturing the oil. The son secured a position in a birch mill, where he worked eighteen months, and during that time he had got an idea of how the work was done, and he managed to learn what chemicals were used in clarifying the oil. With this knowledge young Dickerson returned to Connecticut and engaged with his father in the manufacture of the first birch oil ever extracted east of the Keystone State.

The first birch mill was built at Joshuatown, a delapidated hamlet on the Connecticut River, nearly opposite Essex, and there Tom Dickerson & Son began the work that in three years gave them both an independent fortune. The success of the shrewd minister stirred the blood in the veins of some of the observing Yankees, and within two years there were six birch mills in operation within a radius of ten miles of Joshuatown, and this number has increased to eight. Although the clarifying of the oil is not an open secret, it is known to a large number of men who are engaged in the business.

With a capital of twenty-five hundred dollars a man can set up his plant and begin the manufacture of birch oil. The best and most profitable mills are equipped with six water-tight wooden tanks, about six feet square. In some cases these tanks are so built that a fire may be set under them for the purpose of boiling the water that they contain. These tanks have copper bottoms. In many of the mills the work is done by steam, and in such cases there must be a furnace and boiler, and a coil of steam pipes is laid in the bottom of each tank. With tanks, pipe, boiler, a few glass jars, and a good supply of fresh, cold water the manufacturer is ready for business.

The farmers are paid three dollars a ton for birch brush that must not be more than two and a half inches in diameter, and the only variety of birch used is the black, mountain, or sugar birch. From the yellow and white birch no oil can be extracted.

If the farmer does not live more than six miles from the mill, he can, by working early and late, manage to cut and haul to the mill one ton a day. This, to the average New England farmer, is very profitable work, and the building of birch mills in their midst has been of great benefit to a large number of them. Many of these men who have birch to sell are not so favorably located as others. There are many men who drive a slow-going ox team to the mill with but half a ton of brush, and the distance that they travel going and coming is more than twenty miles. Their compensation for the day's labor of three yoke of oxen and themselves is one dollar and fifty cents, but these men are satisfied with that, and in most cases their farms are clear of mortgage and they are not indebted to the village storekeeper.

The brush is chopped into pieces of from one and a half inches to five inches long, by a heavy machine built with heavy knives, on the principle of a hay cutter. One ton of brush can be run through a cutter in an hour if kept steadily running.

These short pieces are thrown into the tanks, in which about a foot and a half of water has been placed, the fire is then built or the steam turned on and the water set a-boiling. While the water is being heated, the covers of the tanks are shut and "plastered" or sealed around the edges with rye flour paste. This is to prevent the steam from escaping.

The water in each tank is kept at a boiling point six hours, at the end of which time the life of the birch is extracted.

Entering each tank near the top is an iron pipe, through which the steam escapes and passes through a coil placed in a barrel that is kept full of running water. In this manner the steam is condensed and drops into a glass jar, placed under a pipe at the bottom of the coil, for its reception.

Birch oil in a pure state is much heavier than water. Thirteen fluid ounces weigh a pound, and instead of rising to the top of the condensed steam, it settles to the bottom of the jar, where, in its action when the jar is moved, it very much resembles quicksilver.

In its crude state the oil is of a copper hue. If boiled in tanks with copper bottom, or if cooked over a steam coil, it is of the darker hue of iron. The most popular and the cheapest method of clarifying the oil is as follows:

The oil in its crude state is poured upon a woolen blanket that is then laid upon the top of the brush in a tank. The covers are "plastered" down and the water set a-boiling. The steam passes through the blanket, which absorbs the particles of copper and iron, and the oil drops into the receptacle at the bottom of the worm of a hue that is a very light green or like the essence of lemon. Clarifying the oil by the use of chemicals is much more expensive and generally less satisfactory.

A tank six feet square will hold a ton of brush and each ton yields four pounds of oil. The mills are run during the season, night and day, and each tank is filled three times. The daily product of a six-tank mill is about seventy-five pounds of oil per day. Five years ago, the oil brought three dollars and fifteen cents a pound readily, but now the price is one dollar and a half a pound, but even at this reduced figure the birch oil manufacturer is able to pay his running expenses and make a neat income besides.

The product of the eight mills in Connecticut is handled by one firm in Essex, Connecticut. The mills do not run during the summer, because of the trouble of preparing the brush for the cutter, it being necessary to remove the foliage. The season opens about the first of October and the mills run until the last of April.

The oil of birch in an adulterated form is used in tanning leather to imitate Russia leather, which has a very peculiar odor. For a long time tanners were at a loss how to give American hides this odor. They finally discovered that birch oil would do it, and now a great deal of it is used for that purpose.

Further information on the subject will be found in the SCIENTIFIC AMERICAN SUPPLEMENT, No. 336.

The Brain of Laura Bridgman.

Every one has read accounts of Laura Bridgman and of the marvelous results obtained by Dr. Howe in educating her. Losing her sight, hearing, and nearly all sense of smell and taste at the age of two, she remained practically without education until the age of nearly eight years, when she was placed under Dr. Howe's care. A careful record of her intellectual progress was kept for many years, and in 1878 Professor Stanley Hall made a valuable series of physiological and psychological tests upon her. She was shown to have some sense of taste, but practically none of smell. She could not hear even the loudest noise, but appreciated vibrations. Rotation made her dizzy. Her tactile sense was two or three times more acute than normal. Mentally she was eccentric, but not defective; she lacked certain data of thought, but not the ability to use what data she possessed. Her emotions were very lively, and she had a certain hysterical tendency. She died in 1889, at the age of sixty. Her brain was obtained, and has been studied by Dr. H. H. Donaldson, of Clark University (*American Journal of Psychology*, September, 1890).

Dr. Donaldson's report is a model of careful scientific work, and contains much of interest to students of anatomy. But his findings are decidedly meager and show little more than would be expected. The brain weighed about 1,200 grammes. This is considerably below the average for women, which for Anglo-Saxon and German races is about 1,275. Considering her small stature and body weight, the brain, however, was not especially small.

An examination of the lobes and convolutions showed that there was some defect in the centers for articulate language; also defect in the occipital lobes, especially the right (visual center), and in the temporal lobes, especially the tips. This last condition may have been due to her imperfect sense of smell and taste. The fissure of Sylvius was short, and the posterior corpora quadrigemina small. A careful microscopical examination might give some important information as to the central course of the optic and olfactory tracts, but this has not yet been done. There was nothing in the appearance of the brain which would ally it to low type, criminal, and insane brains.—*Medical Record.*

HABITUAL divers in salt water often have inflammation of the eyes. The exposure such diving necessitates is not beneficial.