THE NIIN OF YUCATAN.

From the Report of the United States Commissioners of Agriculture.

A communication from Dr. Arthur Schott, late of the Scientific Commission of Yucatan, furnishes some descriptive statements concerning an insect, and the nature and uses of a grease-like or wax-like product, with the result of a chemical examination of its properties.

Among the numerous interesting natural productions of Yucatan, not the least remarkable is the niin (pronounced *neen*), the knowledge of which, and of its technical application, has survived the national independence of the gifted Maya race. The niin is the grease of an insect bearing the same generic name. The niin may be considered akin to the cochineal, also the product of a similar insect; but they differ essentially in their nature, one serving as a well-known dye, while the other finds its application as a drying oil.

The nature of the niin will be clearly understood by the annexed scientific analysis, made by Mr. V. G. Bloede, analytical chemist, of New York. The matter examined by that gentleman consisted of a small quantity which Dr. Schott brought some time before from the city of Merida, Yucatan.

The analysis is as follows:

The Yucatan niin is a yellowish-brown, fatty mass, having a peculiar oily odor. In its general properties it seems closely allied to hog's lard or suet. It is neutral to test-paper, neither presenting acid nor alkaline reaction, though when exposed to the air it acquires a very faint tendency to manifest the former. Its melting point is about 120° Fah., though, when once melted, it still remains in a semi-fluid state with the temperature as low as 80° or 85° Fah. When cooled to 10° Fah., it becomes hard and brittle, like suet. At ordinary temperature, that is, about 60° Fah., it is of a thick, pasty consistency, like ordinary lard. Its specific gravity at 60° Fah. is about ·92.

Its Solvents.—In regard to solvents, the niin presents the same general properties as any ordinary animal fat. It is not soluble in either hot or cold alcohol, even after extended maceration. It is freely soluble in both hot and cold ether, with which it forms a yellow, oily liquid. It is very soluble in turpentine, with which it forms an oily liquid possessing peculiarly valuable properties for mixing delicate oil colors, of which I shall speak hereafter. It dissolves freely in benzine; chloroform, also, is among its best solvents.

Chemical Properties.—The niin, in its classification in organic chemistry, must undoubtedly be ranked among the drying oils, though its absorption of oxygen takes place rather more slowly than with many other oils. Nor is this slowness in drying accelerated to any extent by boiling it with oxide of lead. It is the first, or nearly the first, example we have of a thoroughly drying animal butter or solid fat. Like some others of the animal fats, it contains a distinct volatile acid peculiar to itself. As, for instance, butter contains butyric and caproic acid; goat's fat, hircic acid; so the niin contains an acid of a peculiar, pungent smell, which might be aptly termed niinic acid. Its chemical composition differs little from ordinary animal fats. Like others, it contains a fluid oil—oleine—and a solid containing stearic, margaric, and other fatty acids. A portion of the acids may be obtained by dissolving the niin in turpentine or ether. The oily portions pass into solution, while a solid precipitates, consisting of the acids indicated, which may be separated from the fluid by filtration.

Saponification.—A peculiarity of the niin seems to be its difficult saponification. The strongest ammonia procurable has no saponifying action on it. Even if the fat be digested in ammonia for several days, no liniment is formed, but a marked transition from yellow to red seems to be the only change produced. This change of color depends merely on the action of ammonia on the coloring matter of the niin, which, like the yellow turmeric (*Curcuma longa*), changes to red as it assumes an alkaline reaction.

With potash, too, it saponifies but slowly and imperfectly, and a concentrated lye is necessary. With soda it forms a soap only after extended boiling with a strong lye. It is only after several hours' boiling with oxide of lead that it forms the so-called "lead soap," and then the product is very imperfect. From these facts we can at once deduce that the niin cannot be considered a "good saponifying fat," but belongs to the "drying oils."

Effects of High Heat.—When the niin is melted in a porcelain dish, and the resulting oil exposed to a continued and high heat (between 250° and 350° Fah.) for an hour, or until a considerable portion of it has evaporated, the residue in the dish will then be found to have assumed a tough, flexible, varnish-like condition—a gelatinous mass no longer soluble in turpentine, or affected by heat or cold, at least to a great extent.

If a piece of this gelatinized niin is placed on a piece of porcelain, moistened with turpentine, and ignited, another remarkable change takes place; for, if the plate is slightly inclined as the mass burns, a thick, yellow, resinous oil or gum flows from it, which possesses most remarkable adhesiveness, closely resembling a thick solution of india-rubber, but which does not dry, retaining its half-fluid consistency for several days. This is a most singular change, and one that is worthy of further investigation.

Change of Air.—When the turpentine solution of the niin is exposed to the air in thin strata for a few days, it acquires the properties of a resinous varnish; in fact, the change is so complete, that when some of the solution is poured on a piece of glass it dries almost equal to fine shellac varnish. This change is due to the absorption of oxygen. If further developed, this property will undoubtedly make the niin of the greatest commercial value. The film of varnish is very elastic, and at the same time hard, which renders it superior to some of the other gums. An alcoholic solution can also be formed, but this is more difficult.

Suggestions as to Use.—The extreme oiliness of the niin will undoubtedly make it very valuable for various purposes in the arts; and its "drying" solution in turpentine has no equal for mixing fine colors for artists. This turpentine solution of the niin produces a remarkable brightness in the colors prepared with it, and they dry rapidly. But the chief value of the niin, which will give it commercial importance, is its property of forming a resinous varnish when treated as before described, rendering it superior to shellac for some purposes. Another valuable application of the niin could be found in the manufacture of water-proof fabrics. A piece of the most porous Swedish filtering paper, saturated with a solution of the niin diluted in turpentine, will not allow a drop of water to pass through, even after standing in it for days. An excellent way of water-proofing would be to saturate the article with melted niin, and then expose it in an oven to considerable heat until the grease gelatinizes. By these means the niin becomes insoluble not only in water, but also in most of its solvents. If the niin can be obtained, as Dr. Schott says, in "unlimited" quantities, it will, doubtless, in time become of great commercial value.

[For the Scientific American.]

THE COTTON GIN AND ITS INVENTORS.

BY ELZY HAY.

An agricultural article recently published in one of our leading newspapers, contained a casual allusion to Eli Whitney, as the inventor of the modern saw gin for seeding cotton. This was by no means an unnatural or flagrant mistake, as probably not one person in a thousand is aware of the fact that our modern saw gin is not Mr. Whitney's invention, but an improvement upon it. The former, of which I have seen more than one relic, was merely a wooden cylinder with wire teeth or claws running round it in circles. The idea of the saw gin was borrowed from Ohio, as will be related further on. Mr. Whitney sued the earlier inventors and manufacturers for violating his patent, and their defenses were based on the ground that the saw was no infringement of the wire tooth patent. One of Mr. Whitney's original cotton gins, as executed and operated by himself, was in the possession of my father until some fifteen or twenty years ago, when it was lost at an agricultural fair at Augusta, whither it had been sent for exhibition. I remember it well, as among the contents of an attic room where I used sometimes to play in childhood, and a feeling recollection of getting my ears boxed more than once for stealing wire from it to string paper "limber jacks" on.

I have heard my father relate many interesting facts as to the origin and early history of the cotton gin, which he received from persons who were cotemporaries and associates of its inventor. There are probably not a dozen other men living to whom these facts are known, and it may be well to record them here before they are lost in the dim regions of traditionary lore.

Eli Whitney, it is well known, was a tutor in the family of General Greene, of revolutionary memory, at the time he invented the cotton gin; and here are some facts concerning him my father received from a grandson of the General. Whitney's Yankee ingenuity, as exhibited in various amateur tinkerings at refractory door fastenings, broken clocks, etc., inspired the family with such confidence in his skill, that on some occasion, when the watch of Mrs. Miller, a member of General Greene's household, got out of order, she gave it to Mr. Whitney to repair, no professional watchmaker being within reach. He performed the work successfully to the great delight of Mrs. Miller, and the admiration of the whole family.

A short time thereafter, a gentleman called at the general's house to show a fine sample of cotton wool, and remarked while exhibiting it, that there was a fortune in store for somebody who should invent a machine for separating the lint from the seed. Mrs. Miller, who was present, turned to Whitny and said, "You are the very man Mr. Whitney, for since you succeeded so well with my watch, I am sure you have ingenuity enough to make such a machine."

After this conversation Mr. Whitney confined himself very closely to his room for several weeks, at the end of which he invited the family to inspect his model of a cotton gin. It was constructed as I have already described, with wire teeth on a revolving cylinder, but as there was no contrivance for for throwing off the lint after it was separated from the seed, it wrapped round the cylinder, thereby greatly obstructing the operation of the machine. Mrs. Miller, seeing the difficulty, seized a common hair clothes brush, applied it to the teeth, and caught the lint. Whitney with delight exclaimed, "Madame, you have solved the problem, with this suggestion my machine is complete."

The important part thus played by a woman in the history of the cotton gin is unknown, I believe, except as a family tradition, even in her own State. My father was also informed by a gentleman once connected with Whitney in business, that the latter obtained his first idea of the invention from a gin used to prepare rags for making paper, which he saw in a wrecked vessel. Gen. Greene, in whose family he lived at the time, resided in one of the "sea islands" along the Georgia coast.

Unfortunately for Mr. Whitney, the prophecy of the gentleman with regard to the fortune in store for the future inventor of a cotton gin, was never realized in his case, for he was engaged in constant law suits against infringements of his patent right, and lived and died poor. As a Georgian, I regret to say that his adopted State never bestowed any substantial testimonial of appreciation upon the inventor of a machine by which she has profited so largely. Tennessee, Alabama, and South Carolina, it is said, manifested their appreciation of his merits by material and substantial donations while Georgia, with sorrow I write it, has been worse than silent, for her juries refused him verdicts to which the judges declared he was entitled, against the violators of his patent.

So uncertain was the enforcement of the patent laws in those days, that Whitney resorted to the same expedient for the protection of his right that used to bring upon medieval inventors charges of sorcery and witchcraft. I mean the expedient of secrecy.

About the year 1794 or 1795, he settled in a place some six miles from the quiet little village of Washington, in Wilkes county, and established there one of the first, if not the first cotton gin ever worked in the State. He, and his partner Durkee, erected at this place a large cotton store house, which now does service as a barn, and a gin house at present used as a kitchen by Mrs. Tom Burdett, wife of the present proprietor, and the scene of preparation for dinners and "goodies" generally, that would make appropriate offerings to the memory of him who invented cooking stoves. The gin house had narrow grated windows, so that visitors might stand outside and watch the cotton flying from the gin without observing the operation of the machine, which was concealed behind a low screen. Among other visitors we are informed that on the occasion of a certain militia muster in the neighborhood, the rustic battalion was permitted to file through the house, while Whitney's gin was in operation, and see the flakes of cotton thrown off by the brush, but none were permitted to examine further. What a different errand the grandsons of those rustic militia-men, filing past the first cotton gin, were one day to march forth upon!

Women were permitted by Whitney to enter his gin house, and examine the machinery if they liked, as they were not supposed to be capable of betraying the secret to builders—an opinion for which modern females of the strong-minded school will no doubt bear him a grudge—and not altogether without reason, perhaps, when we consider the material assistance he received from a woman in perfecting his invention. This fact of the free admittance of women, was taken advantage of by Edward Lyon, "a smooth-faced young man" residing in a distant part of the country, to gain admission to Whitney's establishment, disguised in female attire. He communicated the secret to his brother John, who immediately set to work and produced his improvement upon Whitney's invention, in the shape of the modern saw gin. The saws were made for him by "little Billy McFerran," an Irish blacksmith in Wilkes county, who died some 25 or 30 years ago. This was the first saw-gin ever made. The saws were first shaped in semicircles, and fastened round the cylinder in pairs, so as to form complete circles when finished.

As early as 1797, a gin factory was established by a man named McCloud, and all Whitney's suits against him were unsuccessful. An old gentleman, who purchased a saw gin from McCloud, told my father that it worked nearly as well then as now (his *now* was thirty years ago) except that it napped badly. It was propelled by water, and ginned 2,500 pounds of seed cotton per day. Previous to this, the gin in ordinary use, was the simple contrivance of two wooden rollers revolving in opposite directions, which preceded Mr. Whitney's invention. It was worked by hand, and ginned only 75 or 100 pounds a day; and it was necessary, besides, to keep a man all the time employed in turning rollers, the friction burnt them out so fast. This machine is still used in ginning the best qualities of "sea-island" cotton, the advantage being that it does not cut the staple, as the saw-gins do.

The honor of having invented the first cotton gin is sometimes disputed with Eli Whitney in favor of Mr. Bull, a gentleman from Baltimore, who settled in Columbia Co., Ga., and introduced the saw gin there, in the year 1795. He first used perpendicular saws, but afterwards changed them for circular, in imitation, no doubt, of Whitney and Lyon. Mr. Bull was an enterprising and ingenious man, and first introduced iron packing screws into this State. These were so expensive, however, costing no less than $1,500 to $1,800, that they were soon abandoned for the common wooden screw now in general use on plantations. His invention of the perpendicular saw gin, was, there seems no reason to doubt, independent of Whitney's though posterior to it, the latter having come into operation in 1793. The circular saw, as afterwards used by him, was no doubt borrowed from Whitney or Lyon. Thus then, though Eli Whitney never reaped the profits of his great invention, it seems clear that he must be left in undisputed possession at least of the barren honors.

[In the extended litigations to which the infringements on Eli Whitney's patent gave rise, it was finally decided that the use of saws instead of the wire teeth at first employed by Whitney, did not constitute a new invention, and that those who used them without license from Mr. Whitney were infringers upon his rights, as patentee of the original device. The assertion of our contributor that Mr. Whitney was not the inventor of the saw gin, is therefore hardly just to that ingenious and gifted inventor, although full credit is given him for the original invention. The man who, subsequent to Whitney's invention, first employed saws, did not invent a saw gin, he only invented a "dodge" whereby he hoped to be able to reap where Whitney had sown.—Eds.

The Writings of Count Rumford.—The American Academy of Arts and Sciences, through the Rumford Committee, have in preparation for publication in four volumes a complete collection of the writings of Count Rumford, whose works have never yet been brought together and edited, and a biography of the Count, which will fill another volume, and be properly illustrated.