[For the Scientific American.]

**On Oil from Cotton Seed.**

The records of the Patent Office show that a great amount of intellect is always engaged in the discovery and useful application of machinery to the various arts useful to man, and it is a matter of some surprise that so little has been directed in giving value to so very abundant a material as cotton seed. If it could be economically made into oil and properly purified, or into saponaceous matter, it would be of immense value. The material is a most abundant one; the present crop of cotton exceeds three and a half millions of bales, and promises not to be less so long as 9 cents per pound will pay the interest on the capital invested. A bale of 500 lbs. yields 40 bushels of seed, weighing 1000 lbs., and three bushels of seed gives one of kernels separated from its hulls, and each bushel of kernels two and a half gallons of oil. All these, after deducting one-fourth of the seed for planting, leaves the enormous quantity of 105 millions bushels, 35 millions of hulled seed, or 87 millions of gallons of oil. These figures are large, but the arithmetic is good.

The only attempt that I have seen to make oil was by a machine patented to Smith and Follin, of Petersburg, Va., about 35 or 40 years ago, and a very imperfect one. The seed was hulled or coarsely ground on the periphery of two stones revolving towards each other; the cracked seed or coarse meal was screened, and the hulls separated, and the kernels (which are but the leaf in embryo) thrown on a granite platform, having a circular groove, in which groove two stones passed round, that were attached through their eyes or centers to an upright shaft, made to turn slowly. There was attached to their shaft or king post, a sword or knife to direct the meal towards and into this groove, and another to scrape from the stones the meal that would gum on them. This pulp or mashed meal was then put in hair cloths and placed on each side of a gently tapering wedge, which was driven by the heavy weight and force of a pestle till all the oil was forced out. A common flax mill will give you some idea of the process. The shells or hulls are greater than their contents, and they may contain much oil, but the fiber that covers the outer surface, will require very hard squeezing to prevent its absorbing the oil, which is probably the great difficulty. This fiber may, in a measure, be removed by swinging off, by passing it over heated rollers, but this would be a tedious method. It would be very desirable that the oil could be forced from the seed without grinding.

The oil is of a beautiful pea-green color, inodorous, and if properly purified, might be good for all or some of the uses for the table, lights, lubrication, and paint, and the coarser part for soaps. A small portion of the cake with indian meal, makes good hoe cake, I know.

The value of the cotton seed, however, as a manure, will always prevent a very large quantity being used for making oil. A. P.

Mobile, Ala.

[Mr. E. Conkling, of Cincinnati, writes us that he has made soap direct from the rough cotton seed.

**The best Time to Transplant Evergreens.**

Messrs. Editors—I notice in the Scientific American of the 12th inst. you recommend the transplanting of cedar, spruce &c., in the early part of spring. I have had considerable experience in transplanting evergreens, and strange as it may seem, I am satisfied that about the 4th of July is the best time in the year. I have transplanted hundreds as late as the 1st of August, with perfect success, but it can be done any time in June or July. At any other season of the year I have found great difficulty in making them live. It is accounted for by the fact that the sap does not flow at the same season with deciduous trees and shrubs. A mistake in transplanting is the giving of them too much water. Give the earth a good soaking at the time, but do not water them again, unless it should be very dry, for 10 or 12 days, then give them another good drenching. This method was recommended to me by the Hon. Samuel Walker, of Roxbury, formerly President of our Horticultural Society, a gentleman who combines more scientific and practical knowledge in regard to trees, plants, fruit, and flowers than any man in New England, which any one will discover by visiting his gardens and nurseries in Roxbury and Dorchester. M. F. F.

Boston, Mass.

(For the Scientific American.)

**Coarse Wheat Meal for Bread.**

During the past winter I tried a number of experiments in making bread with hulled wheat coarsely ground. Wheat ground so that one-third or two-thirds of it passed through a cloth with meshes of 27 to the inch, made good sweet bread. A small circle of friends who partook of it said they would like to have some of it every day on account of its excellent flavor and its healthful nature. There is no necessity for grinding hulled wheat so fine as is now done in making flour, any more than there is to grind quick-lime for mortar. The way to make bread from the wheat meal is to separate the finer portions from the coarser through a bolt cloth of the mesh named, then steep the coarse part in water at from 130° to 200°. When this coarse meal all becomes soft, the finer kind and yeast are added, and made into a dough, and put into cast-iron pans to rise; these are afterwards baked in the usual manner.

My experiments were performed in making bread for the family, and I baked in a stove oven. In some experiments I mixed the salt with the yeast instead of with the meal and water first, but the bread did not *rise* well. This may explain the cause of heavy bread being sometimes produced from the same flour and yeast.

Although I believe that hulled wheat ground into coarse meal, makes sweeter and more healthy bread than fine flour, it will be very difficult to get most persons to believe this:—prejudice in old ways is a great barrier to useful improvements. I will cite a case of this kind that came under my own observation. A year ago last winter I sold some meal of hulled wheat to a neighbor, who, after taking it home, could not get his wife to try it; so he brought it back and explained the difficulty; I invited him to dinner, and served him with wheat meal bread, and a "minute pudding" made of the same meal. He liked them so well that he took some of the bread home, and his meal back again with him. But it was of no use; his wife ordered the children not to eat it, and they would not, and she declared it was unfit to eat; so he brought me back the meal again, and I paid him back his money. Such are some of the difficulties which many persons meet with, who endeavor to improve the condition of mankind.

Others of my neighbors, however, like it, and have been willing to exchange their best smoked ham for my brown bread.

The use of meal made from hulled wheat would save millions of dollars to our people every year, but the greatest gain would be an improvement in health by removing one great cause of constipation, so peculiar to those who use fine flour. I have made at the rate of 180 lbs. of good moist bread from 100 lbs. of hulled wheat meal. The wheat was raised in Kentucky, was white, and of good quality. Red winter wheat, however, makes the sweetest bread. The Mediterranean wheat hulls easy, makes good bread, is the most hardy, yields best, and is not so subject to the attacks of insects as other kinds. O. P. S.

**Cause of Heat and Cold.**

Messrs. Editors—The account given by C. E. Moore, on page 188, "that he has been up far above the clouds, and found the sun to be as hot as in the valleys," also that "snow-capped mountains are of conical shape, and reflect the rays of the sun from their sides," &c., &c.

Aerial voyagers are apt to imagine they rise much higher than they really do. The lightest gas used in filling balloons is sub-carburetted hydrogen, whose specific gravity is as five and a half to ten of the density of the atmosphere on the planes of the earth. A balloon, therefore, cannot rise to an atmosphere of seven pounds to the square inch, or less than half the density of that on the surface below. A balloon cannot rise as high as the specific gravity of the gas it is filled with would permit, the gravity being increased by the silk, ropes, car, and the voyager. I much doubt if any balloon ever rose two miles in perpendicular hight. The fact of his being up far above the clouds is no proof of any great elevation, for I have seen clouds far below me on a mountain of only five thousand feet, or less than a mile of perpendicular hight. The commencement of the perpetual snow line on the Himalaya mountains is far below the base of any cone rising from it. That the rays of the sun are reflected from mountains where perpetual snow exists is certain, but it is reflected without parting with its caloric. I can readily believe Mr. Moore, that he felt as warm above the clouds as he did in the valley below. I am rather surprised he did not feel much warmer. Surely, any person sitting in a car under a large conical balloon covered with silk, expanded to its utmost by the interior gas, the large end towards the sun, and its rays passing down to the small end, where they concentrate on the voyager, he must feel an unusual degree of warmth.

It is necessary, in reasoning on any subject, to take special care that our theory is based on some provable facts, or our reasoning will produce confusion.

It is a well-known fact that three properties of light are separated in passing through a prism. This is owing to their varied degrees of refrangibility. It is also well-known that the sun's rays commence refraction on entering our atmosphere, and that the refraction increases as the atmosphere accumulates in density. It is known that where the density of the atmosphere is about seven pounds to the square inch, everything is in a frozen state, but on, or near the surface of the earth, where the pressure is about fourteen, all the properties of light are liberated and disseminated. Can we doubt, then, that some given density of atmosphere is necessary to develope the action of solar light? Wm. Partridge.

Binghamton, N. Y.

[There can be no doubt but heat is the cause of action in bodies. Heat and cold can be produced in two metals by a current of electricity,—heat is caused by compression and cold by the expansion of bodies, and yet we read of the atmosphere being so dense in the cold Arctic regions that persons can converse with ease at the distance of a mile. It is difficult to account for these phenomena.

**Manufacturing Glue.**

Common glue is a most useful and important substance. It has been known and used from time immemorial for cementing pieces of wood together, and for many other purposes, and is still extensively used in every country. It is generally made from ears of oxen and calves, and the parings of the hides, skins, &c. The parings of ox and other thick hides make the strongest, and afford about 45 per cent. of glue. The tendons and other like parts of animals make glue, but it is not so strong as that made from hides. Animal skin in every form may be made into glue. The cuttings and parings of hides are first macerated in milk of lime in pits or vats, and the liquor is renewed two or three times in the course of two weeks. They are then taken out with the lime adhering to them, and washed in water in baskets, and are then placed on hurdles to dry. When exposed to the air whatever lime remains on them is converted into chalk by absorbing carbonic acid gas from the air. A small portion of chalk will not be injurious for the after processes, although quick lime would. The next process is the extraction of the gelatine or glue from the pieces of skins, &c., so treated. For this purpose they are placed in a large bag, or rather net, made of thick cord, and spread open within a large caldron. A light framing within the caldron prevents the bag from sticking to its sides. The water of the caldron is then gradually brought up to the boiling point, and as the prepared skins in the net gradually melt and mingle with the water, more are placed in the net, and they are frequently stirred up and pressed with poles. The condition of the caldron is tested occasionally by taking out some of the liquor and setting it aside to cool in a glass. When a clear mass of jelly is produced the boiling is judged to be sufficient the mouth of the net is then closed with its cord, and it is raised or hoisted above the caldron over a roller, and left to drain. The liquor of the caldron if not strong enough to make glue may be further concentrated by boiling. The contents of the net are boiled a second time, to make size, and when the solutions are too weak to make glue or size, they are economically used instead of fresh water. The gelatin liquid of the glue caldron are drawn off into a vessel called a "settling-back," which is surrounded with warm water, and the temperature is kept up for about five hours to maintain it in the liquid state until the solid impurities settle to the bottom. The clear liquor is then drawn off into wooden coolers, which are about six feet wide and two feet deep; here it becomes a firm jelly, which is cut out into square cakes with a spade; these are deposited in square cakes in a wooden box having slits in it, through which a brass wire attached to a bow is drawn to cut it into thin slices. These are placed on nets stretched in wooden frames and placed in long lattice sheds, when they are exposed to the air to dry. They are frequently turned and carefully watched until they are about two-thirds dry, when they are removed to a room, and they are left to dry still further, and then they are finally dried in a warm room. The drying of the glue is an operation which requires great care and attention.

Good glue should contain no specks, but be transparent and clear when held up to the light. The amber colored glue is the best kind for cabinet makers, not the black kind, as some suppose. The best glue swells without melting when immersed in cold water, and it renewes its former size on drying. The best method of softening and dissolving glue for use is first to immerse it in small pieces for about twelve hours in cold water, then set it over a fire and gradually raise its temperature until it is all dissolved.

Fine white glue is made from careful selections of white clean skin parings; and these may be bleached in a degree by immersing them in a weak milk of chloride of lime instead of simple lime. Size for stiffening straw and leghorn hats is made of clippings of parchment and fine white sheep skin dissolved in boiling water. White glue is employed in the stiffening or dressing used for silks and other fabrics which are re-dyed and re-dressed.

If glue which has been steeped in cold water until it has swelled be then immersed in linseed oil and heated, it dissolves, and forms a glue of great tenacity, which, when dry, resists damp. Glue is employed for making molds for castings in wax and plaster of Paris. Mixed with molasses it forms the ink rollers of the book printer.

**The Fatigue and Fracture of Metal.**

Many accidents, the causes of which had been pronounced mysterious may be ascribed to a progressive deteriorating action, termed the "fatigue" of metals.

Metal in a state of rest, although sustaining a heavy pressure, or strain, as in a beam, or girder, and exhibiting only the deflection due to the superposed weight, will continue to bear that pressure, without fracture, so long as its rest is not disturbed, and the same strain was not too frequently repeated, but if either of these cases occur, a certain disturbance of the particles take place, the metal is deteriorated, and that portion subject to the reiterated strain ultimately breaks down.

**Artificial Propagation of Fish.**

The Sandusky *Register* says that a most singular phenomenon may now be seen around the docks, in the water, in that city. Immense numbers of white fish last fall were cleaned on the docks, and the offal and spawn thrown into the Bay. This spawn *has hatched*, and now, around the docks may be seen millions of miniature white fish. Here is a fact in pisciculture, showing that from the refuse spawn, hatching can be induced.

**The Fire Engine Boiler.**

Messrs. Editors—In reply to Mr. Prosser's note in your last, in regard to the boiler employed on our Engine, we have simply to say, that the merit of *originating* it is *not* claimed for Mr. Lee; neither is it *conceded* to Mr. Prosser. Lee & Larned,

Proprietors of the Steam Fire Engine.