

coats, hair that length!" and he marked off with his right index finger on the fingers of his left hand the space of about three inches. When the present writer asked what cross had been used, he replied: "No cross whatever; see them, and you'll find they're pure Jersey"; but they had been bred upon the farm for some considerable time, and gradually accustomed to a climate in which warm winter coats were needed, consequently were produced.

But when all is said that can be said about the influence of locality in determining the form and other characteristics of live stock, those influences which are distinguished by the term "environmental" are often well within the control of the breeder who will to exercise his power of control. So very much depends upon the early part of the rearing of young animals, and so much also upon the treatment following that in the earlier stages of life, and so continuously up to the period of maturity. The making of the animal, largely depending in the first place upon breed, is also very much in the hands of the rearer. The power of breed must be sustained by means of food and the comforts of proper housing, when necessary, or it will fall, and then the animal lies largely at the mercy of circumstances. Breed granted, the qualities belonging to breed will be developed, well or ill, fully or imperfectly, according to the conditions of life, lumped together as "environment." So in the human race. Much must depend upon the mental and physical constitution of the parents of the child and of the ancestors of those parents. Even the instincts of culture and the tendencies of habit in civilized society appear to be strongly hereditary, and under favouring conditions will show themselves in children at an early age. On the other hand, as the results of degrading influences and conditions, brutal habits, low moral types and coarseness of nature generally, are strongly innate, as a rule, and ready to crop out unless met in early life by powerful counter-influences. That which is thus true as regards the mental and moral, as well as the physical training of children, is equally true as touching heredity and the influences of locality and management considered as factors in the decision of character and qualities. It applies to live stock of all kinds—horses, cattle, sheep, goats, pigs, dogs, poultry, &c. The foregoing instances of local changes of type in Jersey and Shorthorn cattle will illustrate similar changes, not only in other breeds of cattle, but also in all the other species of animals upon the farm. In some cases local influences will be so strange and so strong as to cause alteration of type, notwithstanding the most careful rearing of the young with the fixed object of perpetuating the parental type. Then recurrence to unaltered lines bred from the parent stock, for use as restoring blood, may be necessary. But where it is not so, where the breeder by his vigilant attention during the growth of the young stock and the supply of artificial correctives (in food and other things) to meet any tendency to variation, has succeeded in securing constancy, there the need of going back to other branches of the parent stock which remain constant to the old type would not be felt. Fresh blood might be required, but not for the purpose of restoring characters lost through local influences.

Mr. W. D. Gunn, Veterinary Captain, Assistant to the Inspector-General Civil Veterinary Department, Simla, India, sends to the *Field* a communication, accompanied by photographs, recording the birth of a mule foal from a mule belonging to a potter in the Kapurthala State, India, on its return from the Tirah Field Force. Parturition occurred on August 6th, during the night, and on information being given to the Prime Minister of the State, Sirdar Jhagat Singh, C.I.E., he at once went to see the foal on the following morning. The greatest excitement had been caused in the town of Kapurthala by the occurrence, and the pundits are at a loss to know what to think about it. They say that such an event has never been known before. When Sirdar Jhagat Singh saw that the mule had really dropped a foal, he at once communicated with the Civil Veterinary Department, and, after making inquiries, Capt. Gunn proceeded to the Kapurthala State, and took the photographs. He says the mule must have been covered by a pony while proceeding with the transport to the frontier war. The foal is beautifully formed, and has the appearance of a pony foal with very small ears. The mother is about twelve years old, and stands 11½ hands, being a very typical Indian transport mule. Captain Gunn says there can be no doubt about the genuineness of the case. The foal was dropped at midnight, and was seen the next morning by large crowds, including the Prime Minister, a Sikh gentleman of the highest respectability. The Sirdar states that the appearance of the genital parts and the large udder left no doubt that the mule gave birth to a foal.

In these days when so much importance is paid to the possession of blood by the light horse, and hints are being expressed in some quarters that the favour shown to animals of another stamp, it is curious to read what an old writer, namely, Mr. Geoffrey Gambado, thought about the question as far back as the year 1796, when he wrote "An Academy for Crown Horsemen." Mr. Gambado, to judge from his portrait, which adorns the title-page of his work, must have been a weller weight, and consequently the strength of his opinions may be accounted for by this, but it may be remembered that he was an instructor of riding by profession, and claimed several prominent personages as his pupils. He thus expresses himself: "It is a melancholy truth that our breed of horses is terribly degenerated, nothing is now to be seen but blood horses; every apprentice must ride a bit of blood. A bit of blood is well and may be termed so, for neither flesh nor bone have they to boast of . . . on the road what dangers do we incur from the weakness of our horses! The pitiful apyler logged things of this age fly into a ditch with you at the sight of a pocket hand-

kerchief or the blowing of your nose." It is evident from his writings that the author's opinions differed very materially from those of modern experts in other respects, as he expresses a decided predilection for bald faces, wall eyes, and white legs; whilst he recommends an animal with long ears, though the context gives rise to the impression that by using this expression he intends to give effect to the strong views he entertains against the then common practice of cropping horses.

Mr. Gambado also offers some very quaint and unconventional advice upon the subject of buying horses, but, as he confesses himself to be a bit of a dealer, it is quite possible that a few of the most peculiar utterances may be affected by an *arrivé pensée*. For instance, he writes:—"Be sure to buy a broken-kneed horse whenever he falls in your way: the best bit of flesh that ever was crossed is sure to come down one day or another; whereas one that has fallen never will again if he can help it." He likewise appears to have possessed some decidedly original ideas upon the subject of unsoundness, as he asserts that "spavins, splints, corns, &c., being all curable are beneath you"—the purchaser's "notice;" whilst, failing a long tail being procurable, he insists upon parading the virtues of a rat tail, on the grounds that there is an air of comicality about it. The editor of Mr. Gambado's book, however, seems to have considered that an apology was due to the readers thereof for certain of the author's utterances, and this is forthcoming in a paragraph which suggests that they were penned after dinner. There is much, however, that is quaint and original, it may be added in the work of this old gentleman of bibulous propensities, as he proves himself to have been a keen observer, and his sarcastic criticisms of men and horses contain a good deal of valuable information regarding the customs of the times he lived in; whilst the illustrations are really excellent.

That old writer, Gervase Markham, was a true lover of the horses. He was a champion of improved methods of horse breeding and horse racing. He was himself the importer of valuable horses, and is said to have imported the first Arab. In a list of Sir Henry Sidney's horses in 1589, "Pied Markham" is entered as having been sold to the French Ambassador, and Gervase sold an Arabian horse to James I. for £500. The following passage from his work, "A Way to Get Wealth," is full of the quaint eloquence of his period. How lovingly he discourses on the horse's "nature in general." He thus writes of him: "He is valiant, strong, and nimble, and, above all other beasts, most apt and able to endure the extremest labours, the moist quality of his disposition being such that neither extreme heat doth dry up his strength, nor the violence of cold freezes the warm temper of his moving spirits; but that where there is any temperate government, there he withstandeth all effects of sickness, with an unconquerable constancy. He is most gentle and loving to the man, apt to be taught, and not forgetful when an impression is fixed in his brain. He is watchful above other beasts, and will endure his labour with the most empty stomach; he is naturally given to much cleanliness, is of an excellent scent, and offended with nothing so much as evil savours."

Photographs of Pedigree Stock.

IN the Zoology and Physiology section of the British Association at Bristol last week Dr. Francis Galton read a paper on "Photographs of Records of Pedigree Stock," in the course of which he said:—"It is my purpose shortly to communicate with the councils of some of the societies who publish stud or herd books, urging the systematic collection of photographs of pedigree stock and of more information about them than is now procurable. I believe that if my proposals were carried into effect they would greatly facilitate the study of heredity. I have lately shown how the general knowledge that offspring can inherit peculiarities from their ancestry as well as from their parents may be superseded by a definite law whose nature was first suggested to me by theoretical considerations. This ancestral law proves the importance of a much more comprehensive system of records than now exists. A breeder ought to be in a position to compare the records of all the near ancestry of the animals he proposes to mate together, in respect to the qualities in which he is interested. More especially he ought to have access to photographs which indicate form and general attitude far more vividly than verbal descriptions. But the information in stud and herd books is too meagre for the requirements of the breeder, while the photographs published in newspapers and elsewhere are inadequate for making complete genealogical collections. My principal suggestion is that a system of collecting photographs should be established which would be serviceable to breeders. They should be serviceable to them not only as portraits, but also as affording means of obtaining measurements of the animal. Such a system might be easily initiated, and be afterwards self-supporting. An initial study of the form of each pure-bred animal in connection with the portraits of all its nearer ancestry would test current opinions and decide between conflicting ones, and it could not fail to suggest new ideas. Likenesses would be traced to prepotent ancestors, and the amount of their several prepotencies would be defined; forms and features that supplement one another, or, as they are termed, "nick in," and others that clash or combine awkwardly, would be observed and recorded; conclusions which are based on incomplete and inaccurate memories of the appearance of the several members of the ancestry would be superseded by others derived from a study of their actual photographs. The value of the ancestral law would be adequately tested, and it would be possible to amend

it when required. It may be said that, even if all the ancestral photographs were spread in full view on a table, no human brain could combine into a single mental image the peculiarities in feature even of the two parents, and of the four grandparents, in the proportion laid down by the ancestral law. But a substitute for a mental picture may be obtained by compositing the photographs, allotting to each its appropriate time of exposure. A photograph may be so taken that measurements made upon the photograph, after certain corrections have been applied to them, will be nearly as good as those made on the animal itself. Measurements are of the highest importance, for science is based on numerical data, and the science of heredity is no exception to the general rule. The non-preservation of adequate records of pedigree stock is a cruel waste of opportunity, and has been most prejudicial to the acquirement of a sound knowledge of the art of breeding."

The Late Mr. J. J. Colman as an Agriculturist and Stock Breeder.

[FROM A CORRESPONDENT.]

BY the death—on Sunday last at Corton, near Lowestoft—of Mr. Jeremiah James Colman, British live stock interests have lost one of their best-known adherents. Mr. Colman had already won great success as a manufacturer and organizer of industry at the now world-famous Carrow Works, Norwich, when he turned his attention to agriculture, and more especially to live stock developments. Just thirty years ago, in the autumn of 1868, he entered on the occupation of the Easton Lodge Farm, some five miles east of Norwich. There he soon began to collect some of the most typical specimens of the Southdown shewe, and as there was much care and judgment shown in the selection, with special attention to the elements that should perpetuate the best characteristics of this variety of sheep, no very long time elapsed ere Mr. Colman was an exhibitor and prize winner. During the thirty years that have intervened there has been as much attention to the principles which were upheld at the foundation of the flock, and the results have been most noteworthy. Year after year has seen Mr. Colman as a successful Southdown breeding stock exhibitor at the Royal Agricultural, the Royal Counties, the Norfolk, Suffolk, and Essex Shows, while at the Smithfield Club and the Norfolk and Norwich Christmas Shows, highest honours have fallen to him for fatted sheep. Very recently it was announced that the Easton flock would be sold in the autumn of the year 1899, and of course, the death of its owner makes that event a certainty, and one that sheep-breeders will anticipate with no little interest, as there can be little doubt that the flock is second to none in the kingdom.

Mr. Colman has, however, done yet more for agriculture by his service in cattle breeding. When, in the summer of 1869, he resolved on founding a herd of Red Polled cattle at Easton, these Norfolk and Suffolk stock were in a transition state; they were not known outside the two counties, and nobody could say whether they were to advance or to be lost in the mass of non-descripts. The founding of a herd was a much more arduous matter than the formation of a flock. Though the earliest cattle bought were fairly good from the dairyman's point of view, Mr. Colman saw that it was a necessity to demonstrate that the cattle were also good beef producers. He entered the lists as an exhibitor in 1871 and was fairly successful, but after the Herd Book of the breed had been started in 1874—a bit of progress which he heartily supported—and more accurate knowledge was available, Mr. Colman spared neither labour nor money to help on the improvement of the local breed. How well he exerted himself the records of the Royal Agricultural, the East Anglian Societies, and the Smithfield Club for the last twenty-five years show, as do also the great general advance in value, and the fact that a preponderant portion of the wonderful progress that the Red Polled has made in the United States, traces back to Mr. Colman's herd. Champion honours again and again, and class prizes innumerable, have gone to Mr. Colman's representatives, both as breeding stock and as fatted stock. Those who knew the Red Polled of 1868 and can compare these with the Red Polled which Mr. Colman showed at the Birmingham "Royal" and at the King's Lynn, Norfolk, displays last June, will say that he has been the chief means of demonstrating that the Red Polled be a good milk-yielding animal, it is also a producer of the prime meat, and one of the handsomest of varieties. Mr. Colman has, however, also been among the most successful of exhibitors of fat cattle of his own breeding, or bought when young and trained on for exhibition. He has also been a Jersey breeder with much success. That he had a thought for the farmer less favoured, with a heavy purse, he has in recent years shown by his offers of prizes to be competed for by tenant-farmers' live stock—£50 for cattle, £25 for sheep.

In many another department of agricultural work Mr. Colman has been also prominent. He has been a steady friend of the Royal Agricultural Benevolent Institution; a member of the R.A.S.E. from 1870, and elected a Governor in 1880; a warm supporter of the local agricultural societies, both county and district; and a great aider of the efforts which have been so many years in operation to ally practice with science by carefully conducted experiments under the direction of the Norfolk Chamber of Agriculture. The success of the Norwich exhibition of the Royal Agricultural Society owed no little to Mr. Colman, and the British Dairy Farmers were also enabled to secure Mr. Colman as a warm friend of their efforts to improve the dairying interests. This is a brief sketch of what this prince of merchants has effected for British agriculture, which, by-products for his life, has not been complete in Parliament.

for the latter the celebrated Field Marshal. Bargains like this, of course, are not picked up every day.

Certain traits and peculiarities of disposition run for generations in families of farm animals, just as in branches of the human family. In one strain there is a certain flightiness, which breaks out unexpectedly and often very inconveniently; in another there is a thread of stubbornness; in a third a constant suspiciousness under every new condition, and so forth. A peculiarity will disappear for a generation, but one knows that a certain strain of blood is practically bound to bring it back. One of the most certain ways to strike out a quick nervousness, for instance, from a family of cows, is to mate them with an in-bred bull of a peculiarly solid and easy disposition; but the first cross is rarely enough in the case of suckled offspring, because the influence of a dam always goes for something. The nervous dam, ever sniffing danger, communicates her notions to the calf, and the improved brain of the latter is more or less affected by force of sympathy.

Young animals which are most playful, and which are fond of being noticed by the human kind, are usually the best, for they have the two prime qualifications of strong physical vitality and well-balanced brain power. In any case, they are ordinarily the best for man because they put themselves so readily in line with his desires. Our farm animals, however, are good readers in their way of human character. Very often they will discover a good-hearted individual or keep clear of a naturally harsh or fickle character before a casual observer in the human ranks has seen much to attract or repel him in the creatures of his kind which are under the "lower" observation. Dogs are phenomenally keen critics of human character, or at least of those phases of character which work unconsciously to the foreground. Horses and cattle are slower in the uptake, to use a northern expression, but they watch gesture, and study the tone of voice with wonderful attentiveness until they find the key of the new situation.

An argument in support of those who raise their voices against giving ardent liquors to horses is supposed to be found in a story that comes from Paris. According to the narrative, a Parisian wine-seller was in the habit of supplying his faithful steed with a portion of the contents of his stock when the animal seemed to be below par, and, as he imagined, with beneficial results. Of late, however, he seems to have noticed a shrinking of his stock, his suspicions becoming certainties when he heard a peculiar noise in his cellar a few days ago. On proceeding to investigate matters the worthy tradesman is reported to have discovered his horse lying dead drunk upon the floor, and surrounded by several empty wine bottles, the inference arrived at being that the animal had broken off their necks in order to reach their contents, which object, singular to say, he is stated to have accomplished without cutting his lips. In fact, the utter improbability attached to all the so-called details which have been received of the offences of this bibulous horse is so evident that the whole story vanishes into a cloud of irreconcilable contradictions; but it provides a warning to those who are apt to indulge their horses too liberally with draughts of alcoholic beverages. Beyond all doubt a drink of old ale, with or without the traditional toast in it, is appreciated by many a jaded horse; and rogues upon the turf have often been found to run as straight as could be desired after a dose of port wine or whisky has been poured down their throats. It is, moreover, quite a common practice in America to drench show horses with spirits before they enter the ring, but there may be carrying a good thing too far, and cases have been known of prizes being lost owing to an animal being stupefied by drink. A case in point is that of a celebrated greyhound which lost the Waterloo Cup in consequence of an overdose of alcohol, and therefore the fable of the Parisian steed of bibulous propensities may be referred to as conveying a very useful moral.

It is very desirable that in the purchase of draught horses some trial of their ability to work should be afforded before a bargain is completed. This cannot always be made under favourable conditions at the time of sale—for example, at a fair or at a horse auction, because the necessary appliances are lacking. In the Parisian market, a special track, the trial track, is reserved for this purpose, and heavy vehicles as well as sets of harness are placed at the disposal of the public. Unfortunately, say MM. Goubaux and Barrier, these sets of harness are neither so numerous nor so varied that they can be fitted to any horse. "Many of the animals," we are told, "are worried by a poorly-fitting collar, make a noise similar to that of roaring, an affection from which, in reality, they are entirely free."

"Compositing" Photographs.

A CURIOUS suggestion is offered by Dr. Francis Galton in his British Association paper upon "Photographic Records of Pedigree Stock," from which an extract is given in last week's LIVE STOCK JOURNAL, page 393. In order to consider it fairly I must quote Dr. Galton's words as printed, and two entire sentences are necessary. They stand thus:—

It may be said that, even if all the ancestral photographs were spread in full view on a table, no human brain could combine into a single mental image the peculiarities in feature even of the two parents and of the four grandparents, in the proportion laid down by the ancestral law. But a substitute for the mental picture may be obtained by compositing the photographs, allotting to each its appropriate time of exposure.

Both sentences are required to convey Dr. Galton's

meaning, but it is the thought in the latter sentence I wish to examine.

Suppose the photographs of ancestors, from a given number of generations back, all tributaries included, down to the point at which the influences of those ancestors meet in a single descendant, were so "composited," and the result, the composition, the picture compounded of all those photographs blended together in proportions according to the length of exposure, were seen beside the living descendant of those ancestors, what degree of resemblance between the composite photograph and the composite animal should we be likely to have?

In the first place we should remember that the ascendant animals were male and female in equal numbers. The composite photograph, consequently, would be of hermaphrodite character. If the photographs were of cattle, I am not quite sure that we should not see upon each side of each head a bunch of more or less transparent horns, of various shapes and lengths, instead of one solid or opaque horn combining all the different curves of the male and female horns of the photographic ancestry. And would not an effect similar in kind take place if the ancestry were horses, or other long-necked animals, carrying their heads at different heights? How, too, if they ranged in shoulder height from twelve to eighteen hands?

At the best, the photographs could show only the outside of each animal, and certainly not more than one-half of that. The "composited" photograph of a single pair of animals would give, say, a blend of as much of each of the two parents as we could see from standing points opposite to one side of each; but the inheritance even of outside characters depends much upon things within, things quite beyond the reach of photography, besides the extent to which inheritance in general may be subject to influences of environment.

But another point here presents itself. In "compositing" the photographs of ancestors, we have to remember that the later ancestors are themselves composites of the earlier, so that in blending the characters we are at once on the wrong ground. We are doing again, or endeavouring to do again, that which has been done already in the course of reproduction. If I blend in proportions according to their places in the steps of descent the photographs of the four grandparents and two parents of each of two animals, a male and a female, from which I propose to breed, so as to see what the offspring of the intended union should be like, I am doing what would seem to be a very unnecessary act, inasmuch as the natural process has already given me, in the two animals I propose to pair, a true answer to the question I wish to solve. Each of them represents the compound of one-half of the number of animals whose photographs are "composited," and the two together represent, so far, the sum total of results, so that in truth I have only to blend the photographs of the two animals which I propose to pair. All the rest of the "compositing" is done; and if I add to the blend of the photographs of my single pair the blended characters of their ancestors, I base my calculations upon false quantities, factors already dealt with in the natural process being doubled by my arithmetical process. I should be clearly upon a wrong basis of reckoning.

To say that ancestral influences do, in fact, assert themselves, and that stamens actually sometimes reproduce characters long latent, would be, although quite true, no answer to my objection. The blend, as proposed by me, would be a wholly untrue one, not touching the law of atavism in the smallest degree.

The collection of ancestral likenesses (photographs, if good and not improved by artistic touches after the sun's light had done its work, might be the best of all) would be useful indeed; and Dr. Francis Galton's recommendation of their use deserves more than consideration: deserves that steps should be taken to carry it into practice as far as may be found possible. Knowledge of as much of the character as a photograph can tell of, of as many ancestors as may conveniently have their "photographic records" preserved, would be serviceable to many breeders of live stock. The photographs of animals of distinguished merit are becoming more and more numerous. The preservation of them by breed societies might be usefully undertaken. But there is an obvious drawback to any scheme of general photographic records of registered stock. The mediocre multitude would become, in the course of time, if long preserved, mere lumber. The rule of geometrical progression would make the number so great as to be beyond the accommodation of private houses, and the process of reference at the offices of breed societies, if breeders generally availed themselves of those records, would necessitate large additions to each staff of clerks. Reproduction of all photographs of all registered animals would be impossible. The difficulty already experienced is to prevent works of registration from becoming too cumbersome. Perhaps the most feasible suggestion would be that breed societies should have presented to them for their acceptance good photographs of any animals the registering breeders or owners might choose to send. It must be optional to the person registering; and the question of preservation also must be optional to the society receiving the photographs. Possibly a small additional registration fee might be fairly required for photographs accepted for preservation. Thus the best types would be preserved for future reference. It is difficult to see how the preservation of photographs of lad and midding as well as of the letter and best animals could be made practicable.

WM. HOUSMAN.

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breed. To reach and to keep the highest place, the special object must be held in view, and all other objects sacrificed if necessary to the attainment and preservation of that one object. Exceptionally great skill may effect the combination of exceptionally great merit in different directions; but even the greatest skill will be hard taxed to preserve the combination, and to keep the balance of merit from falling to one side or the other. W. H.

William Charge Booth.

BORN JUNE 30, 1837, DIED SEPTEMBER 30, 1898.

The illness, arising from a weak heart, that befall Mr. Booth last winter, was scarcely expected to result so shortly in such a sudden termination. Last week he appeared well and hearty. On Friday morning he started with a friend to drive to the station on a visit to Lord Londonderry. The old phaeton, in which he drove so many years to and from Warlaby, was brought round to the Hall door; he had a little difficulty in mounting, but he took the reins and remarked to his friend as they started, how fresh and beautiful everything looked after the rain; suddenly, before the carriage was out of the drive, the reins dropped, he fell back, and was gone. The doctor happening to call pronounced death as instantaneous. His family were mostly away in Scotland, but the dreadful news that came to them with such terrible force, fell equally among his large and wide circle of friends. The funeral was fixed for noon on Monday. A very large number were unacquainted with the cemetery until after the funeral had taken place, while others who knew of the sad event could not possibly reach Catterick, where he was buried, in time. The muffled peal of bells, the large gathering of friends who did arrive, the crowds from Richmond and the adjoining villages all told of the deep affection in which he was held by rich and poor, high and low alike. A waggon with four farm horses drew his remains from Oran to the grave. The bare coffin laid on the black pall was covered with wreaths and flowers. The Bishop of Richmond, his personal friend, recited the service and gave an address on his valuable life and noble example, that few who heard it will ever forget. Sons and tears came from the crowd in the church, and even the Bishop himself once broke down. The beautiful choir, which he had trained and taken so much interest in, finally sang his favourite hymn—"Jesus, lover of my soul"—as he was lowered in the grave.

He was the youngest son of Mr. John Booth's seven children. The two eldest sons, Richard and Mark—the latter an artist—died young, but the names of Thomas Christopher Booth, of Warlaby, and John B. Booth, of Killerby, are well known to the present generation. Thomas died September 7th, 1878, aged forty-five; John died June 23rd, 1886, aged fifty-one. William joined the Navy, and passed much of his early life at sea. He returned to England, married, and settled down at Oran, where his natural inheritance of blood stock and Yorkshire taste led him to get a few thoroughbred and hunters, and with "The Hunt" he won several races. The death of his brother Thomas was a terrible grief to him, but he was equal to the emergency, and played a good father's part to the widow and eight young children left, as well as to the herd at Warlaby, of which he was trustee. No man was more self-sacrificing. Winter and summer, every week, and at times oftener, he drove over to watch and look over his great charge; for times were good and herds were valuable. A year later, 1879, the tide began to turn; that black year inaugurated the agricultural depression that is even now keenly felt; prices fell, herds began to be given up, and it was apparent to many breeders that the old blood of the Warlaby herd needed refreshing. On the other hand, the older school of breeders adhered to the purity lines. No man had a more difficult post to fill in doing his duty to the family inheritance, and yet keeping together the old supporters of the blood. He introduced the Aylesby Flowers through Knight of the Heather and Flower King, the Scotch strain through My Favourite, the Irish strain through Royal Rover, the blood of the Alnwick herd through Hopeful and St. Patrick, and the Aylesby Ws. through Lord Powarth's Windsor Royal. It was generally conceded that these introductions had not been on the whole so beneficial, yet when the young family came of age, and it was decided to sell the bulk of the Warlaby herd, June, 1895, the Windsor Royal heifers made the highest prices, and the purists could point to Sir Lucius Studley as admittedly the finest specimen of a Short-horn bull in the kingdom.

The death of his brother, Mr. John Booth, in 1880, who left a wife and two young children, necessitated different action. The herd was sold at Killerby in October of the same year; fifty-seven head averaged £97 Gs. 4d., and the estate let. It should be perhaps, however, mentioned that at the Warlaby sale, June, 1895, forty-eight head averaged £135 Gs. 0d. The old cows and calves then retained have been reproductive, and at the present time the herd under Mr. Richard Booth's management numbers about forty.

In 1892 Mr. Talbot Crosville, of Ardfort Abbey, Ireland, suggested that some recognition should be made of Mr. Booth's generous services. Whereupon a number of breeders subscribed and presented him, at a dinner given in his honour at the Langham Hotel, London, December 5th, 1892, with a large, handsome silver cup, candelabra, and canister. On the cup, which was presented by Mr. Charles Polo-Gell—in a very happy speech, for Mr. Booth knew nothing of the presentation even when at the dinner—was engraved:—"Presented to William Charge Booth, of Oran, Yorkshire, by a few personal friends, at whose desire he

"undertook the supervision of the herd at Warlaby on the death of his brother Thomas Christopher Booth in 1878."

He was a very active member of the Yorkshire Agricultural Society, also of the Short-horn Society, and only last year was its President. In his own county he was a member of the North Riding County and District Councils, and was an enthusiastic knight of the Pinrose League as he was of the local volunteer corps, of which he was major. His eldest son is in the Army, and now doing active service in West Africa.

At social gatherings he was a host in himself, and only on the Tuesday evening before the fatal Friday gave his services at a concert at Gilling for the benefit of the Richmond Victoria Jubilee Hospital. He was a ready and very happy after-dinner speaker, as well as at political meetings, and could sing a good song, his rich, full, melodious bass voice sending a thrill through his audience. No man was more generally beloved; his keen sympathy with those "distressed in mind, body, and estate" was felt and expressed in a manner that brought balm to many a weary spirit. To his church he was devotedly attached; the grand old building at Catterick attests his active helpful efforts by its fine organ, its bells, its windows, and especially its choir, and the services, at which he was a devoted attendant.

He lived and acted a Christian, self-sacrificing and helpful, either by word or deed, and as the Bishop eloquently remarked, he was a man whose life was a noble example to others, and one "who will be missed indeed."

Scraps.

It is scarcely likely that the whole science of equitation will be revolutionised in consequence of the extraordinary success which has attended the American jockey Tod Sloan since his recent reappearance on the English Turf; but, on the other hand, there can be no denying the fact that the methods of a rider who can win eighteen races out of thirty are entitled to respect. Sloan's theory consists of placing as much of his weight as possible on the withers of his mount, and at the same time carrying his body so forward as to almost lie along its neck, this style being adopted with the view of offering as little resistance as possible to the air, whilst at the same time placing the weight where it can most easily be borne. No doubt the possibility, which the success of the rider referred to have almost caused to be accepted by race-goers as a certainty, that a horse can carry his rider with less exertion when the latter is practically on his withers, may have the effect of causing some modification of opinion regarding the qualifications of weight-carrying horses; but it may be observed that the famous Jem Robinson of the past, and in later days George Fordham, both practised similar methods to those of Sloan. It will be interesting to see the effects which his series of successes will create in the seats of hunting men, but under any circumstances there is very little probability that Sloan's example and style will be copied by equestrians generally, as, though undoubtedly effective when races have to be won, they can scarcely be regarded as graceful.

The consistency of some horses, so far as their speed over certain distances is concerned, is remarkable, but surely the reliability of the champion pacer Star Pointer eclipses that of any other animals. Five times already has this celebrated horse beaten two minutes, four of these great performances having been accomplished within the last two months; but hitherto the 1 min. 59 secs. dead has proved beyond his capacity. On August 28th, 1897, his time was 1 min. 59½ secs., and this was repeated on August 6th last. Twenty-two days later he was ½ sec. slower, whilst his two subsequent efforts to lower his own record on September 1st and 17th were still more unsuccessful, as it took him 1 min. 59½ sec. upon each of these occasions to cover his mile. It is, nevertheless, worth recording that in the course of these two later trials, Star Pointer's times for the quarter and half and three-quarter miles were faster than upon the occasions when he completed the whole distance most speedily, his fastest quarter being on September 17th, 1898, namely, 28½ sec., his fastest half-mile, 57½ sec., being also travelled on September 17th; whilst his fastest three-quarters, 1 min. 28½ sec., was covered on September last. Whether these times may be taken to prove that Star Pointer is developing sprinting powers and a corresponding loss of stamina, is a matter which experts in pacing must decide for themselves, but Star Pointer, whatever he may be able to accomplish in the future, will always be remembered as the first horse to beat two minutes, whilst it may be added to his credit, that having once done so he repeated the performance four times.

"I must needs say," writes Gervase Markham in 1617, speaking of hunting horses, "that if the records of ancient writers be true, the horses in our days are nothing so tough and enduring as were the horses of former ages; for one author writes, that the Sarmarians, being intended to take upon them a long journey, would keep their horses fasting for two days before, but only for a little comfortable drink, and then would gallop them a hundred and fifty miles without breathing; others tell us other tales of no much incredulity, of the horses of Scythia, Greece, and Barbary, by which we may gather that questionless horses have endured labours beyond imaginations; and truly in these our days should a man but compare and measure the many miles, the rugged and deep ways, and the intricate and winding passages which a hunting horse passeth in a day, in one of our English hunting matches, and therewithal takes into his consideration with what wonderful swiftness, strength, and spirit, they are performed, he shall find them little short of those old reports, and far beyond either our hopes or expectations; yet thus much I must let you

understand, that there is not any horse which naturally, out of his own spirit, being put to his own choice of food, and to the liberty of his own order in feeding, which is able to do the least part of those infinite labours which we see daily performed by horses of contrary keeping. La Broue, who is the grand-master of the French cheneviers, and whose precepts carry general authority with our English riders, he said, that for horses for service in the wars, there is nothing more profitable than sometimes to hunt them, and ride them after swift chases, both because it makes a horse light and nimble, enabling his wind and making him fit for travel, and also breeds in him a kind of civility and acquaintance with other horses, and takes from him evil thoughts and malicious humours, proving by his proposition that this hunting of horses brings to a horse two benefits, that is, nimbleness and strength, and takes from him two vices, barbarous rancidness and fantastic restlessness."

The *American Agriculturist* has challenged the statistics of the United States Department of Agriculture as regards both the total number of sheep and the yield of wool. That journal concludes, as the result of special investigations, that the sheep are over-estimated, and the wool under-estimated in the official reports. The total number of sheep in the United States is put at 32,601,000, and the total wool clip at 248,586,000 lb. The clip of wool is thus put at a lower total than in any recent year. Evidence accumulates that there will be a great extension of sheep-breeding this autumn, and that the "range country" will be called on to supply thousands of breeding ewes to farmers in the Eastern States. Sheep breeding has almost been abandoned by the Eastern farmers, but the enormous increase in the consumption of mutton, and the advancing prices of wool are turning them again to the flock. It is stated that the officials of the Chicago Union Stock-yards are undertaking a canvass of the Eastern States to find customers for breeding ewes, and that they anticipate a demand for about 600,000. The drought in Australia which is said to have caused very heavy losses of sheep, is cited as one explanation of the improvement in the sheep breeding outlook in the States.

Photographic Records of Pedigree Stock.

In the last number of your JOURNAL Mr. HOUSMAN has raised an objection to my method of calculating the probable characteristics of the future offspring of pedigree stock. He considers that I reckon the effects of ancestry twice over. He argues that the parents are bodily composites of their respective ancestry; and that by making a composite which includes the two parents and their ancestry, I fall into a serious blunder. This argument is specious, but it is quite untenable. I have not done what Mr. HOUSMAN imagines. Instead of the simple parental value, I take a mean value consisting of one half of the actual parental value, and one half of the calculated parental value. The use of symbols makes this perfectly clear. Let *F* be the father, *M* the mother, *f* the calculated value of any specified character in the father, and *f + x* its real value. Similarly let *m* and *m + y* be the calculated and real values respectively, of the same characteristic in the mother. The calculated value is the most probable one. It is apt to differ from the real value for the same reason that an individual member of a family of brothers is apt to differ from the mean of all of them. Mr. HOUSMAN says the calculation for the offspring should be ½{*F + M*}. I say it should be ½{*f + (f + x) + m + (m + y)*}. In other words he ignores any difference that may exist between the calculated and real values of the parents, and I do not. Where there is no difference between the two, my method is identical with his. Thus, if *x* and *y* are each equal to 0, *F* will = *f*, and *M* will = *m*, and my formula will become ½{2*F + 2M*} = ½{*F + M*}, which is that of Mr. HOUSMAN.

But I must excuse myself from entering further into newspaper controversy. Mr. HOUSMAN has evidently misunderstood me in other particulars, and it would be tedious to explain. My paper is not yet published, and though I expect advance copies daily, its first formal appearance will be in the forthcoming journal of the British Association. (I may add that a few copies which were not finally revised, were circulated by me to friends just before and after the time it was read). I am at present engaged in making experiments on photography and measuring cattle, and should be very grateful for private communications containing helpful advice from breeders of stock, and from animal photographers. 42, Inland Gate, S.W. FRANCIS GALTON.

Agricultural Returns.

The preliminary instalment of the Agricultural returns gave figures for Great Britain as a whole in relation to certain crops and cattle, sheep, and pigs. Now we have, in the Board of Agriculture Journal, the details for the main divisions and the several counties. As to live stock, the returns show increases of cattle in England and Scotland, and a decrease in Wales; increases of sheep in all three; and a decrease of pigs in Scotland alone. The figures for the main divisions of Great Britain are as follows:—

		CATTLE.	SHEEP.	PIGS.
		No.	No.	Do.
England	1898	4,071,503	15,282,538	1,000,000
	1897	4,507,234	15,721,513	1,000,000
Wales	1898	701,777	2,815,000	100,000
	1897	700,180	2,815,000	100,000
Scotland	1898	1,244,224	7,000,000	100,000
	1897	1,222,648	7,000,000	100,000

limitation to the power of his draught." After the trial the wagons were weighed, the twelve weighing 38 tons 4 cwt. 2 qrs., the four added afterwards 13 tons 2 cwt., and the supposed weight of the fifty men was 4 tons; total, 55 tons 6 cwt. 2 qrs. Can the massive Shire-bred hunter of to-day beat this record? Perhaps a railway horse superintendent will tell us!

The same book also contains the copy of an epistle from "Eclipse," the famous racehorse, to his son, King Fergus, which runs as follows:—"Dear Son,—I set out last week from Epsom, and am safe arrived in my new stablestall this place. My situation may serve as a lesson to me; I was once the fleetest horse in the world, but old age has come upon me, and wonder not, King Fergus, when I tell thee I was drawn in a carriage from Epsom to Cannons, being unable to walk even so short a journey. Every horse, as well as every dog, has his day; and I have had mine. I have outlived two worthy masters, the late Duke of Cumberland, that bred me, and the Colonel, with whom I have spent my best days; but I must not repine. I am now caressed, not so much for what I can do, but for what I have done; and with the satisfaction of knowing that my present master will never abandon me to the fate of the high-mettled racer! I am glad to hear that my grandson Honest Tom performs so well in Ireland, and trust that he and the rest of my progeny will do honour to the name of their grand sire.—ECLIPSE, Cannons, Middlesex. P.S.—Myself, Dungannon, Volunteer, and Vertumnus are all here. Compliments to the Yorkshires horses."

The late Mr. William C. Booth's celebrated horse The Beau, after winning thirteen hunter races in succession, was beaten, much to the surprise of his owner, and Mr. Hutchinson, who generally rode him, by a horse Anacron at Ayr, where the latter was trained by Steele. Anacron was very well bred, being by Boird, but had a dreadful temper, and of this a good story used to be told of him before he went into Steele's hands. He was to be accompanied by rail three stable companions to a Scotch meeting; but the only man who dares enter his box, a local saddler, could not be found. So he was left behind. The others all failed in their engagements, and the stable party was disconsolately returning home when who should ride up but the saddler on Anacron, who was entered for the last race. He was hurried to the post, and being in a good mood won. The trainer's wife had sent him on by a second train as soon as the saddler turned up.

Photographic Records of Pedigree Stock.

MR. GALTON'S reckoning under this head (page 455) treats as a vulgar error the notion that an animal is a composite of its father and mother. Instead of "Half is his and half is thine: it will be worthy of the two," we must say "Quarter his and quarter thine: it will be worthy of the half." Then where is the other half? Is it in "environmental influences," or in animals which have lived, say, in the parents, grandparents, great-grandparents, and antecedent progenitors of the immediate parents of the individual whose pedigree we examine? If in those progenitors, are not all of them already included in the sire and dam?

Suppose one should contend that they are not so included, and that we must therefore make separate calculations for the influences of grandparents as influences which somehow reach the grand-offspring; otherwise than through the intermediate generation. Then, going back as far as we will, a fraction must always be beyond our reach. Let us even trace a man's genealogy to Adam and Eve, and have we not still, on the principle of taking each parent as only one-fourth, a fraction not included in the sum total?

I suggest these questions in the desire of obtaining from a competent source an explanation which shall commend itself to all intelligent readers, and not to provoke that which Mr. GALTON wishes to avoid—a newspaper controversy. I would much rather that either Mr. GALTON or any other equally competent student of hereditary powers, who has adopted the reckoning of the one-fourth proportion—as that which each parent contributes to its immediate offspring, should state the principle upon which that proportion is assumed, than myself endeavour to show it from what I take to be Mr. GALTON'S meaning. No doubt the subject will be well discussed in the circles of science, and eventually the outcome of discussion will reach the ordinary live stock breeders in some form as to enable them to apply in their practice those rules of reckoning which shall appear to give on the average approximately true results.

To myself, so far, a doubt remains as to the question whether confusion does not sometimes occur between the transmission of hereditary influences (which may be some time latent) and the outward manifestation of those influences in likeness to parents or to earlier ancestors. WM. HOUSMAN.

P.S.—In his paper read before the Zoological Section of the British Association, Mr. GALTON says that "the ancestral law" is that, on the average, the two parents contribute between them one-half of the total heritage of the offspring; that the four grandparents contribute between them one quarter, the eight great-grandparents one-eighth, and so on." My position is—that no ancestral influence whatsoever can reach an animal unless it be transmitted to that animal by its immediate parents. The two parents, therefore transmit to the offspring the whole of the ancestral influences which control its characters and qualities; and without here discussing the question of conditions under which the male of the female parent's influence may prevail, I agree with Mr. GALTON in allowing an average of equal proportions to the respective influences of father and mother. The influences of environment, although to be taken into account as sometimes causes of variation, are apart from the question at issue. W. H.

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MCMULLEN, A. P., HERRINGFORDHURRY PARK, HERTFORD. Shire Horses: Iron Chancellor 14677, winner of many prizes. Popular Victor by Mars Victor, many Stallions and Colls for sale or hire. Mares and Fillies of best breeding and in work.
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MUNZT, P. ALBERT, M.P., DUNSMORE, RUGBY. Shire-bred Stallions, Colls, Mares, and Fillies, about hands and all ages. Prize winners, Royal Agricultural, London, and other leading shows. Also high-class Shropshire Sheep, winner 1st prize at Royal Agricultural 1892; 2nd prize, 1887; 1st prize, 1888.—Apply, THOMAS EWART, Dunsmore Farm, Rugby.
OSWENTON, GEORGE, MARINERS, WESTERHAM. Breeder of Pedigree Shires and Pedigree Aberdeen-Angus Cattle.

FARNELL, J. RUGBY. Stud of Shire Horses of the most fashionable and noted strain; kept in natural condition. Stallions and Mares for Sale.—Apply, Mr. HOWERS, Manor Farm, Woolcock, near Rugby. Telegrams: HOWERS, Danochurch.

FRATT, MESSRS. I. AND SONS, MELTON, WOODBRIDGE, SUFFOLK. The largest stud of Suffolk Horses. Winners in 1897 of the Champion Cup at the Royal Show, Manchester, Champion Prize at the Suffolk County Show, and Special for best collection, besides numerous class premiums. Stallions, Mares, Fillies always on sale.—Letters to ARTHUR T. FRATT, Chillesford, Wickham Market, Suffolk. Telegrams to Chillesford, Orford.

ROWELL, JOHN, BURY, HUNTINGDON. Breeder Pedigree Shires and Hackney Stallions for sale or service; also Colls, Mares and Fillies for sale.

SALT, W. CECIL, DAIN FARM, WILLINGTON, BURTON-ON-TRENT. Shire Stallions for service: Albert Edward 5467, Valesman 14918, Prince Charles 16322, Royal Regent 16085, Gabriel 14064, Sir Anthony 12286, Sir Edwin 14488. Inspection invited.

SMITH, ALFRED JAMES, RENDLESHAM, WOODBRIDGE, SUFFOLK. Breeder of Pedigree Shires. Stallions for service: Albert Edward 5467, Valesman 14918, Prince Charles 16322, Royal Regent 16085, Gabriel 14064, Sir Anthony 12286, Sir Edwin 14488. Inspection invited.

STEPHENS, M.P., CHOLDERTON Stud. Thoroughbreds of high-class, with great power; specially suitable for Hunter sires and Racehorses; also Mares of same class.—Apply, MANAGER, Cholderton, Salisbury.

SUTTON-NELTHORPE, R. N., SOAWBY HALL, LINCOLNSHIRE. Shire Horses and Mares. Only high-class animals kept of the best blood that can be found. Inspection invited. Seven minutes' walk from Soawby Station, Great Central Railway.—Apply as above, to G. F. FRASHER-DRAKE.

TAYLOR, GARFETT, TROWSE HOUSE, NORWICH. Stallions, Mares, and Fillies of the Shire and Hackney breeds for Sale.—Kirby Bedon Stud Farm.

TEMPLE, JAMES WILLIAM. Breeder of Pedigree Hackneys. At Stud: Doncaster 2940, Lord Marton 2282, Col. Gordon. Leywood Brilliant 5678. All the above are winners of first prizes at leading Shows, and Doncaster was champion at the Royal. For fees, pedigrees, &c., apply STUD GROOM, Leywood, Groombridge, Sussex.

THOMPSON, W. and J., BARRON'S PARK STUD, DESFORD, LEICESTER. Breeders of Pedigree Shires. Stallions for service: Hitchin Conqueror 4458, Champion London, 1890; Stonehall 18375, Cup Winner London, 1895; Sopwell Duke 14908, Commended London, 1895; Eastoft Lad 14019, Sire Lincolnshire Lad II. 1866, 4th, London, 1895; Desford Vulcan Chief 10110, Champion Ashbourne, 1895; Colheridge Swell 1899, 2nd L.S.H. Show, 1895.

WHITWORTH, ROBERT, WATLEY STUD, HALIFAX. Hackney Stallion Edemung 5669, Pony Stallion Doncaster Model 5979. A few fashionable Hackneys, Carriage Horses, and Hunters always on sale.

WINGATE-SAUL, LANGSTOCK. Stud Horse, the Double Champion Reserve General Gordon 2084. Stock by him head the list in Vol. XII. H.S.B., they having over 50 per cent. more prizes than the combined total average of the two greatest sires known, one of which was Danegelt. Young Stallions and Mares by this champion sire of winners on Sale. Stables adjoin Leamwater Main Line Station. Letters and telegrams as above.

WHOLEY, ERNEST A., ALMUNDREY, HUNTERSHEAD, has always a few high-class HARNESSES HORSES, MATCH PAIRS, &c., thoroughly broken.—Apply as above.

Horses.

The number of horses exported during the nine months ended September 30th was 25,343 against 23,910 during the corresponding period of last year. Of that number 14,446 went to Holland against 12,131 last year; 5,010 to Belgium against 5,118; 3,346 to France against 3,494, and 2,841 to other countries against 2,197. The value of the horses exported was £820,711 against £591,847, the increase being chiefly in the animals sent to Belgium. The number of horses imported during the nine months was 39,192, against 40,616 last year. The United States sent 31,235, against 22,252; Canada 5,152, against 8,052; and other countries 9,805, against 10,312. The value of the horses imported was £932,737, against £1,010,673 last year.

THOUGH in the South October has brought no much-desired autumn rain-floods, in the North there has been a great deal of rain following on occasional sharp touches of frost. Draught-horse breeders are busy with their foal shows, and the successes of particular sires with these are carefully noted by hiring clubs, who would do well also to mark at the same time the prices realised for geldings got by old horses still in use. Stallion owners seem inclined to keep the old terms of service.

If the relaying of street pavements seriously interferes with the conduct of traffic for a time, compensation comes in the end in the giving of a good foot-hold for horses when the first frosts set in. Saucer-shaped hollows in the worn-out wood are frequent causes of slipping and stumbling, and if a fall is escaped sinews and tendons are sometimes severely strained.

In one respect at all events the American Inspector-General of Remounts, assuming that such a functionary exists, possesses an advantage over the English prototype, as he apparently is not compelled to seek for a very high...

to the details of the Agricultural Holdings Bill, and he reminded them that a Bill of this kind brought in in the House of Commons would not be discussed as there from the agricultural tenants' point of view. A Minister would not be so mad and foolish as to take the responsibility of bringing in a Bill, unless he was sure he could receive the necessary time and attention. Regarding the resolution on the marking of foreign meat, he said that was not a purely agricultural question, but was also a question as to which there was great controversy. It was one of these questions he did not quite understand that raised in the House of Commons the unfortunate point of conflict between the interests of town and country. He must say it was a monstrous injustice that they should have to face, not merely competition which was proper and legitimate, but in addition they should have articles which were not what they presumed to be sold in the name of our articles because a better price could be commanded. He was hopeful that they might find some way of checking, if not preventing, what was an undoubted injustice. The butchers' boycott movement had been characterized as a most deplorable and suicidal conflict. Concerning the discussion on tuberculosis, Mr. Long said that what the Commission recommended was that the Government should supply tuberculin, and pay if veterinary surgeons applied it in a proper manner. That was a very small expenditure—only something like £5,000. They had had from all directions explicit declarations as to the value of tuberculin, but he had been compelled to ask that there should be some evidence that the agricultural public were prepared to make use of this remedy. Up to this time no such evidence had been given. Not a corporate body or a single individual had applied, and the only resolution attempted to be passed had been rejected. He thought he was entitled to ask the agricultural community to speak out clearly and distinctly before he asked the Government to provide this tuberculin for their use. When this was done he would be quite prepared to ask the Treasury for the money. He was bound to say that the visit paid to Sudbury did not lead him to believe that the process was so easily carried out as some people seemed to think. He hoped and trusted that they should be in a position to pass the Agricultural Products (Adaptation) Bill.

Mr. Long, General Gaters, and Colonel Wauchope spoke at the annual dinner of the Chamber of Agriculture held in the evening.

Meeting of Show Officials.

A MEETING of show officials was held on Tuesday afternoon at the Agricultural Hall in the Bedford Saloon, kindly placed at the disposal of those present by Messrs. Probyn. The proceedings opened by the CHAIRMAN calling upon Mr. Vero Shaw to read the circular which had been sent out to the secretaries and managers of agricultural and horse shows, and the reply thereto—some fifty in number—which had been received. Although the latter were almost without exception most strongly sympathetic with the objects before the meeting, it was felt that, owing to the fact that the majority of the writers had not had an opportunity of learning the views of the councils of their respective societies, it would be desirable to refrain from publishing their letters, and for the same reason it was decided that for the present, at all events, the meeting itself should be regarded as a strictly private gathering. At the same time it may be stated, without betraying any confidence, that the letters read came from show officials residing in all parts of the country, including Scotland and Ireland, and that the expressions of good will towards the objects of the meeting were very heartily expressed in the majority of cases. Regarding the composition of the meeting held on Tuesday, it may also be said that there were representatives of London, Yorkshire, West Country, Midland, East Anglian, and South of England shows, and that both letters and telegrams were read from secretaries who were prevented at the last minute from coming owing to indisposition or the pressure of business engagements.

Regarding what transpired, it may be stated that an unofficial discussion of some considerable length took place with reference to the desirability of shows acting more closely in harmony with each other, and of endeavours being made to avoid the clashing of dates. The question of the universal adoption of one arrangement of prize colours was also touched upon; and the possibility of a common line of action being taken as regards the attitude that should be taken up by agricultural and horse shows towards exhibitors and their servants who misbehave themselves was earnestly discussed.

The opinion, however, was generally expressed that owing to the informal and unofficial composition of the meeting, it would be undesirable to move any resolution upon these subjects, but it was proposed, seconded, and carried unanimously, that "in the opinion of those present it is desirable that an association of agricultural and horse shows be formed." It was further decided that Mr. Vero Shaw be requested to take steps to acquaint the secretaries of such shows with the views of the meeting, and to urgently request them to lay the same before their respective societies, the meeting being assured that not only would such an association as that proposed be the means of uniting agricultural and horse shows to their mutual advantage and protection, but that it would form a new and valuable medium as a means of communication between exhibitors and shows. It was finally decided that another meeting should be held in London during the cattle show week; those present meanwhile pledging themselves to do all in their power to ensure the establishment of such a Society as that referred to in the resolution given above.

We are requested to state that Mr. Vero Shaw, who has been entrusted with the duty of making arrangements for the next meeting, will very gratefully receive

any suggestions or communications from those interested in the success of the proposal to form an association. Letters on the subject may be addressed to him, Crystal Palace, London, S.E.

The Ancestral Law.

TO THE EDITOR OF THE LIVE STOCK JOURNAL. SIR,—I venture to ask that you will afford space in your columns for the following concise account of a memoir published by me last year, in which the truth of the Ancestral Law (as it is now called) was verified. I do so because of its obvious bearing on the interests which your JOURNAL represents, and because some misapprehension exists as to the character of the law—certainly in the mind of your esteemed correspondent, Mr. HOUSMAN. What I propose is to reproduce extracts from the memoir that shall afford a just idea of the results arrived at, and no more. It is impossible to give a brief and popular account of the statistical treatment by which these results were reached, so I must refer persons who care to know more about that to the memoir itself. I send a spare copy of it for your own use, in which the selected passages are pencilled.

42, Rutland Gate, S.W.

FRANCIS GALTON.

Extracts pieced together from my memoir on "The average contribution of each several ancestor to the total heritage of the offspring."—"Proceedings Royal Society," Vol. 61 (1897).

"In the following memoir the truth will be verified in a particular instance, of a statistical law of heredity that appears to be universally applicable to bisexual descent. I stated it briefly and with hesitation in my book, "Natural Inheritance" (Macmillan, 1889; page 131), because it was then unsupported by sufficient evidence."

"I have had great difficulty in obtaining a sufficient amount of suitable evidence for the purpose of verification. A somewhat extensive series of experiments with moths were carried on, in order to supply it, but they unfortunately failed, partly owing to the diminishing fertility of successive broods and partly to the large disturbing effects of differences in food and environment on different broods and in different places and years. No statistical results of any consequence or value were obtained from them. Later, however, while engaged in planning another extensive experiment with small, fast-breeding mammals, I became acquainted with the existence of a long series of records, preserved by Sir Everett Millais, of the colours during many successive generations of a large pedigree stock of Bassett hounds, that he originated some twenty years ago, having purchased ninety-three of them on the Continent with this purpose. These records afford the foundation upon which this memoir rests."

I then state the law which has since been often re-stated; namely, that the two parents contribute between them one-half of the total heritage of the child; the four grandparents, one quarter, and so on. Since $\frac{1}{2} + \frac{1}{2} + \frac{1}{4} + \frac{1}{4} + \dots = 1$ the whole heritage is thus accounted for.

"It should be noted that nothing in this statistical law contradicts the generally accepted view that the chief, if not the sole, line of descent runs from germ to germ and not from person to person. The person may be accepted on the whole as a fair representative of the germ, and, being so, the statistical laws which apply to the persons would apply to the germs also, though with less precision in individual cases. Now this law is strictly consonant with the observed binary sub-divisions of the germ cells, and the concomitant extrusion and loss of one-half of the several contributions from each of the two parents to the germ-cell of the offspring. The apparent artificiality of the law ceases on these grounds to afford cause for doubt; it is close agreement with physiological phenomena ought to give a prejudice in favour of its truth rather than the contrary."

"The Bassets are dwarf bloodhounds, of two, and only two, recognised varieties of colour. Excluding, as I have done, a solitary exception of black and tan, they are either white, with large blotches ranging between red and yellow, or they may in addition be marked with more or less black in the former case. They are technically known and registered as "lennon and white," in the latter case as "tricolour." Tricolour is, in fact, the introduction of melanism, so I shall treat the colours simply as being "tricolour" or "non-tricolour"; more briefly as T. or N. I am assured that transitional cases between T. and N. are very rare, and that experts would hardly ever disagree about the class to which any particular hound should be assigned. A stud book is published from time to time containing the pedigrees, dates of birth, and the names of the breeders of these valuable animals. The one I have used bears the title "The Basset Hound Club Rules and Stud Book," compiled by Everett Millais, 1874-1890. It contains the names of nearly 1,000 hounds, to which Sir Everett Millais has very obligingly, at my request, appended their colours, so far as they have been registered, which during later years has almost invariably been done. The upshot is that I have had the good fortune to discuss a total of 817 hounds of known colour, all descended from parents of known colour. In 847 out of these 817, the colours of all four grandparents were also known."

Table I. gives the results derived from these. Again in 188 cases out of the above 507 the colours of all the eight great grandparents were known as well. The results of these cases appear in Table II.

"Partly owing to inequality in the numbers of the tricolours and non-tricolours, and partly owing to a selective breeding in favour of the former, the different possible combinations of T. and N. ancestry are by no means equally common. The effect of this is conspicuous in the tables, where the entries are huddled together in some parts and absent in others. Still, though the data are not distributed as evenly as could be wished, they will serve our purpose if we are justifying in groups them without regard to sex. "Our first inquiry then must be, is or is not one sex so markedly prepotent over the other, in trans-

mitting colour, that a disregard of sex would introduce statistical error?"

(It would occupy too much space if I attempted to describe the ways in which this inquiry was made; suffice it to say that the error liable to be caused by not taking sex into account, is insignificant.)

By methods fully described in the memoir, I found "co-efficients" appropriate to each of the various cases in Tables I. and II. By multiplying these co-efficients into the total number of offspring in these several cases, a figure was obtained that gave the "calculated" number of the offspring that were tricolour. Fractions have been disregarded. Thus for the upper left-hand place in Table I, the coefficient was found to be 0.91. The total number of offspring was 119. Now, $0.91 \times 119 = 108.29$, so, the 0.29 being disregarded, the "calculated" number of tricolour offspring is entered as 108. The highest coefficient in the two tables applies to the top left-hand corner of Table I, and is 0.96; the lowest applies to the bottom of right-hand corner of II., and is 0.18. A few observed cases occur outside the limits of the two tables; they are of no importance.

In the following tables I have extracted such portions of two of those in my memoir as will illustrate the above extracts, and show the extraordinary correctness of the ancestral law in this particular case, the only one in which I have as yet been able to verify it directly on a large scale. It will be seen that the grand totals agree closely, viz., 391, 387; 180, 181; that the totals of each line agree very well, viz., 53, 56; 52, 56; 9, 9; 8, 8; 49, 46; 0, 8; and that the individual pairs also agree well. There are 32 pairs in all, 10 in the first table, and 22 in the second, and with the exception of two pairs in the latter (8, 12; 18, 8) the accordance is marvellous. I will conclude with one more extract.

"In order to satisfy myself that the correspondence between calculated and observed values was a sharp test of the correctness of the coefficients, I made many experiments by altering them slightly, and recalculating. In every case there was a notable diminution in the accuracy of the results. The test that the theory has successfully undergone appeared on that account, to be even more searching and severe than I had anticipated.

"It is hardly necessary to insist on the importance of possessing a correct law of heredity. Vast sums of money are spent in rearing pedigree stock of the most varied kinds, as horses, cattle, sheep, pigs, dogs, and other animals, besides flowers and fruits. The current views of breeders and horticulturists on heredity are contradictory in important respects, and therefore must be more or less erroneous. Certainly no popular view at all resembles that which is justified by the present memoir. A correct law of heredity would also be of service in discussing actual problems relating to hereditary longevity and disease, and it might throw light on many questions connected with the theory of evolution."

CALCULATION AND OBSERVATION COMPARED.

(See not taken into account.)

I. PEDIGREES UTILISED UP TO THE SECOND ASCENDING GENERATION.

No. of parents who were tricolour.	No. of tricolours in the offspring.	No. of Grand-parents who were tricolour.				Totals.	
		4	3	2	1	Calculated.	Observed.
Both	Calculated ..	108	90	51	8	256	—
	Observed ..	100	101	54	8	—	259
One	Calculated ..	24	26	3	—	140	—
	Observed ..	20	70	36	4	—	129
Neither ..	Calculated ..	—	—	5	1	6	—
	Observed ..	—	—	7	2	—	9
Grand Totals ..						391	387

II. PEDIGREES UTILISED UP TO THE THIRD ASCENDING GENERATION.

No. of Parents and of Grandparents who were Tricolour.	No. of Tricolours in the Offspring.	No. of great grand-parents who were tricolour.					Totals.			
		8	7	6	5	4	Calculated.	Observed.		
Both	Four ..	Calculated ..	2	24	18	14	—	53	—	
		Observed ..	—	25	18	15	—	—	50	
	Three ..	Calculated ..	—	10	18	18	6	52	—	
		Observed ..	—	17	10	14	6	—	50	
	Two ..	Calculated ..	—	2	2	2	—	10	—	
		Observed ..	—	—	2	3	—	—	9	
One	Four ..	Calculated ..	—	1	1	0	—	8	—	
		Observed ..	—	1	1	6	—	—	6	
	Three ..	Calculated ..	—	1	7	8	18	5	40	—
		Observed ..	—	1	10	12	8	9	—	40
	Two ..	Calculated ..	—	—	2	7	—	9	—	
		Observed ..	—	—	1	7	—	—	8	
Grand Totals ..						180	181			

The report that Mr. Edward Lloyd, the famous tenor singer, will, in his retirement, devote attention to the breeding of live stock, has recalled the fact that other eminent musicians are interested in horses and cattle. M. Jean de Reszke is well known to be a breeder of horses, and has won many prizes for his stud. Another great Wagnerian tenor, Heinrich Vogl, the original Lohengrin in "Der Ring des Nibelungen" both at Bayreuth and at Her Majesty's Theatre, London, has just received a prize for his cows at the Agricultural Show of Bavaria, held at Munich. M. Paderewski, the pianist, has on his estate in Poland also recently taken to the breeding of Scotch cattle. There seems, indeed, to have recently sprung up among eminent musicians quite a fashion for horse and cattle breeding.