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Skotoer 2 1841

F 1v

Skotoer 1841
2


183 B. C. R.
"BROXTON"

f. 2v

Broxton 1839

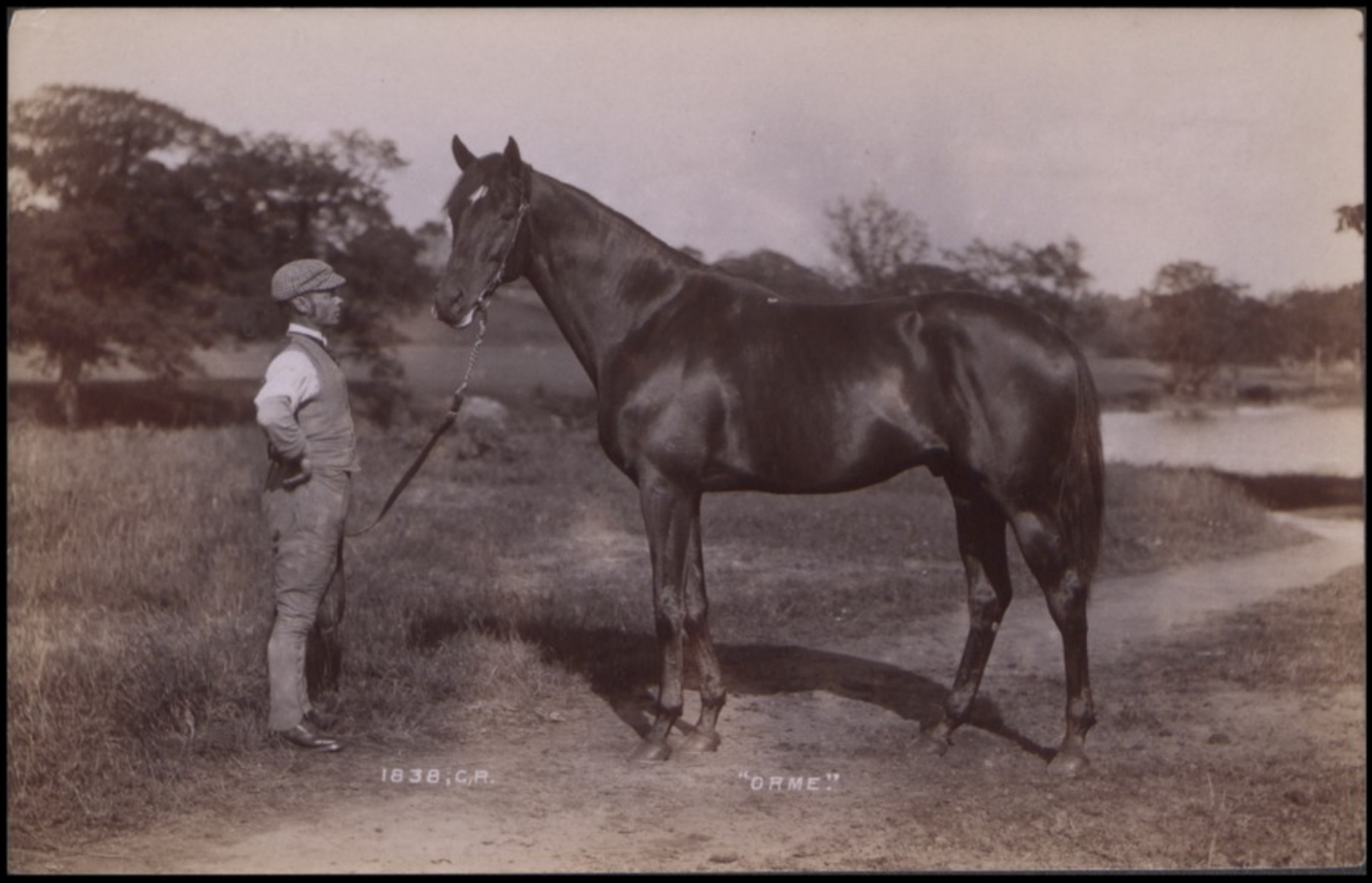
3


1813. C.R.
"DONOVAN."

f. 3v

Donovan

4


1838; C.R.
"ORME."

f. 4v

Orme 1838

5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f. 6r

Horses

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The Journal and Transactions
OF THE
PHOTOGRAPHIC SOCIETY
OF
GREAT BRITAIN.

NEW SERIES, VOL. XVIII., No. 5.] FRIDAY, JANUARY 26, 1894. [PRICE 1s.

NEW SERIES. VOL. XVIII., No. 5. JANUARY, 1894.

The Journal and Transactions

OF THE

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NOTICES.

ARRANGEMENTS FOR MEETINGS.

THE ANNUAL GENERAL MEETING.

The Annual General Meeting will be held at the Society's Rooms at 8 p.m. on the 13th February next, when the report of the Council and the Treasurer's accounts will be submitted to the members, and the result of the ballot for the election of officers and Council will be announced.

General business also will be transacted.

FEBRUARY 27TH.—TECHNICAL MEETING. "A method of modifying platinum prints by after treatment." By Mr. ALFRED W. DOLLOND.

MARCH 13TH.—ORDINARY MEETING.
MARCH 20TH.—EXTRA MEETING.
MARCH 27TH.—TECHNICAL MEETING.
} A course of three Lectures by Mr. LAKE PRICE on "Art and Photography."

This course of Lectures will be illustrated by a large collection of Photographs and Water-colour Drawings by Mr. Lake Price, which will remain on view for a few weeks.

APRIL 10TH.—ORDINARY MEETING.

APRIL 24TH.—TECHNICAL MEETING. "Recent experiences in photogravure." The subject will be introduced by Mr. HORACE WILMER.

At one of the meetings next winter, Mr. HUME NISBET will give an illustrated paper on "Australian Art from the photographic point."

SUBSCRIPTIONS.

The subscription for the current year is now due. Cheques should be drawn in favour of Mr. G. SCAMELL, the Hon. Treasurer, and should be addressed to him at 50, Great Russell Street.

The attention of members whose subscriptions are in arrear is particularly called to Rule 34, which reads as follows:—"The names of members who are three years behind-hand with their subscriptions shall be suspended on the notice board unless the Council give instructions to the contrary."

NEW LIST OF MEMBERS.

Members are requested to send, as early as possible, notice of any alterations they may desire in their names or addresses, as the new list of members will shortly go to press.

TRANSACTIONS.

ORDINARY MEETING, HELD AT 50, GREAT RUSSELL STREET, BLOOMSBURY, W.C.

ON TUESDAY EVENING, JANUARY 9TH, 1894.

Mr. J. SPILLER, F.I.C., F.C.S., Vice-President, *in the Chair.*

The Minutes of the last Meeting were read and confirmed.

The certificates of the following candidates for membership were read for the first time:—

H. M. Haywood, 438, Brixton Road, S.E.
F. T. Carter, 19, Burghley Villas, East Finchley, N.

The following were duly elected members of the Society:—

Professor Z. Falcioni, M.A. (de Rome) 578, Corso Vittorio Emanuele, Naples.
E. J. Wall, 1, Creed Lane, E.C.

The following presents were laid upon the table:—

The British Journal Photographic Almanac for 1894, *presented by* the Editor.
The Practical Photographer for 1893, *presented by* Messrs. Percy Lund and Co.

The undermentioned gentlemen were appointed to act as Scrutineers:—Messrs. A. C. Braham, J. D. England, Karl Greger, W. Kirman, E. W. Parfitt, T. Samuels, and Charles Sawyer.

EQUINE PHOTOGRAPHY.

Captain HAYES said: I feel deeply the honour conferred upon me by being called upon to address this Society, and it was with a great deal of trepidation that I came this evening, because I know very little indeed about photography, although I know a good deal about horses. The study of horses impressed me with the fact that I could not without the aid of photography properly illustrate the books that I have brought out, and that was the reason which induced me to engage in its study. In England we have had very few persons indeed who have photographed horses well. There have, however, been brilliant exceptions, and one gentleman whom I see before me, Mr. Frank Haes, has I think been the pioneer of equine photography in England, and the Messrs. Dixon, father and son, of Albany Street, and one or two others, have approached eminence in this respect.

Now, I wish to deal to-night with equine photography more with regard to what may be called the portraiture of horses, than from the purely artistic point of view, or with reference to artistic arrangement or composition, upon the subject of which you are far better qualified to judge than I am; and I certainly have nothing new to tell you about the matter where the horse or other animal is made subordinate to the whole general effect. I wish to regard the horse as the leading object of the picture. In order to get a good portrait of a horse I think we want to see him placed in the position in which we would like him to be put if we were going to buy him—that is, broadside on. I should like to say what my own experience has been with regard to cameras and other purely photographic matters. I do not refer to work done in a photographic studio, or to work such as that of Anschütz, who has a properly appointed run in which the animals are turned loose, and who has everything he wants done for him; but for persons who go out into the field and try to take their photo-

graphs themselves, I think a hand camera is a necessity. I have wandered through most parts of India and China, and all through the Transvaal and South Africa, trying to take photographs of horses for my work, and I think that without the aid of a hand camera I could have done comparatively no good work at all. Here I think we ought to recognise the great praise that is due to Mr. Frank Haes and others who did their work with a fixed camera and wet plates. Then, further, I think the hand camera should be so arranged that we may focus the object up to the last moment before exposure. It must be recollected that a horse gives us very little time in which to make our picture. If we want him properly posed, we cannot fix him in a head-rest and tell him to keep still. A horse moves at full gallop, let us say, fifty feet a second, and under such circumstances we may have to take him while he is going over four or five feet. It is a simple rule to find out what time you have got to take the picture in—say $\frac{1}{10}$th or $\frac{1}{12}$th of a second, or else we miss the shot. We want to be able to work between wide limits of exposure, say somewhere between $\frac{1}{2}$ sec. and $\frac{1}{800}$th sec., and I do not think there is any shutter that will do this. I am not alluding to one with a slit that passes across the plate and exposes an infinitesimal portion of the plate for an infinitesimally short time, but I think we have no shutter that exposes the whole of the plate at one time and gives speeds ranging between these two extremes. I think, then, that the best system is that which was suggested to me by Mr. Newman, whose name is known all over the world as a great shutter-man, and which consists in the use of a very fast shutter between the lenses and a slower shutter behind the lenses. With regard to focussing, in order to focus up to the moment of exposure we must have a twin lens camera; and in this connection I may say that Mr. Dixon told me he was the first to use twin lenses for this kind of work. We want, too, for focussing, such a dark chamber that it may be perfectly covered from the light. The old form of camera, which I used to use, and which was made by the London Stereoscopic Company, was a very good one indeed, but the ground glass was only partially shaded in, and I had to cover it over, make a hole through the covering, and focus by means of very strong spectacles. Then, in animal photography—say at a race meeting, or in photographing a wild animal turned loose—we must of course have a certain length of focus, say $6\frac{1}{2}$ inches for quarter plate. If we require speed with the shutter, we must have a lens with a large aperture, and I think we cannot well work with a less aperture than $\frac{3}{4}$ of an inch with a quarter plate for good all-round horse work.

A great many persons will take a shot at an animal with an ordinary fixed camera, and will not care whether the animal is sitting or standing, and they will think they have got a very good photograph. The first slide I shall show you is from a negative taken in that way, and it represents a cheetah lying on the ground, and it is all wrong. I will then show you the cheetah in the position I suggest he should occupy in order to present a good portrait. [Slide.] Of course a person could not from this picture form any idea of the shape and make of the cheetah; he is all in a heap, and it would be ridiculous for pictorial effect to give a photograph like that. The next slide [shown] presents him as he would be looking at his best, and we can see all his proportions and form an idea as to how he will stand. It is very difficult indeed to photograph these animals. [Slide—horse and groom.] This is the usual way of photographing a horse. This is "Tristan," and the stableman appears to be very much afraid that "Tristan" is going to savage him. The horse has a nice small head—because it is foreshortened. He has very small fore legs, and enormous hind legs, and is all in wrong perspective, and you can form no idea of what he is really like. This shows the result of using a lens of too short focus. But suppose we place the animal in this position. [Slide of zebra bull.] All four-legged animals always look very much better when the legs nearest to us are extended, the fore legs more in front, the hind legs more behind. I think the reason is it gives the idea of going off to a vanishing point. It is a great piece of luck that the curves of this animal's horns harmonise very well indeed with the curves of his hump. I want you to pay special attention to this zebra bull, the most beautiful in the whole of India; it cost a fabulous lot of money, and is supposed to be wonderfully handsome. This horse [slide] is not quite right, his legs are too much together, both before and behind. But there is one very good point, he is against the

sky; he is the prominent object. He is not photographed in front of the hall door, with all the family, and the nurse-maid and the baby. You see such pictures, and they are nice photographs of the porch and the family, and after looking a good deal, you see a horse in the middle. You want the horse to be the principal object, and the distance dwarfed, and to get him against the sky, and his ears pricked up. This horse is not good looking, because his neck is too short: the neck should always be proportionate to the length of the legs, and the neck of this horse is very short in comparison with the length of his fore legs. Here [slide] is a very much nicer horse, and we get him better placed on his legs, and he also is against the sky. A grey horse taken against the sky has a particularly good effect, as you will see from this slide. [A number of slides were here shown representing horses, with and without riders, and also zebras.] When you want a horse to look really well, you must have it in an excited state. Do not photograph him near the stable, but let him be as excited as you can possibly get him, and you will get a good photograph, and only then. When a horse gets out on a plain he always looks round, he is imagining some beast of prey is going to seize him, and he will always carry himself better in an open space than in an enclosure. With regard to taking photographs of people on horses, I say again I think we get a better effect by photographing against the sky. I refer only to portraiture; when you begin to photograph for a picture of course you will subordinate the animal and its rider to the general effect. In photographing horses one ought to know something about horses, and if they have a rider we should know something about riding, and not allow the rider to sit awkwardly. This photograph [shown] is by Delton of Paris, and I brought it because I could not get any of my own to show the walk so well. I want to show the poses of the horse in the walk, the trot, the canter, the gallop, and the leap. I propose to show you these various paces and motions artistically delineated by photography; it is quite easy to show a walk that will be photographically true, though it might be outrageous from an artistic point of view, but these are true photographically and I think very good artistically. Some one has said that it is the province of the artist to represent what he sees, and not what really exists; but if an artist is going to delineate what he sees he must actually delineate things that do exist, and if he delineates things that do not exist and cannot exist, like putting horses into attitudes that they never did and never can assume, the thing must be artistically wrong and it is an outrage. Although there are many positions which the horse will take up in photography and that will give the idea of movement and not be artistic, still we have got many positions that will be true and artistic at the same time. Now this photograph showing the canter is simply outrageous, the horse does not appear to be moving at all. It looks horrible, but it is really a nice looking horse. The centre of gravity is rather back, but in delineating motion we want to show the centre of gravity of the body in a more or less unstable condition. In this [shown] the horse's legs are all on tne ground, and yet, to my thinking, the idea of motion is conveyed very well. Mr. John Charlton, the chief artist of the *Graphic*, said to me one day that to give the idea of motion in the canter or gallop you must show the horse off the ground. I did not think so, and I said I would try to get a photograph of a horse with all four feet on the ground, and yet giving the idea of motion, and here I think we have it. The head down, the tail up, and all four legs on the ground in the position shown, give the idea of motion. Of course, it was luck; if one leg had the slightest bend in it, or was differently placed, it would look ridiculous. Here is another photograph of the canter; it was taken at Kempton Park last autumn, and represents Mr. Arthur Coventry cantering down the race-course. I think it conveys the idea of movement fairly well. You will observe that one leg is a little blurred; the reason is that the leg is moving forward at the same time as the horse, and it is moving at the rate the horse's body is going, plus its own speed; it is therefore going at about double the speed of the other leg, and is in consequence slightly blurred. [Slides representing racing at Kempton Park were here shown, followed by others of jumping.] The great mistake artists usually make, and a very ridiculous one, is that in the jump they put the horse's fore legs too much stretched out, so that if the horse landed in that position there would be nothing to

support him. As a matter of fact, the horse lands on one fore leg, comes on to the other fore leg, a hind leg coming to its aid, then the other hind leg comes down, and he is then in position to go on with his gallop. A very sharp photograph may be taken of a horse jumping, because really a horse in ordinary jumping does not go so very fast, he always makes more or less of a pause. There was circulated by one of the photographic firms a photograph of a horse jumping, and this was supposed to show the extraordinary rapidity of the plate. Well, the horse was not going at any pace, no horse goes at a great pace when simply jumping a gate,—you could take it with an ordinary Kodak. A fast camera is not required to take a horse jumping, but it is when the horse is racing. This photograph [shown] was taken to show the effect when the hind quarters of the horse are hid, and it seems to me to give the idea of motion very well. If you look at a horse jumping or galloping, you can never fix your eyes on both ends at once; therefore, if when a horse is galloping there is dust thrown up which covers either the hind or fore legs, the idea of motion is expressed better than if you see the whole of the animal cut clear. There is a very good example of this in Rosa Bonheur's *Horse Fair*; a man is riding a horse which is just trotting away, and his elbows are out and his coat blowing backwards, and you only see the hind legs of the horse, but the idea of movement is perfect. This slide [shown] is a photograph of the water-jump at Sandown Park, and it is a very good example of something to which my attention was directed by Mr. Frank Haes, and that is motion on the principle of "follow on." The horses are "Cloister," "Why Not," and "Horizon," and as you see the first is nearly touching the ground, the next is a little higher above the ground, and the third is just clearing the water. It is a very lucky shot; of course I tried for it, but it was a very lucky thing to hit it.

At this point Captain Hayes exhibited slides illustrating the evolution of the horse from the formation shown in fossil remains, and the gradual disappearance of its toes or "fingers," until at the present time only one remains, from which is derived the definition of a horse as "an animal with only one finger." He also exhibited a photograph, taken near Cobham, of a horse with two hoofs on one foot, remarking that this was not a monstrosity, but a case of reversion to a former type. The concluding slides showed zebras tamed by Captain Hayes, who said these were the most difficult animals in the world to tame or ride, and also to photograph.

The CHAIRMAN said that many years ago, when he was in the War Department, he had to try his hand at photographing horses; and although the best optical and other appliances were at his disposal, only a moderate degree of success was attained. As photographer at the Royal Military Repository, it was his duty to make photographs of horses and of horse equipment, and he found that he could succeed fairly well by engaging the attention of the horse at the critical moment by the use of a very shrill loud whistle. The sergeant-major who assisted him had recourse to an extraordinary scheme, which consisted of opening an umbrella suddenly as close as possible to the horse's face. Ridiculous though this might appear, it was found that this made the horse prick up his ears and look altogether a smarter animal. This, of course, was the record of a long time ago; and since then things had moved on, and Captain Hayes and others—especially Professor Anschütz—had been devoting themselves to depicting the horse in his most graceful forms and movements, and they had met with very great success.

Mr. FRANK HAES had done work similar to that of Captain Hayes thirty years ago; he attended Captain Hayes' lectures whenever he got the chance, and always learned something from them.

The CHAIRMAN asked Mr. Haes whether he adopted any particular scheme for attracting the attention of the animal to be photographed?

Mr. HAES said he had to find out something different for each animal. Sometimes one succeeded very well by introducing a boy wearing a bright blue coat—that was the way in which he first got a picture of the hippopotamus. Wild animals had

the greatest dislike to a man in his shirt sleeves; he had got several animals by that means when he could not succeed by any other plan. He had always insisted, and laid it down as a rule for himself, that the only satisfactory way to photograph an animal was that which Captain Hayes had shown to be the correct one, namely, broadside on. The only valuable portrait for a naturalist was a broadside view, which gave more information than any other position. His pictures were always stereoscopic, and that was the only way in which the form of the animal could be distinguished. He used long focus lenses—the No. 1 long focus of Dallmeyer.

Mr. W. E. DEBENHAM wished to make a few remarks which might perhaps be in the nature of criticism, but not of the photographs. He understood Captain Hayes to say that it was easy to show the walk true photographically but outrageous artistically. When a thing was said to be outrageous artistically, the question always arose as to what was artistic, and there might be a divergence of opinion. For that reason a paper which claimed to be a paper on art was almost always a mere empty sound, because it might not accord with the æsthetic views which they held, although it expressed those of the speaker. Of the first picture shown, that of a cheetah in a recumbent attitude, Captain Hayes had said that it was ridiculous from any pictorial point of view, but he (Mr. Debenham) thought many people would be of opinion that it was more pictorial than the other which had been shown as so successful pictorially. As Mr. Haes had said, from the naturalist's point of view a picture broadside on might be more valuable and more instructive. But he fancied that many painters would prefer to represent a cheetah in the position shown in the first slide, rather than in that of the second. Captain Hayes had laid stress upon the position in which the horse's legs should be placed, but a photograph had been shown and described as very successful in which the position advocated by Captain Hayes was reversed, and he did not know that there was any canon of art to say that one position must be better pictorially than the other. The great value of horse photography had been to get rid of the conventions and stock attitudes which certain persons calling themselves artists had adopted. Many of Muybridge's photographs were at first ridiculed and held up as absurdities, but painters had since seen the truthfulness of them, and introduced similar positions into their works. It should be noted too that some artists who went rather to nature than convention, had from very early times—at least as early as the Greek sculptors—used positions of horses such as Muybridge had shown.

Mr. G. L. ADDENBROOKE thought the question with which Mr. Debenham had been dealing was capable of being put into a certain amount of form, which might be founded on a remark of Captain Hayes, that the motion of a horse was compounded of two motions—the progression of the horse, and the progression of the legs—and they must be treated separately. The motion of the body in galloping was almost uniform, but the motion of the legs was very different, and it was possible that at times they went twice as quickly as the rest of the horse.

Captain HAYES said Professor Marey had measured the speed and found it to be about double that of the body.

Mr. ADDENBROOKE said at times the legs were moving at twice the speed of the body, and at other times they were quite steady, or at any rate the hoofs were motionless. When one looked at a horse there could be no doubt one would be most impressed by the positions which were most nearly motionless; and therefore what might be called the artistic positions of a horse in galloping were those in which there was the least motion in the legs. It seemed to him that the positions in which the legs had the least motion would appear the more artistic in a photograph simply because the eye was more accustomed to them than to the positions in which the legs were in rapid motion, and not so readily seen.

Mr. T. R. DALLMEYER asked whether the conventional positions of horses as sculptured by the ancients were chiefly those in which there was the least movement?

Also whether it would not be preferable to employ longer focus lenses, so as to be farther away and at the same time obtain the same size of image? By that means the perspective would be better.

Captain HAYES said he was more a writer than a speaker, and perhaps had not great facility in expressing his ideas in spoken words; but he thought he had pointed out as clearly as he could, in starting, that he made no reference to the horse from the artistic point of view—he disclaimed the idea altogether. He said when he began that he was before a body of gentlemen who understood composition in painting and in photography far better than he did, and he had endeavoured to avoid the question. His remarks were to be taken solely and entirely as referring to horse portraiture, and he said that in taking a portrait of a man or a horse it was necessary to give the best possible idea of the man or the horse.

A vote of thanks was passed to Captain Hayes for his communication.

Mr. CHARLES L. BURDICK, of Chicago, gave a demonstration of the Fountain Air Brush, of which he was the inventor. He said the original air brush, introduced ten years ago, was a complicated piece of mechanism and had possibly created a bad impression with respect to the tool; the new instrument, however, contained about one-fifth as many pieces as the earlier form, and had no running machinery whatever. The new apparatus would lay on four times as much colour as the old one in a given time, and the operator had perfect control over the character of the spray, which could be varied from a fine close texture to a broad open one, or from a fine line the width of a lead pencil mark to a solid band of colour nearly an inch wide. The motive power of the tool was compressed air contained in a reservoir and conveyed to the brush by a rubber tube, the pressure required being from 6 lbs. to 10 lbs. per square inch. The air brush lent itself especially well to the modelling of rounded shadows, and was used with great success in working up enlargements and retouching large negatives.

Mr. BURDICK then proceeded to illustrate the use of the instrument by sketching with it, his work being much admired.

A vote of thanks was passed to him for the demonstration.

THE AFFILIATION OF PHOTOGRAPHIC SOCIETIES.

THE FOLLOWING PAPERS, LANTERN SLIDES, &C., ARE AT PRESENT AVAILABLE FOR CIRCULATION.

A paper by Mr. A. Dawson, entitled "Photogravure." This is accompanied by examples by various firms.

A paper by Mr. W. Jerome Harrison, entitled "A Proposal for a National Photographic Record and Survey," with examples of the work already done by the Birmingham Society.

A paper by Mr. F. L. Pither, entitled "Notes on Landscape."

A paper by Mr. Leon Warnerke on "The development of printing out papers," with illustrative examples.

A paper by Mr. J. McIntosh, entitled "Harmonising harsh negatives," with illustrative examples.

A paper by Mr. R. Child Bayley, entitled "Messrs. Lumière's process of printing with salts of manganese," with illustrative examples.

A set of 71 lantern slides of Yorkshire scenery by the Leeds Society.

A set of lantern slides by the Hull Photographic Society.

A set of lantern slides by the Cheltenham Society.

A set of lantern slides by the Southsea Society.
A set of 67 lantern slides, entitled "Linen and its Production," with explanatory notes by the Brechin Photographic Association.
A set of lantern slides of landscapes, &c., taken within a radius of fifty miles of Manchester by members of the Manchester Camera Club.
A set of 33 slides by the Rotherham Photographic Society.

There is also an offer by Mr. W. E. Debenham to demonstrate before Affiliated Societies one of the following processes :—
Wet Collodion.
Transparencies by the Carbon Process.
Collodio-bromide.

ABSTRACTS.

CHEMISTRY.

ON THE PRODUCT OF THE ACTION OF MERCURIC CHLORIDE UPON METALLIC SILVER. *By Chapman Jones.* (*Jour. Soc. Chem. Ind.* **12**, 983.)—The author states that when a solution of mercuric chloride is caused to act upon a silver photographic image, whether in a gelatine or collodion film, the metallic silver is changed into a white substance which has been supposed to be a mixture of mercurous and silver chlorides. So far as he is aware, the properties of this substance have never been ascertained; it has been taken for granted that it is a mixture, and that its behaviour is simply that of a mixture of the two chlorides. He thinks, however, that the facts given below leave no reasonable room for doubt that it is a double chloride formed by the reaction $HgCl_2 + Ag = HgAgCl_2$.

Preparation.

The preparation of the substance in bulk at first presented considerable difficulty. After trying many modifications for the preparation of silver mercurous chloride, the best that he has been able to discover is to add to the pulverulent silver a considerable excess of mercuric chloride made into a thin paste with water, to agitate the mixture frequently and occasionally to grind it in a mortar, for two or three weeks, and then to introduce it into a long-necked flask or bolt head, and heat it in a water-bath for from 12 to 20 hours. The mass is then mixed with a considerable quantity of water, and as soon as the chief part of the excess of mercuric chloride has settled down the supernatant turbid liquid is poured off. By repeating this operation a comparatively small quantity of the preparation will be lost with the part that remains behind. The mercuric chloride crystals remaining greatly facilitate the retention of the particles of unattacked silver. The product rapidly settles from the water, and it is thoroughly washed and dried in a steam oven. A preparation which contained, after cold digestion, over 3 per cent. of unattacked silver, contained 1·84 per cent. after seven hours' heating in a water bath, 0·55 per cent. after another seven hours' heating, and 0·27 per cent. after elutriation as described. The author has tried heating in a sealed tube instead of in an open vessel, but this variation appears to offer no advantage.

An attempt to prepare this substance by direct precipitation with hydrochloric acid from a solution containing silver and mercurous nitrates was unsuccessful. Under these conditions the silver chloride is first thrown down, carrying with it a very small proportion (about a half per cent.) of mercurous chloride. Before all the silver is precipitated the mercury comes down in quantity. Three consecutive fractions contained respectively 5·35, 63·52, 92·97 per cent. of mercurous chloride. There

seems, therefore, to be a tendency for the two salts to combine, and it would obviously be possible to prepare a solution that would yield a certain amount of the double chloride, or of the two chlorides in the same proportion.

Analysis and Properties.

The readiest method of analysing silver mercurous chloride is by simple ignition, when the mercurous chloride is volatilised and silver chloride remains. The silver chloride must be perfectly fused, but this is not likely to lead to any loss if nothing hotter than an ordinary Bunsen flame is employed. Any unattacked metallic silver in the preparation remains as chloride, its equivalent of metallic mercury passing off. The percentage of metallic silver in the preparation, provided of course that it is properly washed and dried, is the same as the silver chloride found in excess of 37·85 per cent., the amount in the pure double salt, provided that not more than one or perhaps two per cent. of metallic silver is present. It is a curious coincidence, and saves a rather tedious calculation.

From the action of metallic silver on silver mercurous chloride, a sample of the double salt containing an appreciable amount of metallic silver will not give a constant weight when heated (for drying) in the water oven. The author has ascertained the specific gravity of $HgAgCl_2$, and gives details of the action of metallic silver, mercury, ammonium chloride, potassium chloride, potassium cyanide, caustic soda, sodium carbonate, and hydrochloric acid with it.

As regards the action of potassium silver cyanide he states that the primary change may be expressed by the following equation:—

$$HgAgCl_2 + KAgCy_2 = Ag + AgCl + HgCy_2 + KCl.$$

Some of the mercury cyanide appears to be held in the residue by the silver chloride so tenaciously that prolonged washing with water removed only a part, and that slowly. It is known that silver chloride takes up mercuric chloride, and this may be an analogous effect, but in a few experiments that naturally suggested themselves the author has not been able to induce silver chloride to take up or combine with mercury cyanide and hold it with anything like the tenacity shown in the reaction under discussion.

Silver cyanide is found in the residue and its appearance is accounted for thus. Silver chloride is quickly changed to cyanide by a solution of potassium cyanide and then dissolved, and potassium silver cyanide has the same effect except the solution of the silver cyanide, which obviously is impossible. The reaction—

$$AgCl + KAgCy_2 = KCl + 2AgCy—$$

takes place readily, and a double proportion of silver cyanide is precipitated.

Action of Ammonia.

When dilute aqueous ammonia is poured upon silver mercurous chloride the solid is changed immediately to a fine black colour, which, however, is modified to a brownish or slatey tint by washing and drying. The products of five reactions upon analysis show that the residue contains silver, mercury, chlorine, and nitrogen, and that the solution contains silver, a little mercury, which appears to increase as the action of the ammonia is prolonged, and chlorine. The results seem to indicate that probably two doubly substituted ammonium chlorides are formed, namely, $NH_2AgHgCl$ and $NHAgHg_2Cl$ in varying quantities, silver chloride dissolving, and that secondary reactions also take place.

Action of Ferrous Oxalate.

A solution of ferrous oxalate in potassium oxalate readily reduces either mercurous chloride or silver chloride alone, and also silver mercurous chloride, to the metallic state, the whole of the chlorine being removed and the whole of the metals remaining in the residue. Ferrous citrate was found to have no visible effect upon silver

mercurous chloride after contact with it for several minutes, but immediately a little potassium oxalate was added reduction began.

Action of Sodium Sulphite.

A cold solution of sodium sulphite at once darkens silver mercurous chloride. By grinding the salt in the solution a turbidity, which looks as if it were due to silver chloride, makes its appearance; this dissolves and the residue shrinks together as the reaction is completed.

The atomic proportion of silver in the residue, taking the mercury as unity, was found in four reactions to be 1·89, 2·02, 1·99, 1·90. There is no doubt therefore that the residue consists normally of silver and mercury in the proportion of two atoms to one. The mercury in the solution was proved to be present as mercuric sodium sulphite. Therefore the decomposition of the silver mercurous chloride may be represented by the equation—

$$4\ AgHgCl_2 = Ag + Hg + 2\ AgCl + 3\ HgCl_2,$$

and as the mercury and silver dissolved are changed into sulphites, as stated above, the full equation may be written—

$$4\ AgHgCl_2 + 7\ Na_2SO_3 + x\ Na_2SO_3 =$$
$$Ag_2 + Hg + Ag_2SO_3, x\ Na_2SO_3 + 3\ HgNa_2(SO_3)_2 + 8\ NaCl$$

the x being equal to about seven.

Action of Sodium Thiosulphate.

A 10 per cent. solution of sodium thiosulphate was employed, which had a scarcely perceptible acid reaction. Unless care was taken to add a considerable excess to the silver mercurous chloride, sulphide of mercury was precipitated, and the consequent production of sulphuric acid caused a gradual and considerable precipitation of sulphur. But by arranging so that the salt never comes into contact with less than a sufficient excess of alkaline thiosulphate, the decomposition of the thiosulphates is so far prevented that there is a mere trace of sulphide in the residue, and the acidity of the solution is not great enough to affect litmus paper. An experiment done under these conditions gave proportions of the metals which indicate that the primary change of the silver mercurous chloride may be expressed thus:—

$$3\ HgAgCl_2 = Ag + Hg + 2\ AgCl + 2\ HgCl_2,$$

and that some of the metallic mercury of the residue then precipitates some of the silver from the solution. The author finds that mercury readily precipitates silver from a solution of silver chloride in sodium thiosulphate, and that silver has no effect upon a solution of mercuric chloride mixed with excess of sodium thiosulphate. The excess of metallic silver in the residue falls short of the amount equivalent to the excess of mercury in the solution. This, the author thinks, is probably due to the solution of some of the silver in the thiosulphate solution, the silver perhaps becoming soluble by aerial oxidation. The full equation, showing the action of sodium thiosulphate, may be written thus:—

$$3\ HgAgCl_2 + 9\ Na_2S_2O_3 = Ag + Hg + Ag_2S_2O_3, 2\ Na_2S_2O_3 +$$
$$2\ [HgS_2O_3, 2\ Na_2S_2O_3] + 6\ NaCl.$$

It is necessary to observe that the composition of the double thiosulphate of mercury and sodium does not appear to have been determined, and the above formula is given because it appears to be the rule for sodium thiosulphate to combine with heavy metal thiosulphates in this proportion when soluble compounds are formed.

Conclusion.

We may summarily compare the primary effects of the reagents examined upon silver mercurous chloride by stating that hydrochloride acid, ferrous oxalate, caustic

soda, and sodium carbonate act as we should expect them to do if the silver chloride and mercurous chloride were separate from and independent of each other. Hydrochloric acid dissolves the silver chloride and breaks up the mercurous chloride into mercuric chloride and mercury, ferrous oxalate gives complete reduction to the metallic state, and the alkalis act by partially exchanging chlorine for oxygen. But the reactions produced with the other substances are not merely the added changes they would give with the two separate chlorides. Ammonium chloride, potassium chloride, potassium cyanide, and sodium thiosulphate act similarly in leaving one-third of each metal as residue in the metallic state and dissolving the remainder. Sodium sulphite leaves half the silver and one-third of the mercury as metals, dissolving the rest, and potassium silver cyanide leaves all the silver as metal. Ammonia produces substituted ammonium salts containing both mercury and silver.

The author thinks it must be admitted that the product of the action of mercuric chloride upon metallic silver is most advantageously considered to be a double chloride.

It is not difficult to write down the possible ways in which silver mercurous chloride may break up, leaving metals and fully saturated chlorides only :—

$$\begin{aligned}
HgAgCl_2 &= Ag + + + HgCl_2 \\
2\,HgAgCl_2 &= + Hg + 2\,AgCl + HgCl_2 \\
3\,HgAgCl_2 &= Ag + Hg + 2\,AgCl + 2\,HgCl_2 \\
4\,HgAgCl_2 &= 2\,Ag + Hg + 2\,AgCl + 3\,HgCl_2 \\
5\,HgAgCl_2 &= Ag + 2\,Hg + 4\,AgCl + 3\,HgCl_2 \\
&\text{or } 3\,Ag + Hg + 2\,AgCl + 4\,HgCl_2 \\
6\,HgAgCl_2 &= 4\,Ag + Hg + 2\,AgCl + 5\,HgCl_2
\end{aligned}$$

and by taking seven molecules we can add three equations ; by taking eight, two more ; and so on. Of these changes the first is realised by silver potassium cyanide, the second by hydrochloric acid, the third by the alkaline chlorides, potassium cyanide, and sodium thiosulphate, and the fourth by sodium sulphite. No reagent has been found that induces the decomposition indicated by the equations where five or more molecules of silver mercurous cyanide are necessary to react together.

Mercuric chloride readily reacts upon the mixed (or combined ?) metals left as residues, and it is so possible to produce double chlorides, or mixtures of the two chlorides containing mercury and silver in other ratios than an equal number of atoms. If, for instance, we take the mercury and silver left by the action of ferrous oxalate upon silver mercurous chloride and treat it with mercuric chloride, we should expect to get—

$$HgAg + 2\,HgCl_2 = Hg_3AgCl_4,$$

and the author has established the fact that mercuric chloride does act upon some of these metallic residues in this manner. Whether this product, taken as an example, would be merely a mixture of silver mercurous chloride and mercurous chloride, $AgHgCl + 2\,HgCl$, is a question that he hopes to be able to answer in due time.

When mercuric chloride acts upon such metallic residues, and also, he believes, when it acts upon silver itself, a black compound appears to be first produced. This also needs investigation.

TONING AND FIXING.

THIOSINAMINE AS A FIXING AGENT. *By E. Valenta.* (*Phot. Corr.* **30**, 465.)—It has long been noticed that thiosinamine in a number of its reactions resembles ammonia, notably in its solvent action upon oxide and chloride of silver. To determine the relative solvent action of various solutions of the salt upon silver chloride, bromide and iodide an aqueous, colourless, odourless solution of it was employed. The tables given below show that as far as silver chloride is concerned, a ten per cent. solution of thiosinamine is nearly as good a solvent as sodium hypo-

sulphite, although this is far from being the case where the bromide and iodide are concerned.

TABLE showing the solubility of AgCl, AgBr and AgI in thiosinamine solutions at 20° C.

Strength of solution of thiosinamine employed.	Grammes dissolved by 100 c.c. of the solution.		
	AgCl.	AgBr.	AgI.
One per cent.	0·40	0·08	0·008
Five „	1·90	0·35	0·05
Ten „	3·90	0·72	0·09

TABLE showing the solubility in sodium hyposulphite at 20° C.

Strength of solution of hyposulphite employed.	Grammes dissolved by 100 c.c. of the solution.		
	AgCl.	AgBr.	AgI.
One per cent.	0·04	0·35	0·03
Five „	2·0	1·90	0·15
Ten „	4·10	3·50	0·30
Fifteen „	5·50	4·20	0·40
Twenty „	6·10	5·80	0·60

Valenta points out that when a solution of silver chloride in thiosinamine is boiled for a short time, a blackish sediment, doubtless silver sulphide, is deposited. The presence of a little alkali helps greatly the formation of the sulphide. It is consequently very probable that prints fixed with this new agent, and insufficiently washed, will in time become yellow.

TONING AND FIXING BATH FOR COLLODION PAPERS. *By J. Gaedicke.* (*Phot. Woch.*, **19**, 321.)—The author criticises the employment of the various ingredients of the ordinary combined toning and fixing baths. He states that the salts of lead have only a physical action, and do not affect the colour of the print. It is well known that precipitates of silver compounds can be formed either in the presence or absence of lead salts, and that if silver chloride is precipitated in a milky and incomplete way, it is only necessary to add a trace of lead to effect a thorough precipitation. Citric acid and alum he condemns, and as it is necessary to have an acid bath to obtain rich tones, advises the use of boric acid as not decomposing sodium hyposulphite.

The following formula he has found satisfactory :—

Distilled water	1,000 c.c.
Sodium hyposulphite	200 grammes.
Boric acid	30 „
Lead nitrate	15 „
Ammonium sulphocyanide	20 „
Gold chloride (1 per cent. solution) ...	60 c.c.

BOOKS, ETC., RECEIVED.

THE ARTISTS' ALMANAC FOR 1894. (George Rowney and Co.)

This is a little pocket almanac, intended more particularly for artists, for whom it contains much useful information, including a list of the various art societies, galleries, and exhibitions, with the date upon which the latter open and close.

"NEWTONIAN LIME CYLINDERS." (Messrs. Newton and Co., 3, Fleet Street, E.C.)

We have received a sample of these limes for lime-light purposes, and are pleased to be able to record that they constitute a distinct advance in a direction in which there has otherwise been very little, if any, progress for some long time now. Mechanically they are of medium hardness, are turned and bored with great accuracy, and the surface is beautifully smooth and true. We have not yet had an opportunity of testing them with a mixed jet, but with the blow-through jet they give an excellent light.

The distinguishing feature of the new limes and the point in which they differ so markedly from all others lies in their comparative unalterability when exposed to the atmosphere. Perhaps the following test will give some idea of this. A lime was put in the lantern and used for an hour, left in the lantern that night and all the next day, on the following night it was used for perhaps a quarter of an hour, and again left. Three days afterwards it was again used, still showing no signs of depreciation, and it was not until it had been exposed to the atmosphere for six days and nights that it began to swell and split; it must be mentioned that all this time the weather was exceptionally damp and rainy. Of course, such treatment is not to be recommended, but it gives a very fair idea of what the limes will stand, and Messrs. Newton are to be congratulated on their product.

They are supplied in tin tubes, each tube holding six limes wrapped up separately in paper, no lime being used for packing.

PHOTOGRAPHS OF APPLIANCES FOR MAKING AND MEASURING SCREWS FOR PHOTOGRAPHIC LENSES. (Messrs. Taylor, Taylor, and Hobson. Leicester.)

In sending us these, Messrs. Taylor, Taylor, and Hobson inform us that they have supplied to the South Kensington Museum, in reply to a request from the authorities, a series of exhibits illustrative of the improvements they have introduced in appliances for making and measuring lens screw fittings.

It will be remembered that this firm have adopted in their entirety the standards for lens mounts drawn up by the Committee of the Society, and that they have always taken a leading part in the endeavour to secure the universal adoption of these standards with the advantages which would accrue from their employment. In pursuance of this course they inform us that they have now in their works at Leicester machinery capable of providing, between Christmas and the spring of 1894, no fewer than twenty thousand lenses with fittings of the standard dimensions in place of those they at present may possess. Photographers generally and members of the Society in particular will, we are sure, join us in wishing that the spirit and enterprise shown by Messrs. Taylor in this matter will be appreciated as it deserves. Certainly members of the Society who are anxious to support the recommendations of its Committee cannot consistently continue to use lenses the fittings of which do not comply with the standards, and must at once make use of the advantage placed before them by this firm. Every additional lens possessing the standard fittings is a step, and a distinct step, towards the uniformity which all must wish for, which must come eventually, and which cannot come too soon.

Printed by HARRISON AND SONS, Printers in Ordinary to Her Majesty, 45, 46, and 47, St. Martin's Lane, London, W.C.

(I)

	Name of Horse	Any requisite Description	"Racing" No.	Page	
×	Melanion	B. (1) Hermit (3) Atalanta	I	5	Danebury
	Curzon	Owner = B. de Hirsch	I	11	Danebury
	Reminder	(2) Melanion (3) Postscript	I	13	Danebury
×	Sir Visto		II	22	Rosebery
×	Avilion		II	29	Rosebery
×	Throstle		III	37	Kingsclere
	Grey Leg		III	39	Kingsclere
	Le Var		III	41	Kingsclere
×	Son of a Gun		III	43	Kingsclere
×	Joyful		III	45	Kingsclere
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Photos purchaseable
✓ Strand — Cornmend Exeter ✓
~~Le Fleche~~

✓ Common
✓ Isinglass
✓ Throstle
~~Cloister~~
✓ Salaro
✓ Sir Visto
✓ Galeottmucia
~~Gazetteer~~
✓ Holitzel II
✓ Carbine on a road
✓ St. Simon
✓ Donovan

Large 5/-
Small 3

Photographic measurement of Pedigree Stock

While inquiring into methods of measuring ~~On considering the best way of obtaining satisfactory measurement~~ of Pedigree stock for ~~the~~ purposes of hereditary inquiries, I have learnt to my surprise that ~~been surprised to find the evidence of an extraordinary advance in~~ the art and practice of photographing horses has of late made great advances ~~animals. The cause~~ due probably in part to the greater rapidity of ~~modern plate, the action of~~ the sensitive plates that are become easily procurable ~~in common use is in part a has had great influence in promoting it~~ ~~but~~ Whatever the cause may be the fact is that a weekly paper the "Racing Illustrated" has been established for nearly half a year ~~some months in which are~~ ~~Every number of which~~ has contained remarkably good ~~photographic~~ process-reproductions of the photographs of racers while the French Le Sport universelle and ~~the~~ La Photographie hippique are even more enterprising.

I propose now to show—(1), that photographs of horses & other animals admit of precise measurement; (2), that if those photographs are made on a standard principle, as they easily might be, those measurements would be practically exact without further corrections, (3) that corrections could be accompanied

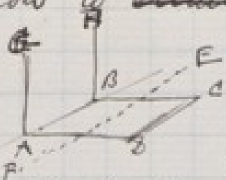
As regards ~~the first point~~, I procured some ~~photographs~~ through breeds, broadside on, ~~and of their~~ size ~~was such as~~ that would easily go bathways into an 8vo page. Their heights of ~~the horses~~ ~~at~~ their withers being ~~a little~~ roughly about ~~a little more than~~ 60 millimetres, or a little more. As their actual height was probably about 15 hands, or 62 ~~the same number of~~ inches the reduction of scale was such that 1 millimetre represented (roughly) 1 inch, in other words, the photos were about one twenty fifth of the natural size. I ~~took~~ obtained 6 photographs of different horses and measured ~~in each of them~~ 4 dimensions in each of them namely the height of the withers, the depth of the chest, the length of the body ~~from ischium to shoulder~~ and the height of the croup. This I did ~~was done~~ 5 times independently, thus obtaining ~~giving 120~~ (6 × 4 × 5 =) 120 observations. In each set of 5 the mean was taken (each set of five measures and accepted as the true value), ~~and the deviation which may be approximately taken to be the true value~~, ~~and~~ the deviations of the five individual measures from this mean being considered as "errors". The result proved to be that there ~~were~~ 28 cases of error = 0, 50 of error = ±0.1, 23 of error = ±0.2, and 19 cases of greater errors. In short, 78 (or 65 per cent) of the errors did not exceed 0.1 millimetre of actual measure or 0.1 inch of real measure, and 101 (or 84 per cent) did not exceed 0.2. I ~~was~~ and am surprised at the accordance of my results, for the measures were made by ~~an ordinary~~ a scale divided into millimetres, ~~scale (of course using a lens)~~ the decimals of millimetres ~~having~~ being estimated. Again the roughness of the ~~representation~~ surface of the ground on which the horse stood, ~~introduced uncertainty, it was~~ (being somewhat strawed or grassed) made the exact level of the bottom ~~on which~~ of the hoof ~~rested~~ somewhat uncertain — ~~I had~~ Presumably in consequence of this uncertainty, one error was as high as 0.6, there were three of 0.5, two of 0.4, and thirteen of 0.3. ~~There seems~~ I have no doubt that if the ground on which the horse stood had been hard, & if the measures were made under ~~taken by~~ the cross wires of a microscope mounted on a graduated bar, with vernier, the error of measurement would be ~~reduced~~ practically nil.

We now come to the standard conditions under which horses should be photographed, in order that the proportions of the photo: should be the same as those of the animal, and that a scale should be provided. There may be simpler plans than the following, but for a complete installation suitable for a yard adjacent to a horse show I would propose a fixed camera and a bricked path for the horse to be led slowly down and ~~to be photographed if necessary while he was walking~~ (stopped when opposite the camera: if fidgetty he would have to be taken while walking. Now this path would have a line of bricks laid endways down its middle at these bricks would be alternately light-colored and dark, thereby affording the desired scale 1 brick = 9 inches. The stopping place would be indicated by cross bricks.

(while walking) A line of Bricks alternately light & dark would be laid lengthways down the middle of the path, partly to give a more exact indication of the line along which the horse was to be conducted, and partly to serve as a scale, a brick being 9 inches long. The limits of the space lengthways within which the horse must stand in order to suit the position of the camera would be marked by cross bricks, a liberal margin would of course be allowed. Let us now consider the errors occasioned by a small deviation of the horse from his standard position in which the imaginary vertical plane passing lengthways along his body lengthwise would rest on the fiducial line. (1) that vertical plane may be inclined to the fiducial line and the length of the body of the horse in the photograph would be unduly shortened. Suppose the inclination to be 1 in 10 (= 4°. 44'), which is I think, a rather large allowance, and suppose the length of the body to be 64 inches (which seems to be near the average for a race horse 15½ hands or 62 inches high) then the loss through foreshortening will be 64 (1 − cos. 4°. 44') = 0.21 inch, practically ⅕th of an inch, which is inconsiderable.

(2) The imaginary vertical line passing lengthways through the middle of the horse's body may rest on the ground nearer to the camera than the fiducial line, or further from it. In the first case the withers would be exaggerated in the latter diminished. Let the real height of the withers be 62 inches and let it be supposed to lie 12 inches from the fiducial line, on the side of the camera Further we will suppose the camera to be ± 62 inches and the distance of the object glass from the fiducial line to be d inches (or 31) inches above the ground. Then the fallacious increase of height will be $2d \cdot \frac{31}{d-12}$

Suppose that a considerable number of animals are to be photographed in somewhat rapid succession in a well lighted yard adjacent to a horse show; ~~when the conditions of light is quite good~~, that the horses about to be photographed is led to a station opposite to a fixed camera. ~~If he stands still & in a~~ Horses especially in those conditions are exceedingly fidgetty animals and ~~it does not at all follow that the~~ difficult to pose correctly, but at the worst they might be taken by a quick exposure while walked slowly in front of the camera. Into these particulars I do not propose to go now nor to describe the various contrivances adopted to arrest their attention & keep them ~~still~~ for a moment, in a ~~still~~ rigid but alert pose. ~~My present object is merely to~~ What I want to ~~explain~~ speak about refers ~~solely~~ to ~~the~~ distortion in perspective ~~of the~~ ~~...~~ and how to ~~eliminate~~ reduce it to an insensible amount.

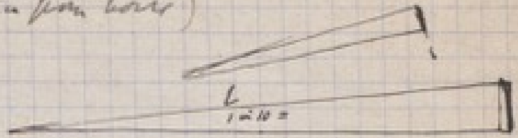


Let ABCD be a square bricked area of, say, 10 feet in the side ~~and square and level~~ for the horse to stand on when photographed & EF is a narrow band ~~through~~ its middle along which the horse is to be led, ~~to be photographed~~ AG BH two vertical lines of equal height painted on the brick wall by ~~the~~ which the area is bounded on the side opposite to the camera. Bricks are spoken of because they give an excellent scale, each being 9 inches long. Of course ~~light~~ light colored ones might be used for EF and also in alternation with dark ones for ~~the~~ more easy definition of the scale. ~~But~~ These details are however foreign to the present purpose. The first condition is that the camera should be directed squarely to the brick wall and the sensitive plate parallel to it. In this case only will AG & BH appear parallel and of equal length in the portrait. A tilt forward or backwards of the camera will ~~distort~~ destroy their parallelism, an inclination to the right or left will destroy their equality. Therefore the fact of their being parallel and equal in the portrait is intrinsic proof that the camera has been set properly in the above particulars.

Foreshortening of ~~length of horse~~ when not standing squarely ⊥ the axis of the camera. & ~~at~~
(camera at a reasonable distance from horse)

Angle of divergence of feet from path (foreshortening)

1 in 10 = 4°.44



l (1 − cosine 4°.44′) = l (1 − .9966) = l × (.0034)

l = 6~~2~~ log = 1.7924

.0034 log = 7.5315

9.3239 = log .2108 inch, practically $\frac{1}{5}$th inch

l = 64

Foreshortening of height of horse due to its being withers not being in the fiducial plane in other words to the mid ~~feet~~ & line between its fore feet not being ~~at the~~ on the fiducial line. ~~(the interval between the fore & hind feet of a horse is about of 62 inches is about 1/6 of his length being 50 inches)~~

∴ a divergence of 1 in 10 of the mid line feet of the horse when the mid hind feet is on it, is equivalent to ~~about~~ a departure of the withers from the ~~fiducial line of about 5 inches when x : length between feet (interval between fore & hind feet) :: 1 : 10~~ say 5 feet

in the diagram let AC = 13 inches and CD = AB = ½ 62 = 31 inches

AH : CD :: AB : AP − 12″   AH = $\frac{AB \times AP}{AP - 10}$ (∝ HB (the error) = AH.

AP feet	inches
10	120
20	240

$\frac{31 \times 120}{108}$

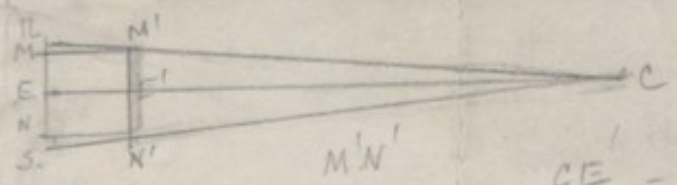
f. 18r

$EC = d$
$EE' = t$
$\frac{RS}{MN} = r$

$r = \frac{d}{d-t}$

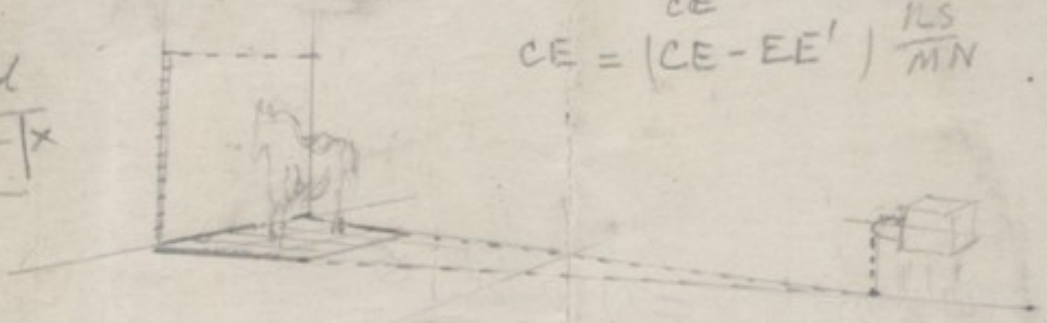
$rd - rt = d$

$d = t \frac{r}{r-1}$ ×

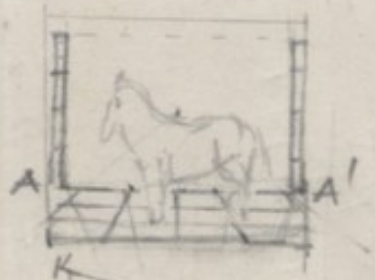


$\frac{CE'}{CE} = \frac{RS'}{MN}$

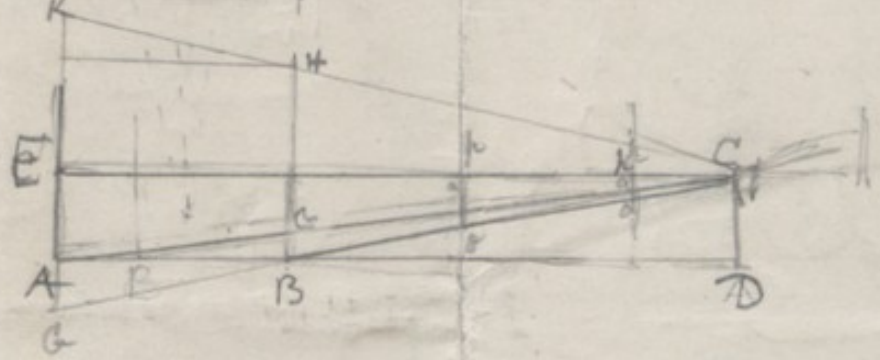
$CE = (CE - EE') \frac{RS}{MN}$



Given head sight, & distance from AA' and distance of AA from camera



BH true height in enlarged LGK = BH. $\frac{CE}{CE-t}$

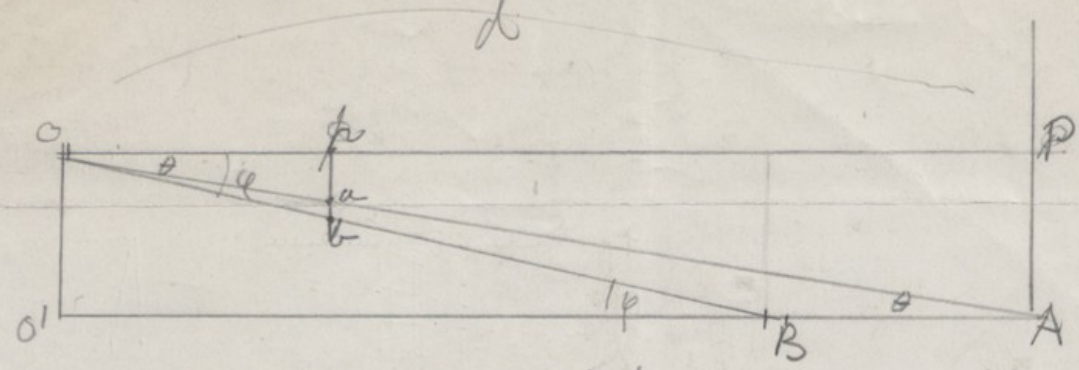


Given scale true distance on floor also and height of horse

$\frac{AD}{BD} = \frac{\beta a}{\beta b} \frac{\delta B}{\delta A}$ $\quad \frac{\beta b}{\beta a} = \frac{\delta A}{\delta B}$

$\beta b = \beta a \frac{\delta A}{\delta B}$

f. 18v



$$\frac{pa}{pb} = \frac{BO'}{AO'} = \frac{AO' - AB}{AO'} \qquad \frac{\tan\theta}{\tan\varphi} = \frac{\cot\varphi}{\cot\theta} = \frac{O'B}{O'A}$$

$b = 0 \quad \cot\varphi = 0$

$O'A = OO' \cot\theta$
$O'B = OO' \cot\varphi$

$$= \frac{d-x}{d}$$

$pb = pa \frac{d-x}{d}$

$pa = Op \tan\theta$	$AO' = OO' \cot\theta$
$pb = Op \tan\varphi$	$BO' = OO' \cot\varphi$

$$\frac{pa}{pb} = \frac{BO'}{AO'}$$

	page	1st type writers	attempt— Chest	Croup	Length	writers	Chest	Croup	Length	writers	Chest	Croup	Length
Solaro	293	83	37.0	83	80	87.0	38.5	85.0	81.0	100	44.3	97.8	93.2
Buckg. Park	295	82.5	39.0	85	83.5	84.8	39.0	86.7	84.0	100	46.0	102.3	99.1
Lavena	301	86.0	40	84	81	85.0	40.0	84.5	80.8	100	47.1	99.6	95.1
Ortolo	305	83	36	79	78	83.7	36.8	80.5	78	100	44.0	96.2	93.2
Gabellina	304	81.5	36.5	80	79	81.8	37.0	80.4	79	100	45.3	98.3	96.6
Speedwell	307	84.0	40.5	87.5	88	86.0	40.5	89.9	86.2	100	47.1	104.9	100.5
Santa Maura	308	84.5	38	84	82	85.3	39.1	83.9	83.0	100	45.8	98.3	97.2

Cotted

83 : 100 :: 37 : x $x = \frac{37}{\ }$

Errors in measuring photos of race horses, in each case deducting from means of 5 of 61 as the true value. The measures are in millimetres and decimals, the scale is such that 1 mm = 1 inch pretty closely

		accepted value	mean error	−.6 −.5 −.4 −.3 −.2 −.1 0 +.1 +.2 +.3 +.4 +.5	Total
	withers	59.4	100.0		
Shotover 1	chest	29.5	49.7		
	length	63.9	107.6		
	Croup	59.0	99.4	2 5 6 7	20
Shotover 2	withers	48.1	100		
standing rather sideways	chest	24.2	50.3		
	length	50.0	104.0		
	Croup	47.2	98.1	2 3 5 3 2 2 2 1	20
Braxton (3)	withers	66.5	100		
	chest	30.5	45.9		
	length	68.2	102.6		
	Croup	67.6	101.8	1 1 − 1 1 2 6 4 1 2 1	20
Donovan (4)	withers	64.8	100		
	chest	30.6	47.2		
	length	64.1	98.9		
	Croup	64.1	98.9	1 2 8 2 3 4	20
Orme (5)	withers	65.0	100		
	chest	29.4	45.3		
	length	64.8	99.7		
	Croup	63.2	97.3	3 2 9 3 1 2	20
Bendor (6)	withers	65.1	100		
	chest	29.8	45.8		
	length	67.7	104.0		
	Croup	64.4	98.9	3 1 5 2 4 3 − 1 1	20

101 78

1 1 − 7 12 27 28 23 11 6 2 2 (4.5 0 4.5) 120

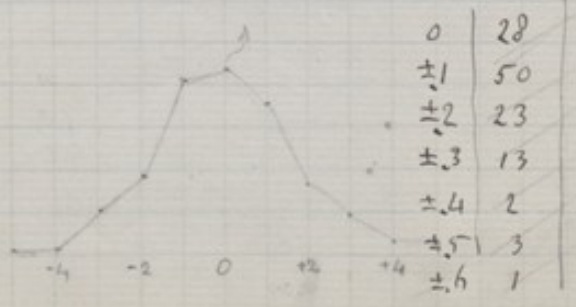
Sums from beginning 1 2 2 9 21 48 76 99 110 116 118 120

78 errors out of the 120 (or 65 per cent) do not exceed ± 0.1 millimetre; that is, about ± 0.1 inch

101 (or 84 per cent) do not exceed ± 0.2

one single error was 0.6 mm

about 45° from face to head keep



28

0	28	23 27
±1	50	11 12
±2	23	6 7
±3	13	2 −
±4	2	2 1
±5	3	1
±6	1	

1 point of the compass = $11^\circ.15'$ Take average height of horse $62' = 15\frac{1}{2}$ hands
log 62 = 1.7924
.9916
(2.7840 log
log 60.81 =)

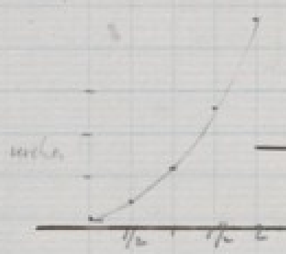
nat cosine $11^\circ.15'$ = .9809 × 62' = length of horse = 60.8
log " " = 9916

62.00
60.81
1.19 loss in apparent length

1/2 point compass = $5^\circ.37'$ + 11.15 = $16^\circ.52'$ log cos = .9809
1.7924 62.00
2.7733 = log 59.33
2.67

2 points $22^\circ.30'$ log cos = .9656
1.7924 62.00
2.7580 = log 57.28
4.72

1/2 point $5^\circ.37'$ log cos = 9979
1.7924 62.00
2.7903 = log 61.70
0.30



Foreshortening of length of Horse
true length taken at 62 inches

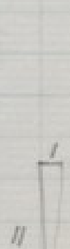
angle of divergence from path, which crosses axis of camera at 90°	inches lost		Departure from centre of path of hind feet, when fore are on it or vice versa inches	
1 point = 11¼	inches	inches	inches	inches
1/2 point	0.30	say 1/3 inch	4.4	say 4½
1 "	1.19	1¼	8.8	8¾
1½	2.67	2⅔	13.1	13
2	4.72	4¾	17.2	17¼

Stray of midpoint between hind legs to one side or other of the path, the midpoint between the forelegs being on it, or vice versa

Take distance when standing between fore & hind legs = 45'

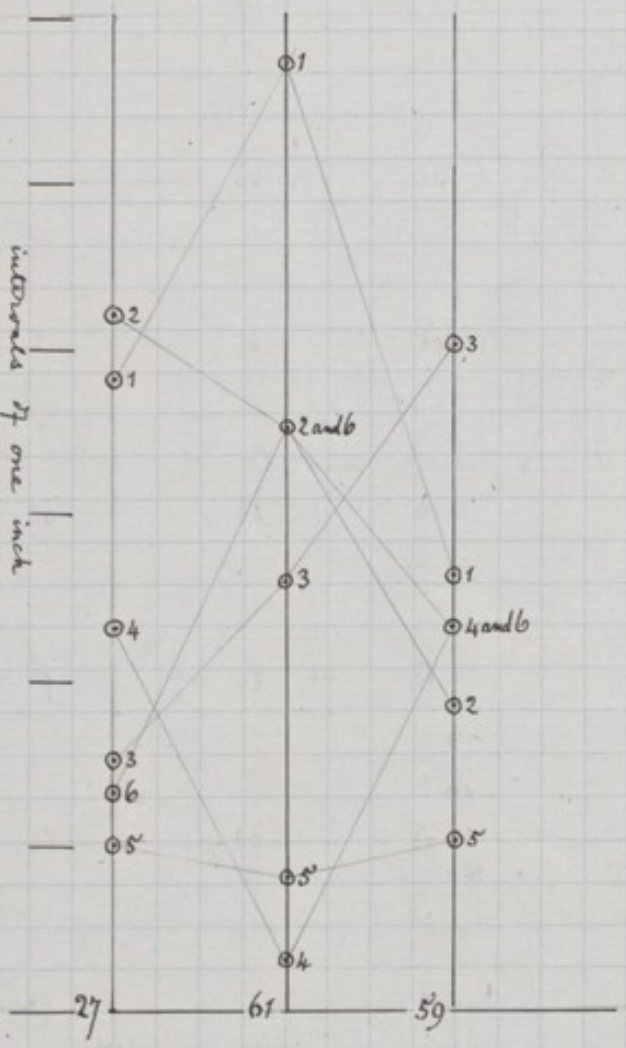
	5°.37	11°.15	16°52	22°.30
log 45 =	1.6532	1.6532	1.6532	1.6532
log sine	8.9907	9.2902	9.4626	9.5828
	0.6439	0.9434	1.1158	1.2360
	4.404	8.778	13.05	17.22

diff cos 4.374 4.27 4.17
which of course diminish becoming 0 at 90°



tan $5^\circ.43'$ = 0.1 nearly $\frac{1}{2}$ point = 1 in 11 nearly

Variations in 2 of the dimensions of horses that are of uniform (reduced) height at withers, of 62 nds., in 15 hands, true scale



No.	Withers	Chest	Length	Croup
1	62	30.8	66.7	61.6
2	62	31.2	64.5	60.8
3	62	28.5	63.6	63.0
4	62	29.3	61.3	61.3
5	62	28.0	61.8	60.0
6	62	28.3	64.5	61.3
Means	62	29.3	63.6	61.3

This must be redone
taking written = 62'
[illegible]

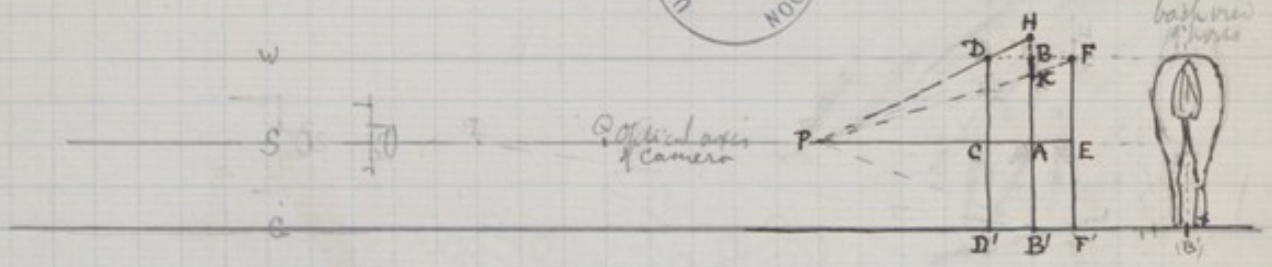
taking written = 100

	written	Chest	Length	Croup
1	100	49.7	107.6	99.4
2	100	50.3	104.0	98.1
3	100	45.9	102.6	101.8
4	100	47.2	98.9	98.9
5	100	45.3	99.7	97.3
6	100	45.8	104.0	98.9
	600	284.2	616.8	594.4
Mean	100	47.4	102.8	99.1
[illegible]	62'	29.3	63.7	61.4

The above table reduced from 100:62
and therefore turned (approx) into inches

62	30.8	66.7	61.6
62	31.2	64.5	60.8
62	28.5	63.6	63.0
62	29.3	61.3	61.3
62	28.0	61.8	60.0
62	28.3	64.5	61.3
Means (inches)	29.3	63.6	61.3
Extreme Diff	28.0 - 30.8	61.3 to 66.7	60.0 to 63.0

100 : 47.4 = 62 : x



G-B' "the horizontal" ground
W B horizontal line touching the wither of the horse
S A optical axis of camera parallel to the ground, half way between W & G

B' is the point in the plane of the feet through which the path passes, consequently B is the position of the withers when the horse is on it
C is at a small distance from A on the side of the camera
E is at the same distance on the farther side.
The camera is focussed on A
When object glass of camera is at P, a height CD will be increased in the ratio of AH to AB and the height EF to be diminished in the ratio of AK to AB

Take PA = 10 feet = 120" ; at 20 feet = 240' ; at 30 feet = 360"
CA = AE = 12"
AB = BD = EF = 31" half the height of the withers

Then the apparent increase of height of BD that is of $2 \times CD = 2BH = 2(AH-AB)$
decrease " F'F $2 \times EF = 2BK = 2(AB-AK)$

AH : PA :: CD : PC
:: AB : PA-AC

$$AH = PA \times \frac{AB}{PA-AC} \qquad AK = PA \times \frac{AB}{PA+AC}$$

It will be sufficient to calculate my differences of AH, as at the ordinary distances of the camera the two values are nearly the same

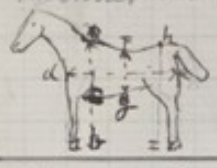
The difference of the deformations of CD and EF is of course $= 2 \times (BH + BK)$

value of PA				
10 feet = 120"	$AH = 120\frac{31}{108} = \frac{3720}{108} =$	34.5 ;	$BH =$ 3".5	$2BH =$ 7".0
20 " = 240"	$AH = 240\frac{31}{228} = \frac{7440}{228} =$	32.6 ;	" 1.6	" 3.2
30 " = 360"	$360\frac{31}{348} = \frac{11160}{348} =$	32.0	" 1.0	" 2.0
40 " = 480"	$480\frac{31}{468} = \frac{14880}{468}$	31.8	" 0.8	" 1.6
60 " = 720	$720\frac{31}{708}$	$\frac{22320}{708}$ 31.5	" 0.5	" 1.0
80 " = 960	$960\frac{31}{948}$	$\frac{29760}{948}$ 31.4	" 0.4	" 0.8
100 " = 1200		31.30	" 0.3	" 0.6

60 measures 60 feet

Capt H. M. Hayes — Points of the Horse 1893 4th 34th

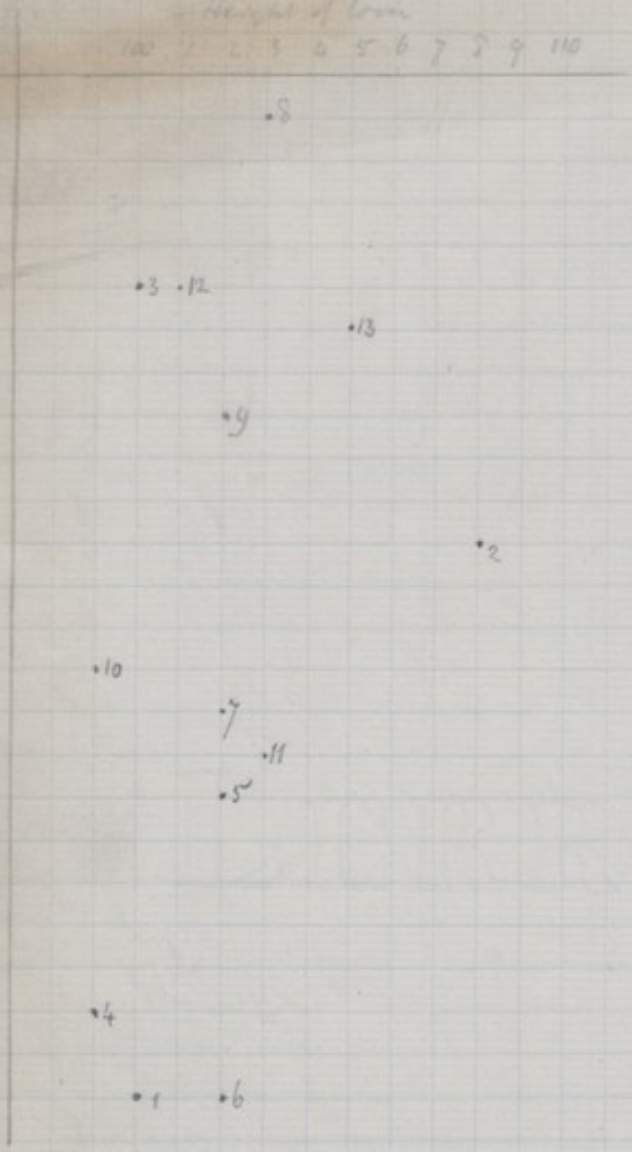
Measured rather roughly in photographs with an arbitrary scale



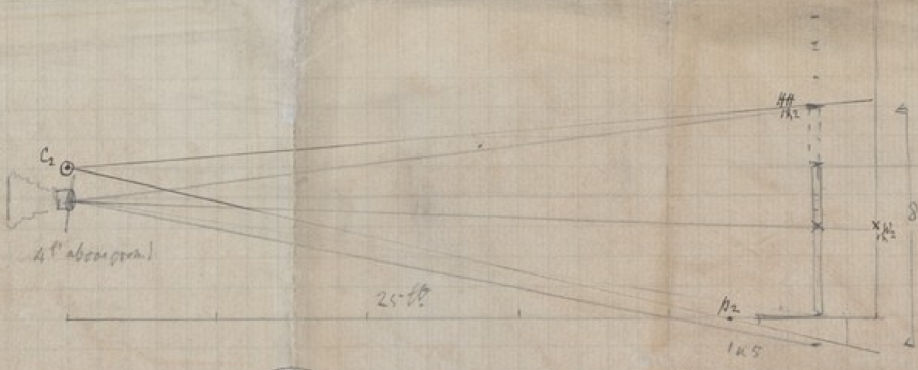
		Height of withers ab	Depth of chest ac	Length de	Depth at hollow fg	Height of loin hz	Reference No.
Ormond	Duke of Portland race horse	12.6	6.9	12.2	5.0	12.6	
		100	66	118	48	100	1
62 St. Simon	" "	10.5	4.5	10.6	4.3	11.3	
		100	43	105	41	108	2
78 Stepaside	Irish hunter	10.5	4.9	11.3	4.2	10.5	
		100	47	99	40	100	3
154 Chance	Shire mare	12.4	6.4	14.3	5.8	12.3	
		100	52	116	47	99	4
160 Pony mare, very low in front		10.2	4.7	11.3	4.1	10.4	
reverse the order		100	48	111	42	102	5
159 Skittles, pony mare		9.7	4.5	10.4	4.0	9.9	
		100	46	108	42	102	6
180 Arab pony, "Magistrate"		9.5	4.4	9.4	3.7	9.7	
		100	46	99	39	102	7
184 Arab, heavy crested		10.5	4.6	10.0	4.5	10.8	
		100	44	95	43	103	8
186 Arab pony, "the Brat"		8.9	4.3	9.0	3.5	9.0	
		100	49	102	40	102	9
190 English cob pony		8.6	4.4	9.3	3.8	8.5	
		100	51	108	44	99	10
192 Kathiawar mare		9.7	4.6	10.7	3.9	10.0	
		100	47	110	40	103	11
194 Romance.	Australian	10.6	4.7	10.5	4.3	10.7	
		100	44	99	41	101	12
200 Underbred horse		10.5	5.0	10.5	4.7	11.0	
		100	48	100	45	105	13
Sums			631	1370	552	1326	
Average		100	48.5	105	42.5	102	
Range		0	44-66	95-118	39-48	99-108	
			22	13	7	7	

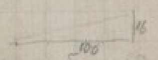
Taking 100 = 52 inches (12½ hands high)
2 = 1 inch (Eight figures = ¼ inch)
1 inch.

Height = 100



Total $= \frac{8}{25}$ or rather $\tan\frac{1}{2}\theta = \frac{4}{25} = \frac{16}{100}$





$\tan\frac{1}{2}\theta = 9^\circ 6'$
$\tan\theta = 18^\circ 12'$ say 20°.

5 ft in 60

6' extended camera reduction to	$\frac{1}{50}$	= 1.2 in	
9' – –	$\frac{1}{33}$	= 1.8 in	x
12'	$\frac{1}{25}$	= 2.4 in	

results.
Camera 4 ft high sloped so that centre of field is 3 ft high
field of 20° taken is 7 ft above ground
at standing place 2 ft from wall
& pavement at a foreshortening of 1 in 5
so 5 inches of pavement (further reduced to $\frac{1}{33}$) = $\frac{1}{33}$ inch

or in 21

Camera 5 ft high – for a guide sloped to point in wall 27' off 3' high
field of 20° taken is 7' above ground & pavement foreshortened 1 in 4
So 4 inches of pavement = $\frac{1}{33}$ inch, (1 inch = $\frac{1}{132}$ inch)

Be satisfied with what can be got for a single view, and employ scales on ground & back
for regarding artistic work one bit
Using a brick pavement. brick wall & brick support for camera. (a regular studio arrangement) Stance Room of horses position barely 2 feet say 24'–26' feet
Corr for height (deviation from 5') × ($\frac{24}{27}$ or $\frac{26}{27}$) × ~~0.89~~ ~~0.9~~
× (0.89 or 0.96)
Proceed by approx.ⁿ take observed diffᶜᵉ on scale and xᵗ accordingly (as if it were the true devⁿ) for 1ˢᵗ approx.
take deviation of 1ˢᵗ approx & repeat process.