of facts bearing upon the subject, all going to prove that intermarriage has universally proved disastrous to the human race wherever it has prevailed to any considerable extent.

But it has been stated, and it must be admitted that there is force in the argument, that in all these cases, intermarriage has not been according to psychological laws; and that had these laws been observed as rigidly as stockbreeders observe them in producing the improved animals for which "in-and-in" breeding has become so celebrated, improvement, and not deterioration, would have been the result.

This is dealt with by Dr. Allen, in the most candid spirit, but at the same time his argument seems to us entirely incontrovertible. It is much too long for us to transcribe, but its gist may be summed up very briefly, as follows: Granted that the statement that intermarriage if conducted in rigid accordance with psychological laws, would improve progeny, it is simply impossible so to conduct it. Even the stockbreeder who is dealing with a coarser and far less complex organism than the human constitution, and who has power to control the coupling of the sexes at will, makes at times the most grievous blunders. The effect of such blunders may be corrected by killing a deformed or diseased animal, or preventing it from perpetuating its defects in future progeny, but these resources are not available in the case of the deformed, deaf, or diseased of the human race, and if they were, they would afford no remedy for the evils of intermarriage, which depend upon such complex and indeterminate physical characteristics that their effects upon the offspring of two nearly related individuals cannot be predicted with even approximate certainty.

From the doctor's essay we infer that the proper limit of consanguinity excludes first cousins from intermarriage, in which we agree with him. We believe that psychological laws have been altogether too much disregarded in the marriage of those not related by blood, and that much of the disease now prevalent in the world may be traced directly to this cause, and when we consider the largely increased tendency to impress upon offspring any peculiarity of consanguineous parents, we are convinced that such marriages are injurious in their effects upon society at large; and also that the Levitical law upon intermarriage was based upon sound psychological science as well as being an expression of the divine will, through the prophet Moses, to the Israelitish Nation.

NATURAL SELECTION.

The following, from the *London Quarterly Review*, is so terse and clear an exposition of Darwin's theory of natural selection, and presents such interesting facts bearing upon a subject now attracting universal attention in thescientfic world, that we give it a place in our columns.

"Mr. Darwin's theory is based on a very few groups of observed facts, and on one demonstrable principle. The first group of facts is the *variability* of all organisms descended from the same parents; a variability not confined to external form or color, but extending to every part of the structure, and even to constitutional and mental characteristics. This variability is found to be one of the most universal facts in nature. It is not common or general only, but absolutely universal. Every one knows from his own experience that no two individuals of a family, whether human or animal, are absolutely alike, but no one knows the large amount, or the infinite phases of this variability, but the naturalist or the breeder.

"The fact of universal and all-pervading variability being proved, it is next shown that every kind of variation can be accumulated, by the simple process of choosing from a great number of individuals those which possess any given variation in a marked degree, and breeding from these. It is found that in the next generation, the offspring do not, as might perhaps have been supposed, cease to vary further in the same direction, but generally vary from their parents as a center in every direction, and if a large number of individuals are produced, a considerable increase of the first variation may be obtained. For example the wild jungle cock (*Gallus bankiva*) has an average size about equal to that of our smaller kinds of domestic poultry, and out of thousands or millions of individuals none are ever so large as the 'Shanghai,' or so small as the 'Bantam' breeds. Yet these are descended from the same race, made permanently larger or smaller by the process above described. In pigeons, the bill, the feet, the wings, and the tail have been altered in size and form to an extent nowhere seen in the original wild stock, and Mr. Darwin has shown that the bones and internal organs are capable of modification to an equal extent. The power of accumulating every kind of variation is therefore proved, and this is the very corner-stone of the theory, and that which best distinguishes it from all hypotheses of transmutation of development that have preceded it.

Another fact of importance is, that all living things have the capacity of increasing in a geometrical ratio. If a pair produce ten young ones once during their lives, and these breed at a year old, there will be nearly 20,000,000 produced in ten years. Many animals, and most plants, have far greater powers of increase than this, and even the slowest breeding of all, the elephant, would, in five hundred years, increase from a single pair to 15,000,000. But we know that in any country once stocked with animals and plants, the number of individuals may fluctuate slightly, but never regularly increases.

Taking an average of all the species, it certainly remains nearly stationary. It follows, therefore, that the deaths every year are almost exactly equal to the births. If the number of sparrows in England is on the average half a million, and if a million young ones are hatched every year, then before the next year a million sparrows must die. So in a forest of oaks, the number of trees cannot increase on the same space of ground, yet millions of acorns are dropped annually, and would all become oak trees under favorable conditions, but all must die before maturity till an oak falls and leaves room for some of them. Now when, according to our supposition, a million sparrows die every year, what is it that determines which individuals die and which survive? We know that wild animals die of diseases, of hunger, of cold, by the attacks of enemies, and perhaps from other causes. Will it be the healthy or the sickly that will die of disease—the strong or the weak that will die of hunger—the well-feathered or the poorly-feathered that will die of cold—the active and wary or the slow and careless that will be killed by enemies? We can only answer these questions one way. We are as sure of the average result, as we are that an insurance company, which charged the ordinary rates to all people with consumption and heart disease would soon be bankrupt; and we may well express it by the term—'survival of the fittest' (this term was first used by Mr. Herbert Spencer in his remarkable work, 'The Principles of Biology,' and its more general adoption would alone answer some of the popular objections to Mr. Darwin's theory), a term which states the absolute fact, that those best adapted to survive do survive, and those least adapted die. This is Mr. Darwin's celebrated theory of 'Natural Selection,' but which is more properly a self-evident principle or axiom. Having been led to it by the analogy of the choosing or selecting by man of certain varieties to continue the breed, while others were neglected or destroyed, he personified the various natural causes which led to the preservation of the half million, and the death of the million, and termed them 'natural selection.' But people are continually forgetting that the term is an analogical one, and object over and over again that 'selection' implies a selecter; whereas if they would take pains to understand the thing, instead of puzzling over the mere term, they would see that the preservation of those best fitted to live, was as much the secondary result of the powers of nature as is the arrangement of sand and pebbles by water, or the selecting of leaves to be drifted into heaps by the wind, while the stones and sticks are left behind.

"Fully bearing in mind these great and demonstrable facts—the universal variability of all organisms and of all their parts—the possibility of accumulating these variations in definite directions—the enormous reproductive powers of all living things; and the mortality equal to the births—and lastly the necessary survival of the fittest—we shall be able to see, that the changes in external nature, animate and inanimate, continually going on, must produce indirect effects vastly greater and more important than any which, as Lamarck supposed, they can produce by their direct action on individuals or species.

"Let us take first the differences of color in animals. These are absolutely inexplicable on Lamarck's theory, for we do not find that any change of conditions produces definite changes of color, still less does it produce the varied spots, lines, bands, and patches of color that occur in animals. Neither have the motions of animals, their desires, or their food been proved to produce any definite effects on their colors. But we know that color is the most variable of all an animal's characters, and yet in a state of nature, color, as a rule, is very constant in each species.

"Mr. Darwin has shown, however, that color is often intimately associated with other constitutional peculiarities. In Virginia the paint root (*Lachnanthes tinctoria*) is eaten by pigs, and makes their hoofs drop off. But black pigs are uninjured by it. Consequently, in places where this plant is abundant the farmers never keep any but black pigs, as no others can be raised except in confinement. Here we have a beautiful illustration of the mode of action of 'natural selection.' The pigs of Virginia are not all born black any more than in other countries, but those of all other colors soon die, and therefore in a state of nature a black race would be produced; and from the powerful action of the law of hereditary descent there can be little doubt that in time the litters would consist almost entirely of black pigs. If after this had happened it were first discovered that white or brown pigs could not live in the district, we should have a striking example of adaptation; but the adaptation would evidently be an adjustment brought about by the simple law of 'natural selection' or 'survival of the fittest,' and the rigid extermination of all individuals not adapted to the surrounding conditions. It can be easily seen that in this case 'natural selection' does not imply a personal selecter, since exactly the same result must happen whether the farmer kills off the white pigs himself and turns the black ones loose, or turns out all together.

"This case, although curious, is by no means isolated. White terriers suffer most from distemper, and white chickens from the gapes. In Sicily the *Hypericum crispum* is poisonous to white sheep alone. White horses suffer severely from eating honey-dewed vetches, while chestnuts and bays are uninjured. Purple plums in North America are subject to a disease from which green and yellow plumbs are free. Again, the white pigeons of a flock are the first to fall victims to the kite. White rabbits of a very hardy kind have been turned loose but failed to maintain themselves, and black fowls on the west coast of Ireland are picked off by sea eagles. Here we have the explanation of the otherwise puzzling fact, that white quadrupeds and birds are so rare in nature, although abundant in all domestic animals; and the explanation is all the more satisfactory because it accounts for the exception to the rule, in the case of many arctic birds and quadrupeds as well as of sea birds, for to these the white color is a protection instead of a danger. Now this same principle will apply to structural and constitutional peculiarities and to habits.

"Man can accumulate variations either in the root, the leaf, the flower, or the fruit of plants, their color, odor, or taste; in the size, swiftness, or scent of dogs; he can alter the bill, the feet, the tail, or the habits of pigeons; can increase the milk of the cow or the fat of the pig; can alter the length of ear in the rabbit and of horns in the bull, or can attend to two or even more of these points at once. In like manner the law of 'survival of the fittest,' by simply determining which out of the immense surplus annually born shall be the parents of the next generation, must lead to the modification of every part of an animal's organization that affects its welfare—that is to say, sooner or later of its whole organization. So long as the changes of land and sea of which geology assures us, and their concomitant changes of climate, of soil, and of vegetation, and of the distribution of animal forms, are going on, each species in turn must be exposed to new conditions and new dangers, must have to live upon new food, or to struggle with new enemies. Those whose organization is sufficiently flexible to furnish in each generation favorable variations, will become adapted to the new conditions, and will appear as the new or representative species of the naturalist; such as could not vary quickly enough would die out, and furnish the extinct species whose remains the palæontologist disentombs.

"Here we have at all events a real and a powerful cause in action, and one which is accurately defined, and has been copiously illustrated by observation and experiment. No occult powers are postulated, but instead of them demonstrable groups of facts; and Mr. Darwin has developed his theory so fully, and has shown it to be in accordance with such a vast mass and variety of phenomena which on any other hypothesis are unintelligible, that it has commanded very general acceptance, especially among geologists with whose general doctrine it so well harmonizes."

Cultivation of the Truffle.

The truffle is a species of tubercular mushroom which grows and lives below the surface of the ground. Since the days of Pythagoras and of the ancient Greeks, a reputation for delicacy of flavor and perfume has been attached to it, which has made it a favorite with all true epicures, and has given it a high market value.

In France, which has at present almost an exclusive monopoly of the trade in this vegetable, more than 18,000,000 francs worth of truffles are consumed annually.

The region from whence these truffles are procured is south of the river Loire, and more especially those portions of France popularly known as Lorraine, Perigord, Saintonge, Gascony, Rouergue, Languedoc, Provence, and Dauphine.

A careful study of localities and a chemical examination of soils by Mr. Chatin, has proved that truffles will only grow in a calcareous soil, and that they are never found in silicious, schistose, or granitic soil. The ground must be perfectly free from permanent moisture. The climate needed must be temperate as both extremes of heat or cold are prejudicial to the truffle. In the Pyrenees truffles are found at a hight of 2,500 feet above the sea, but on the Alps they do not thrive at half this hight.

Singularly enough truffles are only found growing at the foot of a certain limited number of trees or shrubs (27 in all), but the various species of oak seem to be preferred above all others.

Truffles are hunted by means of small dogs trained for the purpose, who smell from the surface the whereabouts of the subterranean tubers, and by scratching the ground indicate to their master the spot where he has to introduce his spade in order to dig up the precious tuber. In the absence of dogs, the hog, whose sense of smelling is much more delicate than most persons believe, is often employed for the same purpose, a boy driving the animal slowly along through the woods, while he holds on by means of a string attached to the porker's hind leg. Wherever the hog stops to "root," the probability is that a truffle is to be found.

Attempts to cultivate the truffle have at various periods been made by enthusiasts but always without success.

It seems, however, that a M. Rousseau, of Carpentras, in France, has at last succeeded in this new branch of gastronomic horticulture, but no report of his system has yet been published.

Gas vs. Gunpowder.

The *Advertiser and Times*, Oswego, N. Y., says: "We saw, yesterday, a novel experiment involving the explosive power of gas. In the new tank excavation, now in a forward state, at the gas works in this city, an old well had been pumped out and then filled up after leaving an aperture beneath. Into this space a limited quantity of gas was introduced from the gas pipe, sufficient to form an explosive compound with the air in the covered well. A match trigger touched off the mine, when a general upheaving of the surrounding earth took place, loosening up the soil and making easier digging."

CEMENT FOR FASTENING INSTRUMENTS IN HANDLES.—A material for fastening knives or forks into their handles, when they have become loosened by use, is a much-needed article. The best cement for this purpose consists of one pound of colophony (purchasable at the druggists'), and eight ounces of sulphur, which are to be melted together, and either kept in bars or reduced to powder. One part of the powder is to be mixed with half a part of iron filings, fine sand or brick-dust, and the cavity of the handle is then to be filled with this mixture. The stem of the knife or fork is then to be heated and inserted into the cavity; and when cold it will be found fixed in its place with great tenacity.

Improved Plow.

The improvement here noticed is one of those simple in character, but on account of practicability and obvious utility, worthy of the earnest attention of those interested in the manufacture and perfection of agricultural implements.

Its object is to firmly brace and stay the beam and other parts of a plow, and, at the same time, to obviate the clogging which takes place from attaching one of the handles to the landside bar or to an arm projecting from the rear of the standard.

The method of attachment adopted in this device leaves a clear space behind the standard, and between the beam and the landside bar; thus permitting stones, weeds, clods, or anything likely to fall into and clog an ordinary plow to escape readily.

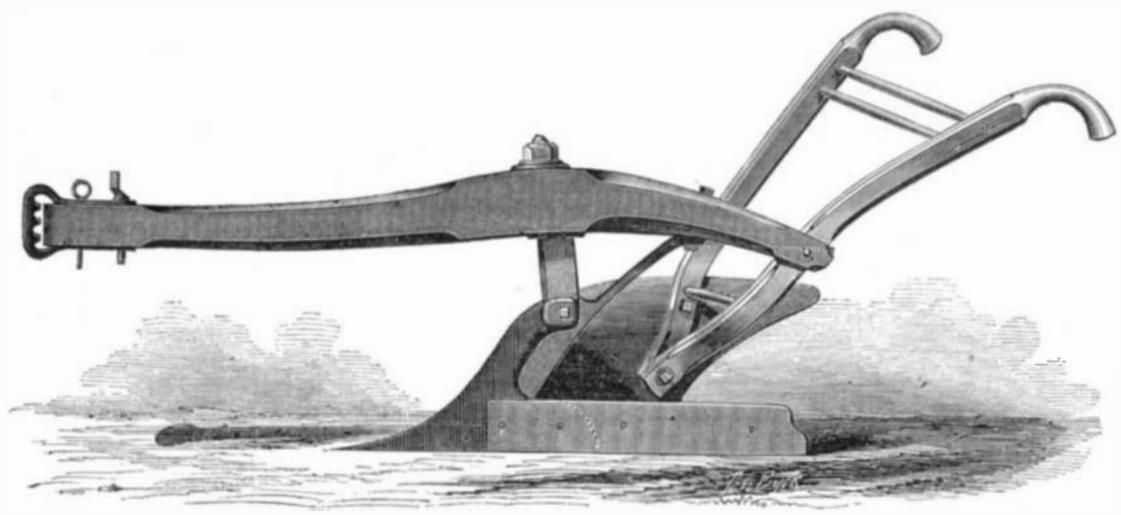
The improvement consists in bringing the landside handle by a proper bend directly across to the mold board and attaching it at, or very nearly at, the same point that the opposite handle is attached. In the engraving they are shown as being attached by a single bolt passing through the lower ends of both handles; but separate bolts may be used if thought best.

The beam is thoroughly braced to the shank, and the landside bar is also strongly braced laterally.

It will be at once seen that the friction upon the landside bar must be very much less when made in the form shown in the engraving, than when it is increased in width to cover and shield the handle as in the old form; and that the draft must be correspondingly lessened. The plow never becomes loaded with stones, weeds, and earth, but constantly clears itself, which also greatly lessens the draft.

The inventor has in his possession certificates from those who have tested the draft of this plow, stating that it is twenty-five per cent lighter than plows of the former construction. Let any farmer figure out for himself what a saving would here be made by the use of this plow. Work implies food for the animals which perform it. A given amount of work represents a given amount of oats, hay, or other forage consumed. Let a farmer estimate the value of one fourth the feed required for a team required to do a spring's plowing on an ordinary farm, and set the value of it against the cost of one of these plows, and he will at once see that if the tests above alluded to are to be relied upon, a large saving has been accomplished by this improvement.

This plow was patented, April 16th, 1861, by Henry F. Mann, at that time of La Porte, Ind., but now of Pittsburgh, Pa., who may be addressed for exclusive rights or licenses at the latter place.



MANN'S PATENT IMPROVED PLOW.

Improvement in Tea-kettle Breasts

That simple, useful, and universal kitchen utensil, the tea-kettle, it would seem has in its ordinary construction some important defects. When it has got "to the boil" it makes steam faster than the meager avenues around the cover can permit it to escape; pressure is thus generated, and the water is forced up the spout and ejected, producing the catastrophe known to housewives and kitchen maids as "boiling over." If it be sought to prevent this by taking off the cover, the fingers are in danger of scalding, and are not unfrequently badly burned.

When the article in question is made of tin, it is liable to rust around the cover and thus enlarge the aperture rendering the cover loose and liable to drop into the tea-kettle, or off during the pouring, when a scald is almost certain. The rust also, not unfrequently extends back as far as the ears, weakening the attachment, which finally breaks out, necessitating a patch.

The engraving shows an improved tea-kettle, which has not the defects we have described. It has a perforated dome for the escape of steam when generated, so that it cannot boil over; and the apertures in the dome are placed on the opposite side from the handle, which directs the steam away from the hand when the handle is grasped. The aperture into which the cover fits is bound with sheet metal, of any suitable kind not acted upon by water; as copper, block-tin, or other suitable material, which also as a col lateral advantage, strengthens the breast.

The old method of punching of a hole through the cover gives vent to the steam, but directs it against the hand precisely where it is not wanted; this improvement on the contrary obviates all necessity for any such clumsy make shift. A tube bent to the proper form may be substituted for the perforated dome, and can be applied to copper or iron kettles which may dispense with the binding.

The whole forms a simple, perfectly practicable, improvement, on a very useful article of kitchen furniture.

A patent was obtained on this improvement, April 6, 1869, by Z Dixon, Bristol, Ill., who now offers for sale the right for the New England States, and who may be addressed as above for further information.

DIXON'S TEA-KETTLE BREAST.

LEGHORN STRAW HATS.

The Leghorn, or Italian straw bonnets and hats are celebrated the world over on account of their beautiful texture, pliability, artistic make, and high cost.

This modern branch of industry, which is limited to Tuscany, was begun in Florence in the year 1825, and has gradually acquired an importance of from three to five millions of dollars for crude straw for export.

The material used is a special variety of wheat cultivated for this express purpose, the seed of which sells at a much higher price than that of ordinary wheat.

The straw is harvested in the mountainous regions of Prato, Empoli, etc., where the vegetation is poor and stunted, the soil being light and sandy.

The fields are weeded by hand and worked with as much care as a garden plot. Fourteen bushels of seed are usually sown to the acre; two bushels being "broadcast" at each time, and each sowing made at a different angle to the first. The effect of this is to produce a very close, compact growth, and only one elongated stem rises from each seed sown.

The straw is harvested while green and before the ear is fully developed. It is gathered into small sheaves weighing about half a pound each, which are at first placed upright in the field to dry, one acre bearing about three thousand of them. Next day these bundles of straw are spread out over rocks and pebbles in the dry bed of water-courses, where they are submitted to the action of sun and dew. At night they are covered up, great care being taken to protect them from rain. The straw is now bleached by means of sulphuric acid gas.

The next operation consists in taking off the ear below the first joint, in separating the lower useless portion, and in cutting the straw into lengths of four inches. Each blade of straw usually furnishes three such lengths. It is then bleached for the second time by fumes of sulphur.

At this point the straws are sorted according to their various sizes—an operation performed by women who acquire, through long habit, a most remarkable tact in distinguishing the smallest variation in diameters, as may be inferred from the fact, that in front of each operator are placed goblets numbered from 30 to 180, each of which is the receptacle for a special size of straw.

The braids are plaited with from eleven to thirteen straws each. Their length is from 300 to 320 feet, their width and the quantity of straw entering into them varying according to quality. With No. 30 straw the braid is coarse and wide, and weighs two pounds and a half. It takes, however, a whole month to plait a single bonnet from such straw. With Nos. 120 to 180 it takes about one pound and a half of straw to a braid. With extra straw—No. 180—the braids are not more than 0·039 of an inch in width, and it takes six months' labor to make a sufficiency for a single bonnet for a lady.

The braids are cleaned, exposed to the sun for a short time, and then sent to the manufacturer to be sewn into shape. This last operation is performed with the very greatest care, the stitches being nearly invisible and yet strong, and not liable to unravel during the pressure to which the hats are often subjected after being sized.

The hats are "ungreased," and any bumps or protuberances on their surface are effaced by rubbing one portion of the tissue against another, or by means of friction with a dog skin.

If an accidental tear be made, a piece is immediately inserted into the slit, and so adroitly is this done that the most practiced eye can hardly discern the imperfection. The hats or bonnets are then immersed into a warm-water bath containing a certain amount of acetate of lead, and are finally bleached for the last time by means of sulphureous fumes. The pliability of these hats is very remarkable when compared with the common straw fabrics made in other parts of the world.

Imitation Leghorns have of late years been largely made, and with considerable success, in the Canton of Aargau, in Switzerland. The trade from this latter region amounts already to a value of several millions of francs per annum. These hats are neither as fine nor as strong as the genuine, but they sell at much lower prices.

The manufacture of "fancy" straw goods is a remunerative branch of agricultural technology, which might profitably be introduced into the United States. Such work is well paid for, and is of a nature suited to our country women and girls, who could earn a living at home, without being obliged to leave their families.

The seed of Tuscany wheat would probably have to be imported annually from Italy, as it has been proved by careful experiments in various portions of Europe, that it rapidly degenerates in quality whenever grown, for several successive years, in regions far removed from its original place of production.

Cheap Method for Grapes.

Mr. William J. Flagg, a practical vine-grower in Ohio, has recently spent three summers among the vineyards of Europe, most of the time in France, but Italy, Austria, and Switzerland were also visited. The modes of vine culture were carefully examined, with a practical eye, and although the excellence of various foreign practices were readily acknowledged, we do not find any desire to recommend or adopt any particular mode of cultivation merely because it is foreign. Mr. Flagg believes the souche (or stock) mode of training vines more suitable for this country at present than those now in vogue "We can and will," says the author, "grow wine cheaper than the Europeans, and for the same reason that we can grow wheat cheaper than they, namely, that we have cheaper land and more of it. In raising grapes on our present system, however, we abandon the only vantage ground we possess and enter into competition with them in a field where they are stronger than we." The appearance of vines trained after the *souche* method is thus described in an earlier portion of the work. "'What is that?' I exclaimed, with no little astonishment, as, turning away from the trellises where vines were so tenderly upheld, we entered a field where there was never a bit of trellis nor stake at all, nor peg to tie to, nor tree to hang upon, but where each individual plant, alone and self-sustaining, scorning all support—its arms embracing nothing—its tendrils twining around nothing—stood on its own bottom, and held up its own top, like a strong-minded woman planted on her rights! It was a field of the variety known as *la folle blanche* (the crazy vine), growing *en souche basse*, which may be translated by stump, or stool, *souche* meaning, literally, stock. * * * As a workman drew apart the branches of one of the *souches*, a profusion of full-sized, white grapes was revealed, all hanging close about the head, and easily sustained by the rugged old stock, which was about ten inches high and five inches thick. 'It is a perfect fountain of wine,' said the man." It is this mode of training that Mr. Flagg would have introduced in America, and apparently with good reason.—*Albion.*

WE notice in one of our exchanges the death of Professor Dussauce, a native of France, who at the time of his death filled the position of chemist to the establishment of Messrs. Tilden & Co., of New Lebanon, N. Y.—The deceased was evidently an indefatigable worker, having written and compiled several scientific works. Respecting Professor Dussauce's early history and education we have no important facts.