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SCIENTIFIC PROPAGATION.

BY JOHN HUMPHREY NOYES.

IT is generally agreed among the highest thinkers that sociology is the science around which all other sciences are finally to be organized. But this *nucleus* is manifestly complex, and we may still inquire, where is the *nucleolus*?—which of the departments into which sociology is divisible is the center of the center? The answer, if it has not yet been uttered, is fast forming in the general mind. The vital center of sociology, toward which all eyes are turning, is the science which presides over reproduction. It is becoming clear that the foundations of scientific society are to be laid in the scientific propagation of human beings.

In perfecting animals we attend to two things, viz., blood and training; and we put blood first. But in the case of human beings we have thus far left blood to take care of itself, and have given all of our attention to training. Education is well advanced, but we are beginning to see that it is like the ancient writing of manuscripts, a slow process, with many drawbacks. We labor to perfect the individual, but what we want is the art of multiplying copies of our work. Education is waiting for its printing-press, and its printing-press is to be scientific propagation.

The duty of the human race to improve itself by intelligent procreation has certainly been seen, in some dim way, from the earliest ages. The analogy between breeding animals and breeding men is so obvious, that it must have thrust itself upon the reflections of the wise at least as long ago as when Jacob overreached Laban by cunningly managing the impregnation of his flocks. Four hundred years before the Christian era, Plato represented Socrates as urging on his pupils this analogy and the duty resulting from it, in the following plain terms:

“Tell me this, Glaucon; in your house I see both sporting dogs and a great number of well-bred birds; have you ever attended to their pairing and bringing forth young?”

“How?” said he.

“First of all, among these, though all be well-bred, are not some of them far better than all the rest?”

“They are.”

“Do you breed, then, from all alike; or are you anxious to do so, as far as possible, from the best breeds?”

“From the best.”

"But how? from the youngest or the oldest, or from those quite in their prime?"

"From those in their prime."

"And if they are not thus bred, you consider that the breed, both of birds and dogs, greatly degenerates?"

"I do," replied he.

"And what think you as to horses," said I, "and other animals; is the case otherwise with respect to them?"

"It were absurd to think so," said he.

"How strange, my dear fellow!" said I; "what extremely perfect government must we have, if the same applies to the human race!"

"Nevertheless it is so," replied he. *Republic, Book 5, Chap. 8.*

Perhaps Socrates died for this bold criticism; but his thought did not die. This same argument from analogy, which has thus been pressing on the human conscience in all ages, has become actually clamorous in modern times. The physical sciences, as they have been successively developed, have all turned by inevitable instinct toward their predestined center. Their drift has constantly been from the inorganic to the organic, and from the organic to the reproductive. Agassiz passes from geology to biology, and finds the secret of biology in embryology. Darwin gathers all he finds in the botany and zoology of all ages into the demonstration that plants and animals can be molded *ad libitum* by attention to the laws of reproduction.

His object was to establish a theory looking backward to the origin of species, but the practical result of his labors has been to establish a theory looking forward to the duty of scientific propagation. His great theme is the plasticity of living forms. He shows, first, how nature alone, in the countless ages of the past, has slowly transmuted plants and animals; then how the unsystematic care of man, since the dawn of intelligence, has hastened these changes; and finally how modern science and skill have rapidly perfected the races that are subservient to human use. In all this he has been at work on Plato's argument. He has not dared to make the application, but others have not dared to ignore it, and to them Darwin has been an awful preacher of the law of God.

Along with the evolution of the physical sciences, there has been an enormous growth of zeal and skill in practical breeding. Every plant and animal that man can lay hands upon has been put through a course of variations and brought to high perfection. And every success in practical breeding has added emphasis to the law that commands man to improve his own race by scientific propagation. Every melting pear, every red-cheeked apple, every mealy potato that modern skill presents us, bids us go to work on the final task of producing the best possible varieties of human beings. Every race-horse, every straight-backed bull, every premium pig tells us what we can do and what we must do for man. What are all our gay cattle fairs, but eloquent reminders of the long-neglected duty of scientific human propagation?

And this preaching has not been wholly without effect. There is evidently much resulting conviction among those who read and think on scientific subjects. Nobody really attempts to obey the law propounded, or even expects to; but all approve of it. In this as in other cases, we "consent unto the law that it is good, but how to perform that which is good we find not."

Phrenologists, popular physiologists, and reformers of various kinds have long been busy carrying over the laws of Darwin into the public conscience, translating analogy into application; and it is remarkable how common it has become for books and newspapers to acknowledge the duty of scientific propagation, and confess that in this matter "we are all miserable sinners." In a rapid run through a mass of popular literature nearest at hand, we have met with the following specimens of out-cropping conviction:

"With the acceptance by scientific thinkers of the principles of structural transformation upon which Mr. Darwin's theory is based, must needs come their recognition by men of unscientific education, and their application to individual life. No scientific thought, thoroughly established and wrought into the belief of the common people, can be without its influence upon their life. Men have as much need to apply the doctrine of Mr. Darwin to themselves as to their horses and cattle."—*American Exchange and Review*.

"Consider agriculture, horticulture, flori-culture, the stock-raisers, even the 'fanciers,' and borrow from them the lessons they practice so accurately. Think of it! Years of study have resulted in volumes of registered observations and deductions for the improvement of the brute races. The horse, the ox, the swine, and every other domestic animal has been raised to a higher type of physical being. Even flowers and vegetables are thought worthy of this same care; yet the precious casket of the human soul is left to dwindle down from one stage of degeneracy to another, till a large proportion of the human race are employed in the vocations that can only flourish upon human decay."—*Dr. CHARLOTTE LOZIER, in the Tribune*.

"Agricultural reports have teemed with lessons for breeding and taking care of all our stock except the most precious—that of ourselves and our children. The Atlantic cable sinks to insignificance compared with the science of the development of man. We exhibit beautiful animal stock, but deformed, erysipelatory, rickety, narrow-chested, dyspeptic, teeth-rotten, flabby-muscle, scrofulous, crooked-backed, bad-jointed girls and boys, with diseased kidneys, diseased livers, and bad nerves. Let all agricultural orators open their mouths against these terrible evils of the land."—*American Institute Transactions for 1858*, p. 160.

"What is needed, in order to improve the physical characteristics of American children, is, in the first place, to find out wherein they deviate from the true model, and then to set at work influences which, under the laws of reproduction, shall directly tend to induce conformity thereto, instead of deformity. It is just as easy to improve the breed of children as the breeds of domestic animals; for the human organism is as impressible in this respect as the organisms of animals, and, I think, rather more so—the susceptibility in this direction being in ratio to the rank.

"If it be true that, in the case of a sheep, you can, by proper heed to certain laws, including as these do certain conditions of living, so change a species of that animal that, from being a small animal with a small quantity of wool, it shall become a large animal with only a small quantity of wool; or from being a large animal with a small quantity of wool, it shall become less in size, but with a larger

fleece, you have reached a point in the modification of the animal structure which may seriously affect all its vital conditions. If this can be done in the case of one species of animals, it can in others—in truth, in all others—and man forms no exception to the rule.”—Dr. JACKSON, in “*Laus of Life*.”

“We ask our friends to read our extracts from Darwin attentively, and see if they do not discern, looming in the background of the facts here presented, a most gigantic question affecting the future of human society—that, namely, relating to its *scientific propagation*. If the races of plants and animals have been so far improved as is there shown, by attention to *selection in breeding*, the question comes up in force, what is man about at this late day, that he is not applying the same principles and observations in a scientific manner to the improvement of his own race? If the farmer achieves with perfect certainty the elevation of his flocks and herds to a certain standard of form and size, beauty and disposition, by observing the fixed laws of propagation, why should not something be done systematically for man in the same way? Why should not beauty and noble grace of person, and every other desirable quality of men and women, internal and external, be propagated and intensified beyond all former precedent, by the application of the same scientific principles of breeding that produce such desirable results in the case of sheep, cattle and horses? Farmers and herdsmen all over the civilized world are enthusiastic in regard to matters that relate to the improvement of stock. Societies are founded, principles are discovered and practically applied, and the ends of the earth are ransacked for desirable animals with which to cross and develop new excellencies. But while this is true of the animals below us, man leaves the infinitely higher question of his own propagation to the control of chance, ignorance, and blind passion. The place where science should rule most of all, is ruled by the least science; the subject around which the highest enthusiasm should cluster, is viewed with the most indifference. Human Breeding should be the foremost question of the age, transcending in its sublime interest all present political and scientific questions, and should be practically studied by all. May the time hasten when this shall be!”—*Religious Paper*.

A writer in the *Galaxy* (a popular monthly) closes a brilliant account of horse-breeding with the following *argumentum ad hominem*:

“In the language of the clergy, permit me to make a personal application:

“At this moment ten times as much care and thought and money are devoted to the production of perfect horses or pigs, as to men and women. By observance of the same care, and application of the same rules, as above stated for horses, it is possible to produce a race of men and women which shall be healthy, spirited, handsome and enduring. The world is full of weedy, homely, suffering human beings, and who is to blame? A man has as good a right to be handsome as a pig, a woman as a horse, certainly.

“Are we then demented? It is a very curious question, one which we commend to the careful consideration of the ‘Society for the Prevention of Cruelty to Animals.’”

So far we have come since Plato; and yet all this is only an application of the little Socratic argument that we quoted, written two thousand years ago.

Let us not make too much of these confessions. This swelling flood of conviction has burst no barriers yet. It is well known that the present constitution of society absolutely precludes, in man’s case, anything like what has been done for plants and animals; and these confessors have no idea of changing the constitution of society. They

cry aloud for *what* ought to be done; but when they come to the *how*, their voices grow feeble. Thus the writer in the *Exchange and Review*, whose doughty preaching stands first among the above quotations, immediately after it falls off into such mumbling as this:

"Passion and ignorance have too long held sway over the motives which prompt the best of us to assume the relation upon which our own as well as the happiness of our children depends. That ordinary mortals shall consider the future advancement of the race in the selection of their wives, is rather more than our knowledge of human nature justifies us in hoping. Nor are we quite prepared to adopt the extreme materialistic view, and relinquish the institution of marriage in favor of a selected class whose sole duty it shall be to improve and elevate the type of the race. But in a general way we can suffer ourselves to be influenced in the choice of our wives by the knowledge that the mental and physical qualities we bring to the union must be blended and intermixed in the natures of our children; and the reflection that the habits of our life and thought, and the various conditions into which we are driven, or suffer ourselves to drift, have their immediate and necessary outgrowth in those natures, should produce some effect upon our own self-conduct and control."

Galton, a late English writer, has actually gone forward a step beyond Darwin in the Platonian argument. He demonstrates by elaborate statistics that genius and all other good qualities are hereditary in human families. Nobody doubted this before; but it is a satisfaction to have such a point seized and fortified by science. He passes over from analogy to the beginning of direct proof that human nature is as plastic and obedient to the laws of reproduction as that of animals and plants, and therefore as properly the subject of scientific treatment. The object of his book, he says, is to show "that a man's natural abilities are derived by inheritance, under exactly the same limitations as are the form and physical features of the whole organic world. Consequently, as it is easy, notwithstanding those limitations, to obtain by careful selection a permanent breed of dogs or horses gifted with peculiar powers of running or of doing anything else, so it would be quite practicable to produce a highly gifted race of men by judicious marriages during several consecutive generations." So far Galton advances beyond Darwin's line. But when he comes to the point where it is necessary to look beyond his theory to the duties it suggests, he subsides into the meekest conservatism. "It would be writing to no useful purpose," he says, "were I to discuss the effect that might be produced on population by such social arrangements as existed in Sparta, [which arrangements were only a distant approach to the system which all breeders of animals pursue.] They are so alien and repulsive to modern feelings that it is useless to say anything about them; so I shall confine my remarks to agencies that are actually at work, and upon which there can be no hesitation in speaking." Then he goes on to show what can be done by wise marriages, much in the vein of the phrenologists.

A writer in the new English journal of science called "*Nature*,"

even discusses, after a fashion, the possibility of improving the human race by applying the Darwinian principles. But it is curious to see how gingerly he touches the practical part of the subject. After showing that in the case of wild animals which mate without interference, any improvement by variation must be exceedingly slow, and that in the case of domestic animals, owing to scientific propagation, the progress is incomparably more rapid, he speaks thus cautiously and mysteriously of the human problem :

“The case of man is intermediate in rapidity of progress to the other two. The development of improved qualities can not be insured by judicious mating, because as a rule human beings are capricious enough to marry without first laying a case for opinion before Mr. Darwin. Neither would it be easy, nor perhaps even allowable, to extend any special protection by law or custom to those who may be, physically and intellectually, the finest examples of our race. Still, two things may be done ; we may vary the circumstances of life by judicious legislation, and still more easily by judicious non-legislation, so as to multiply the conditions favorable to the development of a higher type ; and by the same means we may also encourage, or at least abstain from discouraging, the perpetuation of the species by the most exalted individuals for the time being to be found.”

This last hint is the boldest we have seen ; and yet it is but a hint.

Thus we find the public generally, and even the most advanced writers, simply under conviction in the presence of the law of scientific propagation. The commandment has come ; we all acknowledge it and preach it, and “delight in it after the inward man, but we see another law in our members warring against the law of our minds.” Duty is plain ; we say we ought to do it—we must do it ; but we cannot. The law of God urges us on ; but the law of society holds us back. This is a bad position. Either our convictions ought to become stronger and deeper till they break a way into obedience, or we ought to be relieved of them altogether.

The boldest course is the safest. Let us take an honest and steady look at the law. Let us march right up to this terrible analogy which has been so long troubling the world, and find out exactly what it is, and how far the obligation which it suggests is legitimate. What ought to be done can be done. It is only in the timidity of ignorance that duty seems impracticable.

In order to get clearer ideas of the analogy which is pressing upon us, and of the duty which results from it, we propose for fresh consideration the following questions : 1. *What* has been done for plants and animals ? 2. *How* has it been done ? 3. How far and by what means can the same be done for human beings ? This last question will require a survey of the special difficulties in the case of man, and will lead to some criticism of existing institutions. Without much formality the remainder of this article will be devoted to the discussion of these questions.

To show *what* has been done for plants and animals, we cannot do better than to put Darwin on the stand. His testimony is known to

philosophers, but it ought to be familiar to everybody. The following are quotations from his late work on the results of Domestication :

“As to plants, no one supposes that our choicest productions have been produced by a single variation from the aboriginal stock. We have proofs that this is not so in some cases, in which exact records have been kept ; thus, to give a very trifling instance, the steadily increasing size of the common gooseberry may be quoted. We see an astonishing improvement in many florists' flowers, when the flowers of the present day are compared with drawings made only twenty or thirty years ago. * * * And the gradual process of improvement through longer periods may plainly be recognized in the increased size and beauty which we now see in the varieties of the heartsease, rose, pelargonium, dahlia, and other plants, when compared with the older varieties or with their parent-stocks. No one would ever expect to get a first-rate heartsease or dahlia from the seed of a wild plant. No one would expect to raise a first-rate melting pear from the seed of the wild pear, though he might succeed from a poor seedling growing wild, if it had come from a garden stock. The pear, though cultivated in classical times, appears, from Pliny's description, to have been a fruit of very inferior quality. The art which has produced such splendid results from such poor materials has consisted in always cultivating the best known variety, sowing its seeds, and, when a slightly better variety has chanced to appear, selecting it, and so onward. * * *

“Let us now briefly consider the steps by which domestic races of animals have been produced, either from one or from several allied species. Some little effect may, perhaps, be attributed to the direct action of the external conditions of life, and some little to habit ; but he would be a bold man who would account by such agencies for the differences of a dray and a race-horse, a grayhound and blood-hound, a carrier and tumbler-pigeon. One of the most remarkable features in our domesticated races is that we see in them adaptation, not indeed to the animal's or plant's own good, but to man's use or fancy. Some variations useful to him have probably arisen suddenly, or by one step ; many botanists, for instance, believe that the fuller's tealze, with its hooks, which cannot be rivalled by any mechanical contrivance, is only a variety of the wild *Dipsacus* ; and this amount of change may have suddenly arisen in a seedling. So it has probably been with the turnspit dog ; and this is known to have been the case with the ancon sheep. But when we compare the dray-horse and race-horse, the dromedary and camel, the various breeds of sheep fitted either for cultivated land or mountain pasture, with the wool of one breed good for one purpose, and that of another breed for another purpose ; when we compare the many breeds of dogs, each good for man in very different ways ; when we compare the game-cock, so pertinacious in battle, with other breeds so little quarrelsome, with 'everlasting layers' which never desire to set, and with the bantam so small and elegant ; when we compare the host of agricultural, culinary, orchard and flower-garden races of plants, most useful to man at different seasons and for different purposes, or so beautiful in his eyes, we must, I think, look further than to mere variability. We cannot suppose that all the breeds were suddenly produced as perfect and as useful as we now see them ; indeed, in several cases, we know that this has not been their history. The key is man's power of accumulation ; man adds them up in certain directions useful to him. In this sense he may be said to make for himself useful breeds.

“The great power of this principle of selection is not hypothetical. It is certain that several of our eminent breeders have, even within a single lifetime, modified to a large extent some breeds of cattle and sheep. In order fully to realize what they have done, it is almost necessary to read several of the many treatises devoted to this subject, and to inspect the animals. Breeders habitually speak of an animal's organization as something quite plastic, which they can model almost as they please. If I had space I could quote numerous passages to this effect from highly

competent authorities. Youatt, who was probably better acquainted with the works of agriculturists than almost any other individual, and who was himself a very good judge of an animal, speaks of the principle of selection as 'that which enables the agriculturist not only to modify the character of his flock, but to change it altogether. It is the magician's wand, by means of which he may summon into life whatever form and mold he pleases.' Lord Somerville, speaking of what breeders have done for sheep, says:—'It would seem as if they had chalked out upon a wall a form perfect in itself, and then had given it existence.' That most skillful breeder, Sir John Sebright, used to say, with respect to pigeons, that 'he would produce any given feather in three years, but it would take him six years to obtain head and beak.' * * *

"What man has effected within recent times in England by methodical selection, is clearly shown by our exhibitions of improved quadrupeds and fancy birds. With respect to cattle, sheep, and pigs, we owe their great improvement to a long series of well-known names—Bakewell, Colling, Ellman, Bates, Jonas Webb, Lords Leicester and Western, Fisher Hobbs, and others. Agricultural writers are unanimous on the power of selection: any number of statements to this effect could be quoted; a few will suffice. A great breeder of shorthorns says: 'In the anatomy of the shoulder modern breeders have made great improvements on the Ketton shorthorns by correcting the defect in the knuckle or shoulder-joint, and by laying the top of the shoulder more snugly into the crop, and thereby filling up the hollow behind it. * * * The eye has its fashion at different periods; at one time the eye high and outstanding from the head, and at another time the sleepy eye sunk into the head; but these extremes have merged into the medium of a full, clear, and prominent eye with a placid look.'

"Again, hear what an excellent judge of pigs says: 'The legs should be no longer than just to prevent the animal's belly from trailing on the ground. The leg is the least profitable portion of the hog, and we therefore require no more of it than is absolutely necessary for the support of the rest.' Let any one compare the wild boar with any improved breed, and he will see how effectually the legs have been shortened.

"Few persons except breeders are aware of the systematic care taken in selecting animals, and of the necessity of having a clear and almost prophetic vision into futurity. Lord Spencer's skill and judgment were well known; and he writes: 'It is therefore very desirable, before any man commences to breed either cattle or sheep, that he should make up his mind as to the shape and qualities he wishes to obtain, and steadily pursue this object.' Lord Somerville, in speaking of the marvellous improvement of the New Leicester sheep effected by Bakewell and his successors, says: 'It would seem as if they had first drawn a perfect form, and then given it life.' Youatt urges the necessity of annually drafting each flock, as many animals will certainly degenerate 'from the standard of excellence which the breeder has established in his own mind.' Even with a bird of such little importance as the canary, long ago (1780–1790) rules were established, and a standard of perfection was fixed, according to which the London fanciers tried to breed the several sub-varieties. A great winner of prizes at the pigeon-shows, in describing the short-faced almond tumbler, says: 'There are many first-rate fanciers who are particularly partial to what is called the goldfinch beak, which is very beautiful; others say, take a full-size round cherry; then take a barley-corn, and judiciously placing and thrusting it into the cherry, form as it were your beak; and that is not all, for it will form a good head and beak, provided, as I said before, it is judiciously done; others take an oat; but as I think the goldfinch-beak the handsomest, I would advise the inexperienced fancier to get the head of a goldfinch, and keep it by him for his observation.' Wonderfully different as is the beak of the rock-pigeon and goldfinch, undoubtedly, as far as external shape and proportions are concerned, the end has been nearly gained.

— “Not only should our animals be examined with the greatest care whilst alive, but, as Anderson remarks, their carcasses should be scrutinized, ‘so as to breed from the descendants of such only as, in the language of the butcher, cut up well.’ The ‘grain of the meat’ in cattle, and its being well marbled with fat, and the greater or less accumulation of fat in the abdomen of our sheep, have been attended to with success. So with poultry; a writer, speaking of Cochin-China fowls, which are said to differ much in the quality of their flesh, says, ‘the best mode is to purchase two young brother cocks, kill, dress, and serve up one; if he be indifferent, similarly dispose of the other, and try again; if, however, he be fine and well-flavored, his brother will not be amiss for breeding purposes for the table.’

“The great principle of the division of labor has been brought to bear on selection. In certain districts ‘the breeding of bulls is confined to a very limited number of persons, who, by devoting their whole attention to this department, are able from year to year to furnish a class of bulls which are steadily improving the general breed of the district.’ The rearing and letting of choice rams has long been, as is well known, a chief source of profit to several eminent breeders. In parts of Germany this principle is carried with merino sheep to an extreme point. ‘So important is the proper selection of breeding animals considered, that the best flock-masters do not trust to their own judgment, or to that of their shepherds, but employ persons called “sheep-classifiers,” who make it their special business to attend to this part of the management of several flocks, and thus to preserve, or, if possible, to improve, the best qualities of both parents in the lambs.’ In Saxony, when the lambs are weaned, each in his turn is placed upon a table, that his wool and form may be minutely observed. ‘The finest are selected for breeding, and receive a first mark. When they are one year old, and prior to shearing them, another close examination of those previously marked takes place: those in which no defect can be found receive a second mark, and the rest are condemned. A few months afterwards a third and last scrutiny is made; the prime rams and ewes receive a third and final mark; but the slightest blemish is sufficient to cause the rejection of the animal.’ These sheep are bred and valued almost exclusively for the fineness of their wool; and the result corresponds with the labor bestowed on their selection. Instruments have been invented to measure accurately the thickness of the fibres; and ‘an Austrian fleece has been produced of which twelve hairs equalled in thickness one from a Leicester sheep.’ * * *

“The care which successful breeders take in matching their birds is surprising. Sir John Sebright, whose fame is perpetuated by the ‘Sebright Bantam,’ used to spend ‘two and three days in examining, consulting, and disputing with a friend which were the best of five or six birds.’ Mr. Bult, whose Pouter-pigeons won so many prizes, and were exported to North America under the charge of a man sent on purpose, told me that he always deliberated for several days before he matched each pair. Hence we can understand the advice of an eminent fancier, who writes, ‘I would here particularly guard you against having too great a variety of pigeons; otherwise you will know a little of all, but nothing about one as it ought to be known.’ Apparently it transcends the power of the human intellect to breed all kinds: ‘it is possible that there may be a few fanciers that have a good general knowledge of fancy pigeons; but there are many more who labor under the delusion of supposing they know what they do not.’ The excellence of one sub-variety, the almond-tumbler, lies in the plumage, carriage, head, beak, and eye; but it is too presumptuous in the beginner to try for all these points. The great judge above quoted says, ‘there are some young fanciers who are over-covetous, who go for all the above five properties at once; they have their reward by getting nothing.’ We thus see that breeding even fancy pigeons is no simple art: we may smile at the solemnity of these precepts, but he who laughs will win no prizes.”—*Darwin's Animals and Plants under Domestication.*

Our primary object in these citations was to show *what* has been done for plants and animals; but they also partly answer our second question as to the *how*. It is necessary, however, to bring into more prominence two or three of the practical measures by which the domestic races have been perfected.

The art of the animal-breeder, so far as mere propagation is concerned, is all contained in two precepts, viz.: *Breed from the best*, and *Breed in and in*; and these precepts are reducible to one; for, after a choice stock has been commenced, breeding in and in is breeding from the best. The second precept simply prescribes for choice varieties what the first prescribes for choice individuals. Now it happens that these are the very precepts of the scientific law of propagation which, if applied to human generation, would impinge most violently on the constitution and feelings of society. Breeding from the best means intolerable discrimination—suppression for some, and large liberty for others; and breeding in and in means incest. In order, therefore, to get the law derived from analogy honestly before us in all its bearings on human interests, we must enlarge on these features of scientific propagation.

The negative part of breeding from the best, which is the suppression of the poorest, is effected in the case of the lower animals by two measures, viz.: 1. Castration; and 2. Confinement. The positive part of the process is carried on by selecting for propagation the best individuals of both sexes, but especially males.

The special importance of selection in respect to males is founded on the constitutional difference between the sexes as to the amount of reproduction of which they are respectively capable. For example, a mare can produce, at the very most, only about fifteen colts in her whole lifetime. But a stallion can produce a hundred in a single year. The thorough-bred horse Messenger, in the course of his life, begot a thousand; Hambletonian begot eleven hundred; and a descendant of Hambletonian begot twelve hundred. And for proof that the male transmits his special qualities on this great scale, it is recorded that the English racer, Eclipse, begot three hundred and thirty-four horses that won races; and King Herod begot four hundred and ninety-four successful racers. So that, with reference to direct action on the character of a single generation, the male has the advantage over the female in the ratio of more than fifty to one. And although the female may produce very great results in the second generation—since any one of her male offspring taking her place, may produce his thousand, conveying her characteristics—yet it must ever remain true that the principal means of breeding choice stocks is by the selection of males. Thus the present generation of fine horses in this country, numbering probably its millions, is said to have come mainly from less than a half dozen famous stallions. A writer in the *Galaxy*, before referred to, gives the following account of the process by which our national trotting horse has been created:

"England has produced or perfected the race-horse; America, the road-horse. England, by great care, great skill, and vast expenditure of money, has perfected the race-horse; wonderfully fine, and altogether useless. America, by great care, great skill, and a considerable expenditure of money, has produced the trotter; altogether valuable—that is the difference.

"This quality—the swift trot—has been, in a sense, created by man, and is now transmitted and perpetuated. How?

"By breeding from such horses as showed such a tendency, and by training the progeny so as to create increased speed, which increased speed has been transmitted and intensified. It has now reached a single mile in 2 minutes $17\frac{1}{4}$ seconds, and twenty miles within the hour. What more can be done? No man can tell.

"The history of this achievement in breeding can be traced. I said to Mr. Goldsmith, the great horse-breeder at Walnut Grove, 'Whence comes this tremendous trotting action, as shown in the American road-horse. Racing men assert that the natural *fast* gait of the horse is the run, and that no high-bred horse trots *fast naturally*.'

"'I will show you a little of the *natural fast gait*,' said he.

"Then were brought in succession three young horses, three-year-olds. They were turned loose in the open field, and went trotting away at a great stride, head and tail erect. Then they were scared along by running at them; the dog went after them, and still they trotted *fast*; if they broke into a run, they came down again almost instantly; it was evident that they had a fast trot, which was the gait they *preferred*.

"'What is your explanation of this matter?' said I.

"'I will tell you. There have stood in this country the following stallions, all, except Bellfounder and Abdallah, thoroughbreds, and they nearly so:

Messenger, about 1795.

Baronet, about 1795.

Seagull, about 1820.

Bellfounder, about 1831–32.

American Star, about 1840.

Abdallah, about 1848–50.

And some others. Of these, Messenger, Bellfounder, American Star, and Abdallah were *natural trotters*, and it is asserted that Messenger has come in at the end of a running race on a fast trot. Out of these natural thoroughbred *trotters* have come our great road horses."—*Galaxy*, March, 1869.

We must remind the reader that we are not now attempting to lay down the law for human propagation, but only to give a clear idea of the methods pursued by animal-breeders. Perhaps reasons may be found for treating man exceptionally; and possibly the breeders have not yet found the very best way of treating animals. However these things may be, our present business is to exhibit without disguise or suppression the processes by which animals are being perfected; and for this purpose we ask some further attention to the principle of selecting males, and the physiological facts upon which that principle is founded.

In the propagation of any race, of course two things must be kept in view, viz., Quantity and Quality—increase of numbers and increase of value. And it will be seen from what we have stated above, in regard to the difference between the sexes as to the power of reproduction, that the function of the female bears a special relation to the increase of numbers, and that of the male to increase of value. To simplify the matter, suppose we have a hundred males and a hundred females to breed from. Now it is evident that in order to produce the

greatest number, we must keep all the females breeding up to their full capacity. But it is not necessary to keep all the males thus breeding. If ninety-nine of them out of the hundred were castrated, the one left might fertilize all the germs in the hundred females, and the numbers produced would be the same as if all the males were in full potency and doing their best. Hence it is clear that, without diminishing the quantity of production, we may exercise a very stringent discrimination in selecting males. The whole doctrine of the matter may be reduced to the following general formula: The *quantity* of production will be in direct proportion to the number of fertile females; and the *value* produced, so far as it depends on selection, will be nearly in *inverse* proportion to the number of fertilizing males.

These are the first principles of animal breeding as it stands. Whether and how far they will be found to be transferable to human generation may remain an open question. But it is best for us, at all events, to know exactly what we are talking about when we use the Platonian argument for scientific propagation.

Let us now look at the second precept of the animal breeders, which requires breeding in and in. Darwin says that the object aimed at by eminent breeders is always "to make a new strain or sub-breed, superior to anything previously existing." This, let us observe, is quite a different matter from general efforts to improve whole races. It is one thing to seek in any existing race the best animals we can find to breed from, which has always been done more or less, and which implies no segregation; and it is another thing to start a distinct family and keep its blood pure by separation from the mass of its own race. It is this last method that has produced the Ayrshires and the Shorthorns and the Leicesters. The terms "thorough-bred," "blooded-stock," "pure blood," etc., have no meaning except as they refer to this method of segregation. This indeed is the principal work of modern science in propagation, as distinguished from the unsystematic improvements made in all past ages. It deserves a distinct name, and we will take the liberty to call it *Stirpiculture*.

Now it is obvious that this method of breeding must begin with a pair, or, at most, with a small number of chosen animals, and must proceed by propagating exclusively, or nearly so, within its own circle. In fact it is a return to the conditions which are generally supposed to have existed at the beginning of all species, the human race included. It is an attempt to create a new race by selecting a new Adam and Eve, and separating them and their progeny from all previous races. This process implies breeding in and in, in two senses. First there must be, in the early stages, mating between very near relatives, as there was in Adam's family; and secondly, there must be, in all stages, mating between members of the same general *stock* who are all related more or less closely. This last kind of mating is properly called breeding in and in, though it may not be incest in the human sense of the word.

As a matter of fact it is well known that animal breeders pay very little attention to the principles of the law of incest in any stage of their proceedings. It is even a matter of doubt and disputation among them whether there is any harm in the closest and longest breeding between relatives. Darwin and the best authorities among the breeders incline to the opinion that long-continued mating of relatives, near or remote, leads finally to weakness of constitution and infertility. But they all agree that breeding in and in must be the general law for choice stocks, and that whatever infusion of foreign blood may be necessary must be altogether exceptional. And the general opinion among them is that the necessity of infusion of foreign blood may be obviated altogether by keeping several flocks of the same family in conservatories at some distance from each other, and exchanging breeders between them. Darwin has a long chapter on the effects of close interbreeding and crosses, from which we quote the following specimens:

"That evil directly follows from any degree of close interbreeding has been denied by many persons; but rarely by any practical breeder; and never, as far as I know, by one who has largely bred animals which propagate their kind quickly. Many physiologists attribute the evil exclusively to the combination and consequent increase of morbid tendencies common to both parents: that this is an active source of mischief there can be no doubt. It is unfortunately too notorious that men and various domestic animals endowed with a wretched constitution, and with a strong hereditary disposition to disease, if not actually ill, are fully capable of procreating their kind. Close interbreeding, on the other hand, induces sterility; and this indicates something quite distinct from the augmentation of morbid tendencies common to both parents. The evidence I have collected convinces me that it is a great law of nature, that all organic beings profit from an occasional cross with individuals not closely related to them in blood; and that, on the other hand, *long-continued* close interbreeding is injurious.

* * * "The evil consequences of long-continued close interbreeding are not so easily recognized as the good effects from crossing, for the deterioration is gradual. Nevertheless it is the general opinion of those who have had most experience, especially with animals which propagate quickly, that evil does inevitably follow sooner or later, but at different rates with different animals. No doubt a false belief may widely prevail like a superstition; yet it is difficult to suppose that so many acute and original observers have all been deceived at the expense of much cost and trouble. A male animal may sometimes be paired with his daughter, granddaughter, and so on, even for several generations, without any manifest bad results; but the experiment has never been tried of matching brothers and sisters, which is considered the closest form of interbreeding, for an equal number of generations.* There is good reason to believe that by keeping the members of the

* The degrees of consanguinity, as reckoned by animal-breeders, are different from those of either the common or the civil law. When Blackstone asks "Why Titius and his brother are related," and answers, "Because they are both derived from the same father," he presents but half the truth. They are related because they are both descended from the same father *and the same mother*. This addition doubles the relation, and brings them nearer to each other than they are to either of their parents. A son has fifty per cent. of the blood of his father; but he has one hundred per cent. of the blood of his brother; for they both have fifty per cent. of the blood of their father and fifty per cent. of the blood of their mother, making in each one hundred per cent. of the same combination. Brothers having thus absolutely the same blood, it follows that uncles have the same relation to nephews

same family in distinct bodies, especially if exposed to somewhat different conditions of life, and by occasionally crossing these families, the evil results may be much diminished, or quite eliminated.

* * * "With *cattle* there can be no doubt that extremely close interbreeding may be long carried on, advantageously with respect to external characters, and with no manifestly apparent evil as far as constitution is concerned. The same remark is applicable to sheep. Whether these animals have gradually been rendered less susceptible than others to this evil, in order to permit them to live in herds—a habit which leads the old and vigorous males to expel all intruders, and in consequence often to pair with their own daughters—I will not pretend to decide. The case of Bakewell's Longhorns, which were closely interbred for a long period, has often been quoted; yet Youatt says the breed 'had acquired a delicacy of constitution inconsistent with common management,' and 'the propagation of the species was not always certain.' But the Shorthorns offer the most striking case of close interbreeding; for instance, the famous bull Favorite (who was himself the offspring of a half-brother and sister from Foljambe) was matched with his own daughter, granddaughter, and great-granddaughter; so that the produce of this last union, or the great-great-granddaughter, had $\frac{1}{8}$, or 93.75 per cent. of the blood of Favorite in her veins. This cow was matched with the bull Wellington, having 62.5 per cent. of Favorite blood in his veins, and produced Clarissa; Clarissa was matched with the bull Lancaster, having 68.75 of the same blood, and she yielded valuable offspring. Nevertheless Collings, who reared these animals, and was a strong advocate for close breeding, once crossed his stock with a Galloway, and the cows from this cross realized the highest prices. Bates's herd was esteemed the most celebrated in the world. For thirteen years he bred most closely in and in; but during the next seventeen years, though he had the most exalted notion of the value of his own stock, he thrice infused fresh blood into his herd: it is said that he did this, not to improve the form of his animals, but on account of their lessened fertility. Mr. Bates's own view, as given by a celebrated breeder, was, that 'to breed in and in from a bad stock was ruin and devastation; yet that the practice may be safely followed within certain limits, when the parents so related are descended from first-rate animals.' We thus see that there has been extremely close interbreeding with the Shorthorns; but Nathusius, after the most careful study of their pedigrees, says that he can find no instance of a breeder who has strictly followed this practice during his whole life. From this study and his own experience, he concludes that *close interbreeding is necessary to ennoble the stock*; but that in effecting this the greatest care is necessary, on account of the tendency to infertility and weakness.²

and nieces as that of fathers to children; and cousins, having each fifty per cent. of the blood of brothers, i. e., of the same blood, are in the same relation to each other as that of half-brothers. Thus, according to the breeders' reckoning, incest between father and daughter is precisely the same as between uncle and niece; and incest between half-brother and sister is the same as between cousins, and so on.—J. H. N.

* It is worth mentioning that the finest collection of thoroughbred cattle in America—that of Walcott and Campbell, at the New York Mills, near Utica, N. Y.—is a herd of Shorthorns descended from these very animals bred in England by Collings and Bates. The writer of this article has a copy of the herd-book in which their pedigrees are given. The bull Favorite is often mentioned among their progenitors; and one of the finest of them is a descendant of the triple incest mentioned above. The writer has also had the pleasure of inspecting the herd, under the polite guidance of its manager, Mr. Gibson, and can testify, as an eye-witness, to their wonderful size and beauty. One of the cows measures twenty-eight inches in breadth across the hips. Eleven thousand dollars have been refused for another. Breeding in and in is still going on in this American branch of the Shorthorn family, as it has been for many generations in the original English stock.—J. H. N.

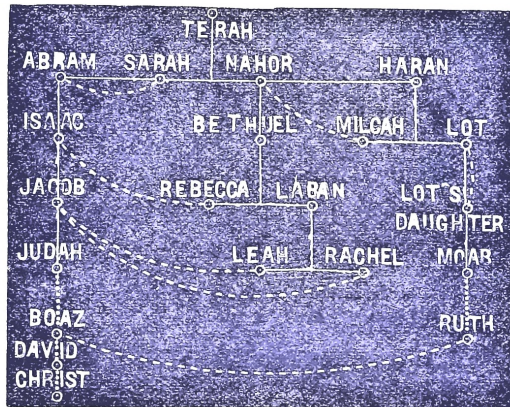
* * * "With *sheep* there has often been long-continued interbreeding within the limits of the same flock; but whether the nearest relations have been matched so frequently as in the case of Shorthorn cattle, I do not know. The Messrs. Brown, during fifty years, have never infused fresh blood into their excellent flock of Leicesters. Since 1810 Mr. Barford has acted on the same principle with the Foscothe flock. He asserts that half a century of experience has convinced him that when two nearly related animals are quite sound in constitution, in-and-in breeding does not induce degeneracy; but he adds that he 'does not pride himself on breeding from the nearest affinities.' In France the Naz flock has been bred for sixty years without the introduction of a single strange ram. Nevertheless, most great breeders of sheep have protested against close interbreeding prolonged for too great a length of time. The most celebrated of recent breeders, Jonas Webb, kept five separate families to work on, thus 'retaining the requisite distance of relationship between the sexes.'"

We have now perhaps a sufficient view of what has been done for the lower races, and how it has been done. The laws of scientific propagation, so far as analogy can teach them, are before us. It is time to inquire how far and by what means these laws can be applied to the human race.

In the first place, there can be no rational doubt that the laws of physiology are in general the same for man as for other animals. Indeed the most important of these laws, so far as our present subject is concerned, has just been scientifically fastened upon man by Mr. Galton. He demonstrates that not only the physical qualities of individuals and races, but their intellectual, artistic, and moral characteristics, and even their spiritual proclivities, are as transmissible as the speed of horses. There can be no doubt that if it were possible for men and women to be directed in their propagation by superior beings, as animals are, or by their own sincere enthusiasm for science, the results of suppressing the poorest and breeding from the best would be the same for them as for cattle and sheep. There can be no doubt that, if it were compatible with public morality and with the proper care of women and children, to "give special privileges to the most exalted individuals in the perpetuation of the species," as the English journal of science suggested, the elevation of the human species would be as rapid as that of any of the lower races. Indeed the difference between the sexes in regard to the power of reproduction, which is the reason for special selection of males, is even wider in the case of man than in that of horses; and, though existing institutions wholly ignore it, we may be sure that, in the nature of things, it gives man superior possibilities of improvement of blood. Finally, there can be no doubt that by segregating superior families, and by breeding them in and in, superior varieties of human beings might be produced which would be comparable to the thoroughbreds in all the domestic races.

We have in history at least one splendid demonstration of the power of segregation and breeding in and in, which goes far toward establishing the entire parallelism between man and the lower animals in respect to the laws of propagation. The Jews may fairly be regarded

as a distinct and superior variety of the human race. Here is an exhibition of the interbreeding out of which that stock issued:



The curved, broken lines indicate marriages. They show that Abraham married his sister (though she was only a half-sister, according to Genesis xx. 12); that Nahor married his niece; that Isaac married the daughter of his cousin, Bethuel, who also was son of Milcah, another cousin; that Lot, the progenitor of Ruth, who was a progenitress of David and Christ, propagated by his own daughter; that Jacob married two of his first cousins on his mother's side, who were also the granddaughters of one of his father's cousins, and great-granddaughters of another; that Bethuel was grandson of Terah by his father, and great-grandson by his mother; that Rebecca and Laban, the children of Bethuel, could thus trace their lineage to Terah by two lines, i. e., through Nahor and Haran; that Isaac could trace his lineage to Terah by two other lines, i. e., through Abraham and Sarah; and consequently that Jacob, the child of Isaac and Rebecca, could trace his lineage to Terah through four lines, i. e., through all four of Terah's children.

These probably are not half the connections that actually existed between the first generations of the Jewish stock. We are not informed where Haran, Bethuel, Lot, and Laban got their wives; but we may presume, from the fashion of the family, that they found them, or some of them, within the circle of their own kindred.

Thus it is evident that the Jewish stock was at first established by a very complicated system of breeding in and in. Afterward Moses made laws against marriages of relatives; but it should be observed also that the rite of circumcision and the whole moral force of the Mosaic economy favored segregation, and was opposed to *foreign* marriages. The policy of the Jewish institutions, as seen in the times of Ezra and Nehemiah, was as severe against marriage with the heathen as against

incest. The truth, therefore, is, that the original practice of breeding in and in, though ultimately prohibited in reference to individual relationships, was continued and enforced on the national scale. The Jews, as a people, have always been breeding in and in. Mating between very close relatives was necessary at the beginning, and not necessary afterward; and so it is and must be in every development of a new stock. As the numbers increase, close relationships can be avoided, and yet the blood can be kept pure.

We conclude, therefore, that breeding in and in was the first and general law of Jewish stirpiculture. At the same time it is evident that there was an exceptional policy at work by which foreign blood was introduced from time to time into the Jewish stock. This policy is seen in the cases of Rahab, Ruth, Bathsheba, etc., and doubtless existed to a large extent in less notable cases that are not seen. Infusion of the best Gentile blood has always been an important incidental of Jewish stirpiculture.

We have, then, as the result of this historical view, two principles contrasted and yet coöperative—breeding in and in the first law, and foreign infusion the second; the first controlling, the second exceptional. These are precisely the two laws, as we have seen, that Darwin and the cattle-breeders are promulgating. And to complete the parallel, we can even discern in the two widely-separated colonies of Terah's descendants, and the interbreeding between them in the times of Isaac and Jacob, an arrangement exactly like the separate conservatories recommended by our modern authorities to eliminate the evils of breeding in and in. So that the essential laws of scientific propagation, as developed in animal breeding, have, in this renowned instance, already been carried over to human beings, and have produced the most perfect race in history.

Though it must be conceded that, in the present state of human passions and institutions, there are many and great difficulties in the way of our going back to the natural simplicity of the Hebrew fathers or forward to the scientific simplicity of the cattle-breeders, yet it is important to know and remember that these difficulties are not physiological, but sentimental. As the old theologians used to say, our inability to obey the law of God is not natural, but moral. We are too selfish and sensual and ignorant to do for ourselves what we have done for animals, and we have surrounded ourselves with institutions corresponding to and required by our selfishness and sensuality and ignorance. But for all that we need not give up the hope of better things, at least in some far-off future. If the difficulties in our way were natural and physiological, no amount of science or grace could ever overcome them; but as they are only passional and institutional, we may set the very highest standard of thorough-breeding before us as our goal, and believe that every advance of civilization and science is carrying us toward it.

The advantage of holding on to our birthright of hope lies in the fact that it keeps us in the way of free thought and free discussion. We cannot agree with Galton that "it would be writing to no useful purpose to discuss social arrangements that are alien and repulsive to modern feelings," and that we must confine our attention "to agencies that are actually at work." True science does not thus wait on human movements. We hold that the very highest premiums ought to be offered for new social inventions favorable to the scientific propagation of human beings. And the freest discussion of such inventions would not necessarily involve any treason to existing society, while it would gradually and safely prepare transitions which are inevitable.

And now, as liege subjects of that great law which we have been bringing to view, and which is manifestly pressing on all men both by analogy and by direct demonstration, we propose to set an example of free thought and free discussion, by criticising some of the institutions that confront that law, and by looking beyond them as far as we can toward measures which in time to come may lead on to full obedience.

1. Undoubtedly the institution of marriage is an absolute bar to scientific propagation. It distributes the business of procreation in a manner similar to that of animals which pair in a wild state; that is, it leaves mating to be determined by a general scramble, without attempt at scientific direction. Even if the phrenologists and scientific experts had full power to rearrange the pairs from time to time according to their adaptations, there would still be nothing like the systematic selection of the best and suppression of the poorest, which is perfecting the lower animals. How much progress would the horse-breeders expect to make if they were only at liberty to bring their animals together in exclusive pairs?

As we have already intimated, marriage ignores the great difference between the reproductive powers of the sexes, and restricts each man, whatever may be his potency and his value, to the amount of production of which one woman, chosen blindly, may be capable. And while this unnatural and unscientific restriction is theoretically equal for all, practically it discriminates against the best and in favor of the worst; for while the good man will be limited by his conscience to what the law allows, the bad man, free from moral check, will distribute his seed beyond the legal limits as widely as he dares. Moreover there is a fundamental fallacy in the pet theory of the halfwayists that science may somehow be insinuated into marriage by instructing the upper classes how to mate judiciously. For what is gained in one quarter by such management must be lost in another. The principle of the case may be seen better in a small example than in a large one. Suppose we have simply four candidates for pairing instead of four millions—viz., a superior man and a superior woman, and an inferior man and an inferior woman. The advocates of judicious mating would bring about a union between the superior man and the superior woman; and

this pair doubtless would have some fine children. But this arrangement would also compel a union between the inferior man and the inferior woman, and they would certainly have some very poor children. How much would be gained on the whole by this operation, especially if, as generally happens, the inferior pair should prove to be most prolific? So on the large scale, the lucky ones who get the good mates of course leave the refuse to the unlucky ones; and the result is simply no progress, except that of "making the rich richer, and the poor poorer." We are safe every way in saying that there is no possibility of carrying the two precepts of scientific propagation into an institution which pretends to no discrimination, allows no suppression, gives no more liberty to the best than to the worst, and which, in fact, must inevitably discriminate the wrong way, so long as the inferior classes are most prolific and least amenable to the admonitions of science and morality.

What then? Are we necessarily the enemies of marriage because we say these things? By no means. We still concede that marriage is the best thing for man as he is. It is the glory of marriage that it utilizes the passions of men so as to make them provide homes for women and children. This is a prime necessity of propagation, scientific or unscientific, and must be well cared for at all events, even if we have to postpone the application of science to improvements in reproduction. Animals are perfected, as we said at the beginning, by attention to two things—training and blood. Thus far training, with home as the indispensable means of training, has been necessarily the main object of human institutions, and doubtless marriage has been the best arrangement that could be devised for this single end. But it certainly is not adapted to the final and superior object of improving blood. We give marriage the credit that belongs to it, and hope it may remain till institutions shall be devised that shall provide for both training and blood.

2. As the general law of marriage forbids breeding from the best, so the special law and public opinion against consanguineous marriages forbids breeding in and in. And as there is no sure line of demarcation between incest and the allowable degrees of consanguinity in marriage, the tendency of high-toned moralists is generally to extend the domain of the law of incest, and so make all approach to scientific propagation as difficult as possible. Thus there have been movements in various quarters within a few years to place marrying a deceased wife's sister under the ban of law; and the State of New Hampshire has quite recently forbidden the marriage of first cousins as incestuous. At the same time it must be acknowledged that an opposite tendency has manifested itself among scientific men in Europe and in this country. The pressure of analogy from animal-breeding has led physiologists and ethnologists to re-examine the old doctrines in regard to consanguineous connections, and venture on some resistance to the pre-

vailing ideas of incest. This is done very carefully, of course, so as not to give shocks. The most that has been attempted has been to defend the marriages of cousins, dropping an occasional hint in extenuation of the pairing of uncles with nieces. A memorable controversy on this line was in progress some years ago among the *savants* of France, in the course of which Dr. E. Dally read before the Anthropological Society of Paris a learned article, entitled "An Inquiry into Consanguineous Marriages and Pure Races," which article was afterwards published in the "Anthropological Review" of London (May, 1864), and was pronounced "excellent" by Mr. Darwin. To show how far the scrutiny of the old doctrines has proceeded, we extract from this article as follows:

"A distinguished pupil of the Paris hospitals, M. B—, has communicated to me a case of consanguineous marriage drawn from his own family. I here give a copy of his note on the subject:

"It seems, from information which has been handed down to me by my family, relating to a period of about one hundred and fifty years (i. e., counting from the great-grandfather of my father), that five generations have married among their first cousins; the degree of relationship has never descended beyond the *first cousins*, excepting in *two cases*, where the *daughters of first cousins have been married by their second cousins*. These five generations have contracted a certain number of marriages which I am not able to particularize, and in which the mean number of children has been three or four. The total number of branches as direct as collaterals has been one hundred and twenty to one hundred and forty. There has been no idiot or deaf-mute met with. I may add that the number of branches is the more surprising since a great number of them have devoted themselves to a life of celibacy, or have made religious professions.'

* * * "M. Périer has mentioned, according to M. Yvan, the beauty of the inhabitants of the island of Réunion, who descend from a few couples only, and yet have known how to preserve their purity of blood. Most of the French colonies, where they are prosperous, offer the same character; in fact, we may remark even in France itself, isolated spots or isolated groups of individuals in the heart of a mixed population; there are very few travelers who have not noticed it, and this has never been with a view of establishing their degeneracy. Among this number are most of the little fishing villages on the coast of France, where the sailor-population lives side by side with the agriculturists, without ever marrying among them. Such is Pauillac (Gironde), about which my friend, Doctor Ferrier, has written me a letter, from which I take this extract: 'Pauillac contains one thousand seven hundred inhabitants; most of them are robust, vigorous, and well-made sailors; the women are renowned for their beauty and the clearness of their complexion. There is, perhaps, no other place in France where consanguineous marriages are more frequent, and where the case of military exemption is more rare.' The inhabitants of Batz are either workers in salt-pits or fens. Their hygienic condition is admirable, and misery is unknown in the country. I find, besides, from my notes, that there are very few of the inhabitants who are relatives beyond the sixth degree; for the most part their relationship is of the third or fifth degree: the children are numerous, and average from two to eight in each marriage.'

"M. Subler, in a recent journey, has been able to establish the extraordinary beauty of the inhabitants of Gaust, in the valley of Assau, in the midst of the Pyrenees. The custom of marrying relations is so inveterate among them that, before marrying an inhabitant of another commune, the young men of Gaust ask permission of the chief men of the place. Our friend, M. Maximin Legrand, has mentioned the same facts about the town of Ecuelles, near Verdun-sur-Saone: and

I think I could quote a hundred, perhaps a thousand, places in France which fulfill the same conditions."

In the course of his article Dr. Dally discusses the pure races, such as the European aristocracies and the Jews, and concludes that in these examples vital power and beauty have been the result of close interbreeding.

There has been quite recently a notable tendency to similar discussions and conclusions among physiologists in this country; and we have late news from England that Parliament has finally legalized the marriage of a deceased wife's sister. So far there is certainly a weakening of the barriers against scientific propagation.

3. Besides the general difficulties which science has to contend with in the laws of marriage and incest, defended by the whole mass of religionists and moralists, there are particular sects which sin against the law of scientific propagation in special ways, and with a high hand. Let us look at some of them.

The Catholic Church forbids its priests to marry. But its priests are its best men. Therefore the Catholic Church discriminates directly and outrageously *against* the laws of scientific propagation. In effect it castrates the finest animals in its flocks. It encourages the lowest scavenger to breed *ad libitum*, and forbids Father Hyacinthe to leave a single copy of himself behind him. We join Galton in the following invective:

"The long period of the dark ages under which Europe has lain, is due, I believe, in a very considerable degree to the celibacy enjoined by religious orders on their votaries. Whenever a man or woman was possessed of a gentle nature that fitted him or her to deeds of charity, to meditation, to literature, or to art, the social condition of the times was such that they had no refuge elsewhere than in the bosom of the Church. But the Church chose to preach and exact celibacy. The consequence was that these gentle natures had no continuance, and thus, by a policy so singularly unwise and suicidal that I am hardly able to speak of it without impatience, the Church brutalized the breed of our forefathers. She acted precisely as if she had aimed at selecting the rudest portion of the community to be, alone, the parents of future generations. She practiced the arts which breeders would use who aimed at creating ferocious, currish, and stupid natures. No wonder that club-law prevailed for centuries over Europe; the wonder rather is, that enough good remained in the veins of Europeans to enable their race to rise to its present very moderate level of natural morality."

The Shakers are in the same position with the Catholics. They claim to be the noblest and purest people in the world, a sacred generation, raised by grace high above the rest of mankind; and yet, with full powers to propagate their kind, they virtually castrate themselves, and expend their labors and wealth on their own comfort and on misbegotten adopted children, leaving the production of future generations to common sinners. Doubtless they excuse themselves by appealing to the examples of Jesus and Paul; but they wrong those martyrs of the past. Jesus and Paul were soldiers who had not where to lay their heads, and well they might refrain from taking women and children into their terrible warfare. But the Shakers live in peace and

plenty, having the best of houses, farms and barns, and actually breed the best of horses and cattle. So that they have no such excuse as the early Christians had for refusing to breed men. We doubt not that they are sinning in ignorance; but that only makes it the more our duty to tell them that, with their large communistic conservatories, and their material and spiritual wealth, they are just the people to take hold of scientific propagation in earnest, and in advance of the rest of the world; and they could not do a better thing for themselves or for mankind than to expend the vast fund of self-denial and cross-bearing purity which they have accumulated in celibacy on a conscientious and persevering effort to institute among themselves the noble art of breeding from the best.

It is curious to observe that while the law of scientific propagation on the one hand thus criticises some of the holiest institutions and sects, on the other it finds traces of good in some of the vilest forms of existing society. For instance, polygamy, so far as the fact of obtaining and supporting many wives implies that a man is superior to his fellows, is an approximation at least to nature's wild form of breeding from the best, which is more than can be said of monogamic marriage. Again, slavery is always more or less a system of control over propagation; and so far as the interest of masters leads to selection, like that practiced in animal-breeding, it tends to the elevation of the subject race. Probably the negroes have risen in the scale of being faster than their masters, for the same reason that horses and cattle under man's control rise faster than man himself. Even common licentiousness, cursed as it is, is sometimes not without compensations in the light of the propagative law. It is very probable that the feudal custom which gave barons the first privilege of every marriage among their retainers, base and oppressive though it was, actually improved the blood of the lower classes. We see that Providence frequently allows very superior men to be also very attractive to women, and very licentious. Perhaps with all the immediate evil that they do to morals, they do some good to the blood of after generations. Who can say how much the present race of men in Connecticut owe to the numberless adulteries and fornications of Pierrepoint Edwards? Corrupt as he was, he must have distributed a good deal of the blood of his noble father, Jonathan Edwards; and so we may hope the human race got a secret profit out of him. Such are the compensations of nature and Providence.

Dare we now look beyond present institutions to the possibilities of the future? We may at least point out briefly the main boundaries of what is needed and must come. The institutions that shall at some future time supercede marriage and its accessories, whatever may be their details, must include certain essentials, negative and positive, which can be foreseen now with entire certainty.

In the first place they must not lessen human liberty. Here we touch the main point of difference between the cases of animals and

men, and the point of difficulty for our whole problem. Animals, under the unlimited control of man, can easily be kept apart and brought together as science prescribes. But man as a race has no visible superior. That fact declares that his destiny is self-government. And in accordance with that destiny, the institutions that scientific propagation waits for must be founded on self-government. The liberty already won must not be diminished, but increased. If there is to be suppression, it must not be by castration and confinement, as in the case of animals, or even by law and public opinion, as men are now controlled, but by the free choice of those who love science well enough to "make themselves eunuchs for the kingdom of heaven's sake." If mating is to be brought about without regard to the sentimental specialities that now control it, this must be done only for those whose liberty consists in obeying rational laws, because they love truth more than sentimentalism.

There is another thing that the institutions of the future must not do; they must not injure HOME. Here we touch another point of difference between the cases of animals and human beings. Man has a social nature that demands very different treatment from that of animals. The best part of human happiness consists in sexual and parental love, and the best part of human education consists in the training of these passions in the school of home. That school must not be superceded or weakened by the new arrangements, but must be honored more than ever.

Can this be done consistently with the changes which scientific propagation requires? That is the hard question which science has now to solve. We offer but a hint toward its solution. If home could be enlarged to the scale, for instance, of the Shaker families, and if men and women could be taught to enjoy love that stops short of propagation, and if all could learn to love other children than their own, there would be nothing to hinder scientific propagation in the midst of homes far better than any that now exist. The Shakers claim that by making the Church the unit of society, they have the best of homes even now, without enjoying sexual and parental love in the direct way. How much more complete might be their home-life if they should some time heed our suggestion, to introduce home-propagation in the self-denying way which science requires, and for which their long cross-bearing has prepared them.

Something of this kind, undertaken by intelligent and conscientious men, endowed with abundant wealth, and under the sanction of government, may ultimately combine home and liberty, with scientific propagation. And it is for such inventions as this, or others more pertinent and hopeful, that discussion ought to be set free, and kings and congresses, social science societies, ethnological societies, philanthropists of all kinds, and rich men who wish to dispose well of their money, should be offering the very highest premiums.

At all events the practical difficulties of our problem must not turn

us away from the study and discussion of it. The great law which Plato and Darwin and Galton are preaching, is pressing hard upon us, and will never cease to press till we do our duty under it. And the need of doing something for the radical improvement of humanity is imminent. Galton calls earnestly for a new race. Hear his appeal:

“It seems to me most essential to the well-being of future generations, that the average standard of ability of the present time should be raised. Civilization is a new condition imposed upon man by the course of events, just as in the history of geological changes new conditions have continually been imposed on different races of animals. They have had the effect either of modifying the nature of the races through the process of natural selection, whenever the changes were sufficiently slow and the race sufficiently pliant, or of destroying them altogether, when the changes were too abrupt or the race unyielding. The number of the races of mankind that have been entirely destroyed under the pressure of the requirements of an increasing civilization, reads us a terrible lesson. Probably in no former period of the world has the destruction of the races of any animal whatever been effected over such wide areas, and with such startling rapidity, as in the case of savage man. In the North American continent, in the West Indian islands, in the Cape of Good Hope, in Australia, New Zealand, and Van Diemen's Land, the human denizens of vast regions have been entirely swept away in the short space of three centuries, less by the pressure of a stronger race than through the influence of a civilization they were incapable of supporting. And we too, the foremost laborers in creating this civilization, are beginning to show ourselves incapable of keeping pace with our own work. The needs of centralization, communication, and culture call for more brains and mental stamina than the average of our race possess. We are in crying want for a greater fund of ability in all stations of life, for neither the classes of statesmen, philosophers, artisans, nor laborers are up to the modern complexity of their several professions. An extended civilization like ours comprises more interests than the ordinary statesmen or philosophers of our present race are capable of dealing with, and it exacts more intelligent work than our ordinary artisans and laborers are capable of performing. Our race is overweighted, and appears likely to be drudged into degeneracy by demands that exceed its powers.”

In another point of view, a tremendous crisis is upon us. The socialisms and spiritualisms which have engaged public attention in the last thirty years seem to have weakened the very constitution of society. Free love, easy divorce, feticide, general licentiousness, and scandalous law-trials in high life, are the symptoms of the times. Many believe that marriage is dying. Is it not remarkable that in this state of things the loud call for scientific propagation is rising? Is there not a rational and even Providential connection between these phenomena? If the powers above are summoning us to the great enterprise of peopling the planet with a new race, why should not the old institutions, which are too narrow for such an enterprise, be passing away? The birth of the new always comes with agony and rupture to the old. At all events, whether the time for the decease of marriage has come or not, let us not doubt that it must come before the will of God can be done on earth as it is in heaven; and let us be ready, when it does come, to make sure that the formative idea of the dispensation to come after it shall be nothing less than scientific propagation.