

The artistic anatomy of cattle and sheep / by B. Waterhouse Hawkins ; with twenty illustrations drawn on wood by the author, and engraved by H. Orrin Smith.

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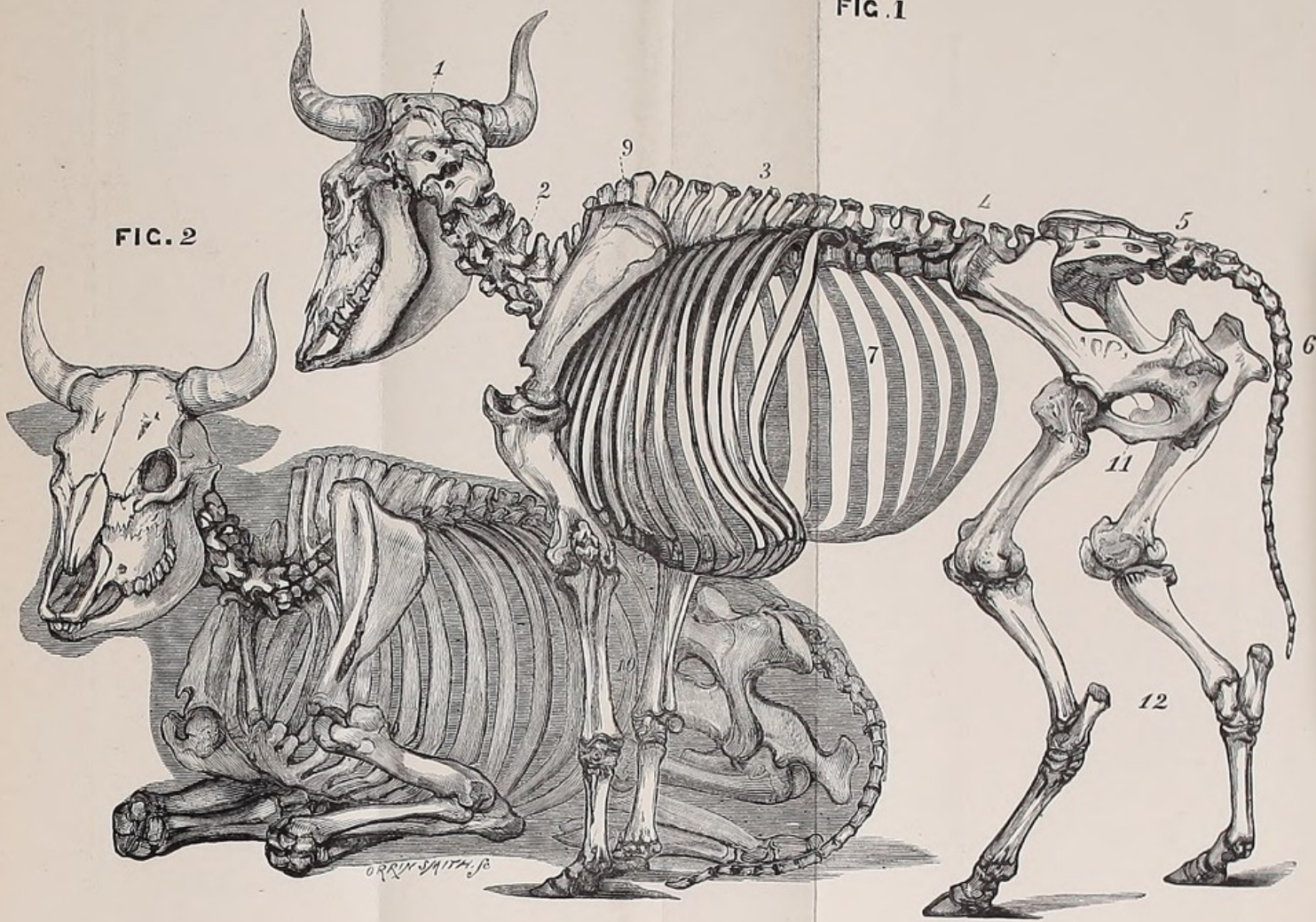
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PLATE II.

FIG. 1

FIG. 2



THE
ARTISTIC ANATOMY
OF
CATTLE AND SHEEP.

BY
B. WATERHOUSE HAWKINS, F.L.S. F.G.S.

AUTHOR OF

"THE ARTISTIC ANATOMY OF THE HORSE,"
"POPULAR COMPARATIVE ANATOMY," "ELEMENTS OF FORM."
"COMPARATIVE VIEW OF THE HUMAN AND ANIMAL FRAME," AND
RESTORER OF THE EXTINCT ANIMALS AT THE CRYSTAL PALACE,
SYDENHAM.

With Twenty Illustrations Drawn on Wood by the Author,

AND ENGRAVED BY H. ORRIN SMITH.



Ars probat artificem.

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and Their Royal Highnesses the Prince and Princess of Wales.

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INTRODUCTION.

In offering this second little Book on the Artistic Anatomy of Animals, I have endeavoured to popularize the causes of the characteristic appearances of a group of animals constantly required by the Landscape Painter of almost every country, and particularly of our own agricultural and cattle producing districts.

Cattle and sheep, at one time, were the most prominent objects of careful study by many celebrated painters of the Dutch School during its zenith, as the inimitable works of Cuyp, Paul Potter, Bergheim and others testify; while, in the English school, the necessary study of the anatomy of these domestic animals has seldom been acquired, even by our ablest Landscape Painters; but when possessed with sufficient force to produce a life-like resemblance of cattle and sheep, it has been exercised as the separate branch

of "Cattle Painting," as was the case with the late veteran academician, F. Ward, and the present talented R.A. Mr. Sidney Cooper. In the works of Landseer, Ansdell, Herring, and a few other artists, cattle and sheep are found as vigorous accessories with anatomical accuracy.

In the Hunterian Museum of the Royal College of Surgeons in London, is to be found the only *accessible* collection in England, of skeletons and preparations of animal structure that can assist the Art Student to comprehend the grand unity of plan ; together with the inexhaustible variety of limbs by which every group in the Animal Kingdom is adapted to all the conditions and circumstances necessary for its mode of life.

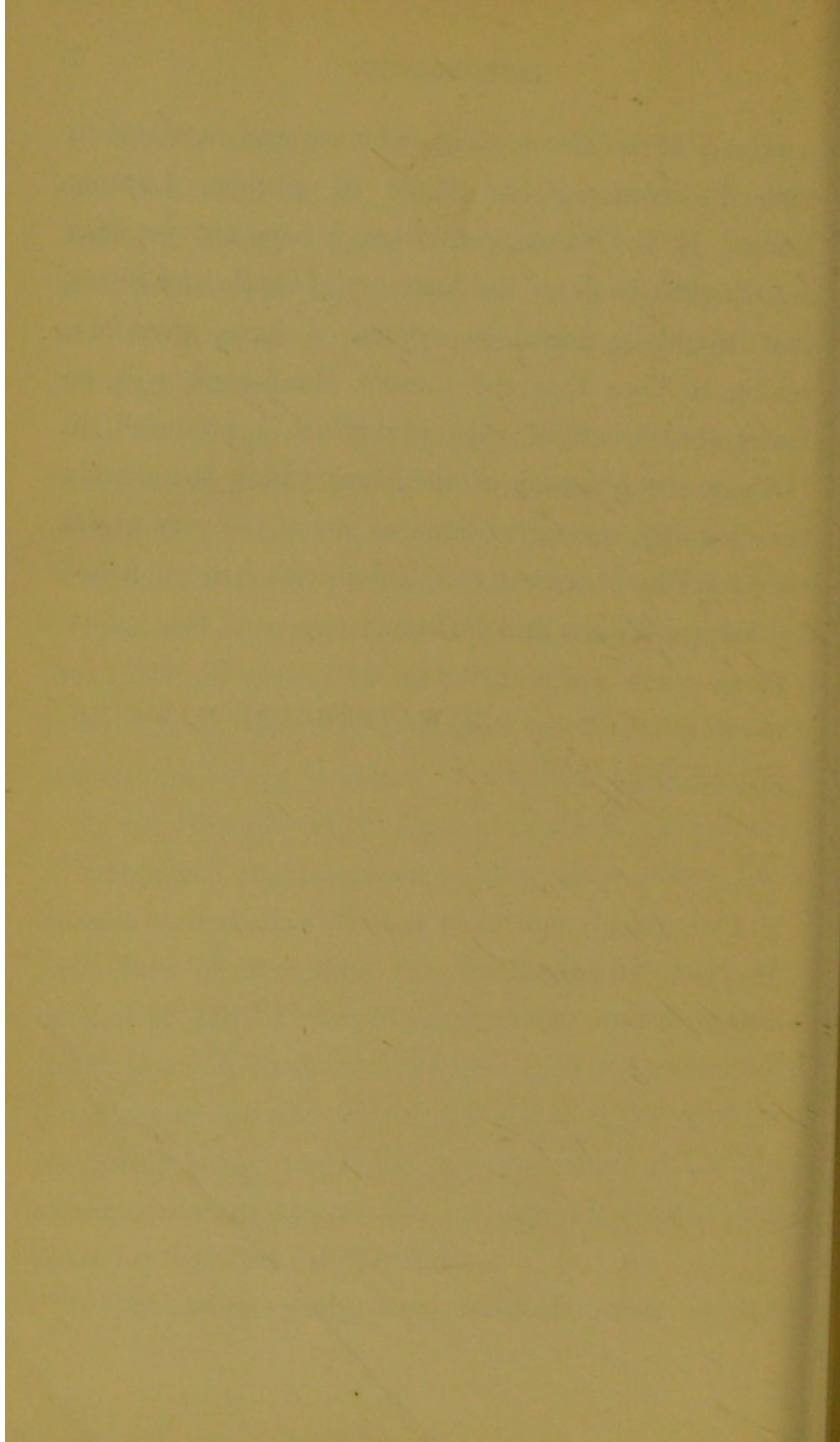
By the liberality of the Council of the Royal College of Surgeons, the advanced student may obtain permission to make use of that collection during the first four days of the week for the legitimate study of Science or Art. I have to acknowledge my obligations to the Council, Museum Committee and Conservators of the Museum for the liberal aid and facilities afforded me during many years, for the production of all my attempts to illustrate the subjects of Comparative Anatomy and Animal Structure.

While several works have been produced on the

Anatomy of the Horse, most elaborate and excellent in their illustrations, like those of Stubbs, Lupton, Youatt, H. B. Chalon and others, I have not yet seen any English book on the Anatomy of Cattle and Sheep that would be useful to artists. I have, therefore, reason to hope that the present Hand-book will be found equally useful with that which I produced, in 1865, on the Anatomy of the Horse, which has already gone through several editions, as one of the very useful series of Hand-books in connection with Art, published by Messrs Winsor and Newton.

B. WATERHOUSE HAWKINS.

Upper Norwood.



THE
ARTISTIC ANATOMY
OF
CATTLE AND SHEEP.

IN introducing the Artistic Anatomy of Cattle to the Painter and Sculptor, it is not my purpose to dwell on the *Natural History* of the Bovidæ, ancient or modern; though a knowledge of their distinguishing features might be useful to the artist, particularly of those animals living in historic periods, and immortalized by poet and historian. “The gigantic horned uri,” and the “woolly-maned bison,” have both figured in the amphitheatre when the Roman conquerors returned home laden with spoils from Britain—great even in those days.

The bones of these animals in a semi-fossil state are so abundant in the Museums of London, Edinburgh, York, Leeds, Manchester, &c., that they can conveniently be seen and studied by those who take an interest in the subject. These perfectly preserved bones prove that the form and nature of ancient

Bovine animals were nearly the same as those now living, except in point of size. They however, attained, gigantic proportions in common with all the animal life abundant at that remote period of the earth's history.

Two of the primitive forms of ancient Bovidæ—*Bos primigenius*, and *Bos longifrons*—are so similar to some modern varieties of cattle, that though the question has been debated by Professor Owen and others, there is but little doubt that they were the progenitors of the several living varieties. *Bos primigenius* (the urus), with the very large and formidable horns projecting from the crest of the skull, bears a striking resemblance to some of the long-horned Scotch cattle of the present day, also the kindred species of wild cattle known as the Chillingham cattle, so poetically described by Sir Walter Scott as “mightiest of all the beasts of chase that roam in woody Caledon.” Sir Edwin Landseer has sent a large picture of these wild cattle to the Royal Academy Exhibition this year, 1867, to which the poet's description is appended, and though the great painter has given in his picture a much milder version of these “mighty beasts” than the poet conceived, yet they are in nature still so wild, that they cannot be approached with safety, and are only to be kept within bounds by the strongest walls and fences.

Professor Bell says in his “History of British Quadrupeds,” “the ancient accounts of the urus, or wild ox, declare it to have been an animal of enormous

size and great fierceness; and the horns are described as being large-spreading, and acute. In this country and in many parts of the continent, there have occurred numerous fossil bones of oxen with large horns having the form and direction of those of certain breeds of our present cattle, particularly of such as are most wild, as for instance the celebrated wild white cattle of Craven, of Chillingham Park, and of Hamilton in Scotland (the *Bos Scoticus* of some authors).” *Bos longifrons*, with the short horns turning downwards, bears some resemblance to the modern short-horned Lincolnshire, and other breeds; but it is still more like the West African cattle, living specimens of which were brought to England some years since for the late Earl of Derby, when the form of head was found to be identical with that of the ancient Egyptian cattle, represented in some frescoes in the gallery of Egyptian Art at the British Museum.

With this brief allusion to the resemblance between the ancient and modern varieties of *Bovidæ*, it may be as well to give a description of the typical form of cattle, which, though quoted from a work intended for the agriculturalist, cannot fail to be useful to the artist. The late Mr. William Youatt in his able book on cattle, says, “Whatever be the breed, there are certain conformations which are indispensable to the thriving and valuable ox and cow. When we have a clear idea of these, we shall be able the more easily to form an accurate judgment of the breeds of the

different counties. If there is one part of the frame, the form of which, more than that of any other, renders the animal valuable, it is the chest. There must be room enough for the heart to beat and the lungs to play, or sufficient blood, for the purposes of nutriment and of strength, will not be circulated, nor will it thoroughly undergo the vital change which is essential to the discharge of every function. We look, therefore, first of all to the wide and deep girth about the heart and lungs. We must have both. The proportion in which the one or the other may preponderate, will depend on the service we may require of the animal. We can excuse a slight degree of flatness of the sides, for he will be lighter in the forehand and more active, but the grazier must have width as well as depth. And not only about the heart and lungs, but over the whole of the ribs must we have both length and roundness, the *hooped* as well as the deep barrel is essential; there must be room for the capacious paunch, room for the material from which the blood is to be provided. The body should also be ribbed home, there should be little space between the ribs and the hips."

If the artist appreciate the *structure* of the animal, he will be more alive to its beauties as well as to the necessary conditions of its existence. He will adapt the character of the landscape, or other surroundings, accordingly as his picture may be intended as a "cattle piece" to which his landscape is only to act as appropriate background, or where the picture is a

landscape in which cattle are only accessories to give the effect of life to the scene. For instance, if he desire to represent cattle and sheep in a natural state of life, he would not place the cattle on a hill side, and the sheep in a water meadow; for though such a condition may often exist at the present day, it is only under an artificial and forced state of things, which it cannot be the object of the artist to represent, any more than he would choose as a picturesque model for representation, an ox or cow without horns. The hornless, polled, or humble cattle, as they are variously called in different localities, are far more interesting to the agriculturist or the naturalist than to the artist, unless he were occupied in producing a faithful picture of the southern districts of Scotland, where hornless Galloways are now most prevalent. Not more than a century ago, however, they were the exception rather than the rule.

The naturalists' question as to whether these cattle without horns represent an aboriginal breed, or are the result of breeding by artificial selection, need not be argued or answered for the artist's requirements. But if when making careful studies of heads, he should find among these hornless varieties of cattle, an abortive horn, a mere tegumentary appendage without a bony core attaching it to the skull, he may remember that naturalists look to such apparent casualties as indications of recurrence to one of the original types which by Nature were all furnished with horns. The artist

may, therefore, also bear in mind that if the leading subject of his picture have any fixed connection with ancient chronology, it would not be strictly accurate to select the humble or hornless varieties of cattle for accessories, even if the scene were laid in the Lowlands of Scotland. This breed of polled or hornless cattle has been cultivated in Britain for economic objects only, having reference to various theories as to the demand upon the system of the animal for such large outgrowths as heavy and expansive horns.

The successful experiments in the breeding of short horns has gone far to confirm the belief that those animals possessing small horns, or totally without, were of quieter dispositions, and consequently better feeders and more easily and quickly fattened for market. The reduction or the absence of horns also enables the grazier to place a larger number of animals in a smaller space, with less risk of combative struggles, when in circumstances so repugnant to Bovine nature. The peaceful effects of reduced horns on cattle have been rather studied from a poetical and philosophical point of view by our Continental neighbours, who have established medals of encouragement for those who carry out this good work: "Une œuvre qui n'est pas seulement agricole mais humanitaire aussi; je dirai même *chrétienne* puisque les vaches désarmées sont moins dangereuses que les autres pour notre prochain."

The painter of Animals who may undertake to portray the fulfilment of the prophecy, Isiah xi, 7, "And

the cow and the bear shall feed ; their young ones shall lie down together ; and the lion shall eat straw like the ox," must select hornless cattle as models for the members of that peaceful combination, though at the cost of picturesque expression.

Cattle are somewhat aquatic in their habits, and often voluntarily frequent water-meadows in preference to hill sides. It is desirable that the artist should be observant of such facts, as they will lead him to appreciate the structure of those animals he may introduce, and induce him to give special attention to the drawing of the limbs, and particularly the feet. Not only may this be said of cattle but of every other animal that he may desire to represent. He will find the feet of all animals, though consisting of a similar arrangement of bones, so modified as to be perfectly adapted to all the requirements (however dissimilar) of each animal's natural mode of life. Cattle seek, and evidently enjoy, wet ground and watery plains by the side of rivers, where the out-spreading of the divided hoofs gives the creature an increased base of support, and at the same time affords a facility for extricating the feet from the hole in the soft ground into which the weight of the animal might have pressed the foot. (See description of Feet, Plate III.)

The small Scotch cattle, commonly called "kyloes," are generally to be found on the boggy ground which abounds in the part of Scotland they inhabit, and their name "kyloe," is nearly the same word as that

used for "ferry," they having to cross the ferries or *kyles*, and frequently having to swim from one island to another, on their way to market, or farm, when the water is too deep for them to reach the solid ground with their feet.

PLATES I & II.

PLATE I.

Frontispiece.—THE SKELETON OF THE OX.

FIGS. 1 & 2.

1. Cranium. See also Plate V., Fig. 1.
2. Cervical vertebræ.
3. Dorsal vertebræ.
4. Lumbar vertebræ.
5. Sacral vertebræ.
6. Caudal vertebræ.
7. Ribs.
8. Sternum.
9. Scapula. See also Plate IV. Fig. 1 *sc.*
10. Front limbs. See Plates III. and IV.
11. Pelvis. See Plate II. Fig. 1.
12. Hind limbs. See Plate III., Fig. 2, and Plate IV., Fig. 1.

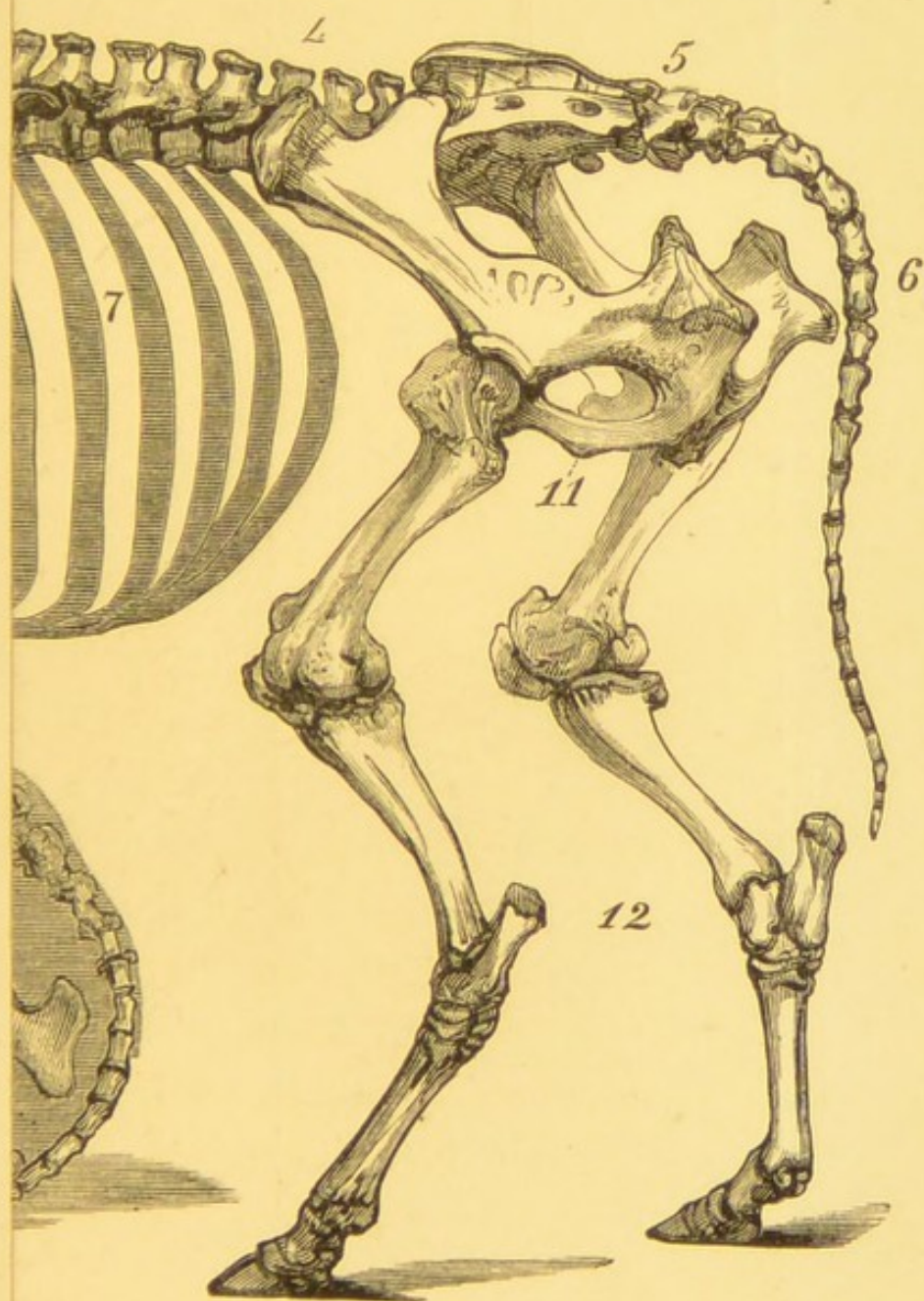
PLATE II.

THE SKELETON OF THE OX.

FIGS. 1 & 2.

1. Cranium. See also Plate V., Fig. 1.
2. Cervical vertebræ.
3. Dorsal vertebræ.

FIG. 1





4. Lumbar vertebræ.
5. Sacral vertebræ.
6. Caudal vertebræ.
7. Ribs.
8. Sternum.
9. Scapula. See Plate IV. Fig. 1 *sc.*
10. Front limbs. See Plate III. and Plate IV. Fig. 1.
11. Pelvis.
12. Hind limbs. See also Plate III. Figs. 2, 2*a*, 2*b*.

At page 10 of the previous Essay, "on the Artistic Anatomy of the Horse," it was urged upon the Art Student, as a necessity, to possess a thorough acquaintance with the arrangement and position of the bones, and their relation to one another. Now this thorough acquaintance with the relation of the bones, one to another, is not only essential to the artist who intends to represent the horse with truth and freedom, but is a positive necessity for the artistic representation of any animal in a natural attitude of action or repose.

To aid the acquirement of a knowledge of this portion of the subject, Plates I. and II. have been designed to display the greatest variety in the appearance of the skeletons, as seen from four different points of view which can be again reversed as to right and left side, by presenting each picture to the looking-glass so as to produce eight variations of aspect from these two first plates.

Plate I., Fig. 1, represents a front view of the

skeleton of the ox in a standing attitude where the carriage of the head, horns, and front limbs are the prominent features of the figure. The long neural spines of the dorsal vertebræ, (No. 3) are here conspicuous, diminishing in length as they recede from the neck. These spines afford a firm attachment for the strong nuchal tendon which proceeds from the occipital, or posterior, region of the skull (1 *a*. Fig. 2) to the summits of these bones, where it acts as an elastic support, allowing the entire control and use of the heavy head and extended horns, so as to enable the animal to remove a fly from its sides with the point of the horn, or meet its antagonist in mid-career, or toss from its horns high into the air a weight equal to that of an adult human being.

The next prominent feature in the front view of Fig. 1, Plate I. is the appearance of suspension of the fore part of the carcass between the front limbs. This is actually the case with those animals where the clavicles are altogether absent, or when present of reduced size, and not articulated either to the sternum or to the coracoid process of the shoulders; the attachment of the front limbs to the trunk being only by the muscles and tissues by which they are enveloped. In consequence of this the varied position of the cartilaginous portion, or supra-scapula (9), will be more or less evident externally, according to the amount of pressure borne by either limb alternately while walking, or equally by both limbs when stand-

ing still. The projection of the head of the humerus (*hu.* Fig. 1, Plate IV.) at its conjunction with the glenoid cavity of the scapula (9, Fig. 1, Plate I.) is distinctly discernible externally, and requires the artist's attention, which may now also be directed to the relation and contour of the hind quarter well exhibited in Fig. 1 Plate II. In this last, the large bones of the pelvis, or haunch will account for the various projections and relative hollows so evident externally in every figure of the cow or ox in natural condition, but from which must, of course, be excluded the distended carcasses of prize cattle at our Agricultural Shows.

In studying the arrangement of bones, constituting the hinder or pelvic arch, it will be observed that all the principal bones are symmetrically opposed to the angle of position of the equivalent bones in the front or pectoral arch. For example, the side walls of the pelvis from the ilium to the acetabulum (11) in the hind quarter is represented by the scapula (9) Plates I & II, from the supra-scapular cartilage to its junction with the humerus (*m*) in the glenoid cavity in the front limb. While the femur, or thigh bone from the insertion of its head into the cup-like cavity of the acetabulum (11) to the large condyles at its distal end has its equivalent in the humerus (*m*) from the shoulder to the elbow joint. In continuation of that limb, the bones representing ulna and radius have their distal ends resting on the several bones of the carpal joint (*c.* Plate IV., Fig. 1.) united to the shank bone (*cn*), which with the terminal metacarpal

bones (*mc*) completes the front foot with its divided hoof. In the same manner the hind limbs (12) from the knee joint to the distal end of the tibia with abbreviated fibula, and the tarsal bones, (*cb*. Fig. 2, Plate III.,) together with the metacarpal bones of the foot are continued from the hock to the terminal joints of the toes and divided hoof, placed at an opposite angle yet symmetrical with the front limbs (10.)

PLATE III.

BONES OF THE FRONT AND HIND LIMBS OF THE OX.

FIGS. 1, 1 *a.*, 1 *b.*, 2, 2 *a.*, 2 *b.*

Fig. 1. Front limb.

Fig. 2. Hind limb.

Fig. 1 *a.* Front view of the left front foot.

Fig. 1 *b.* Hind view of left front foot.

Fig. 2 *a.* Back view of left hind foot.

Fig. 2 *b.* Front view of left hind foot.

FIG. 1. Bones of the carpus wrist or *front knee joint*.

l. Lunare.

s. Scaphoid.

m. Magnum.

u. Unciforme.

cu. Cuneiforme.

n. Splint bone.

p. Pisiforme.

FIG. 1 *a.* Front view of left fore-foot, showing the bifurcation of the pastern joint, one of the large sesamoids with the two larger, or upper pasterns, together with the two coffin bones as in each foot.

PLATE III.

FIG. 1

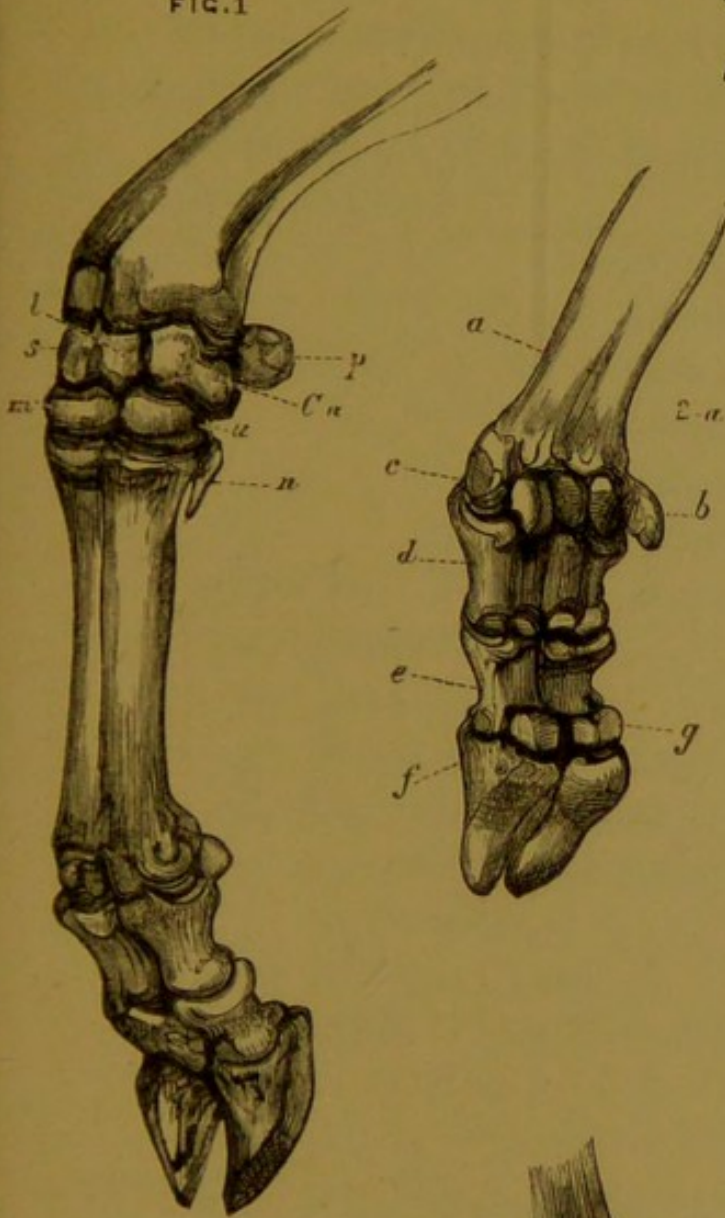
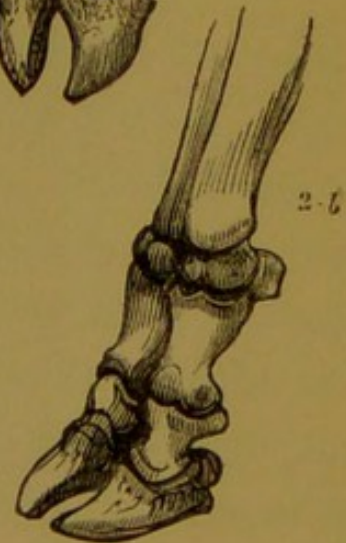
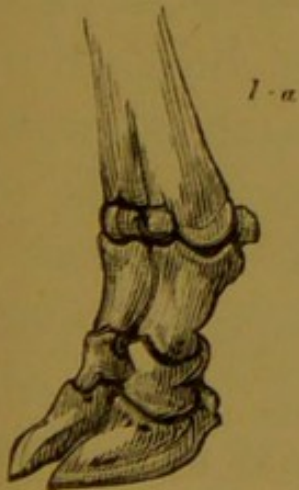


FIG. 2



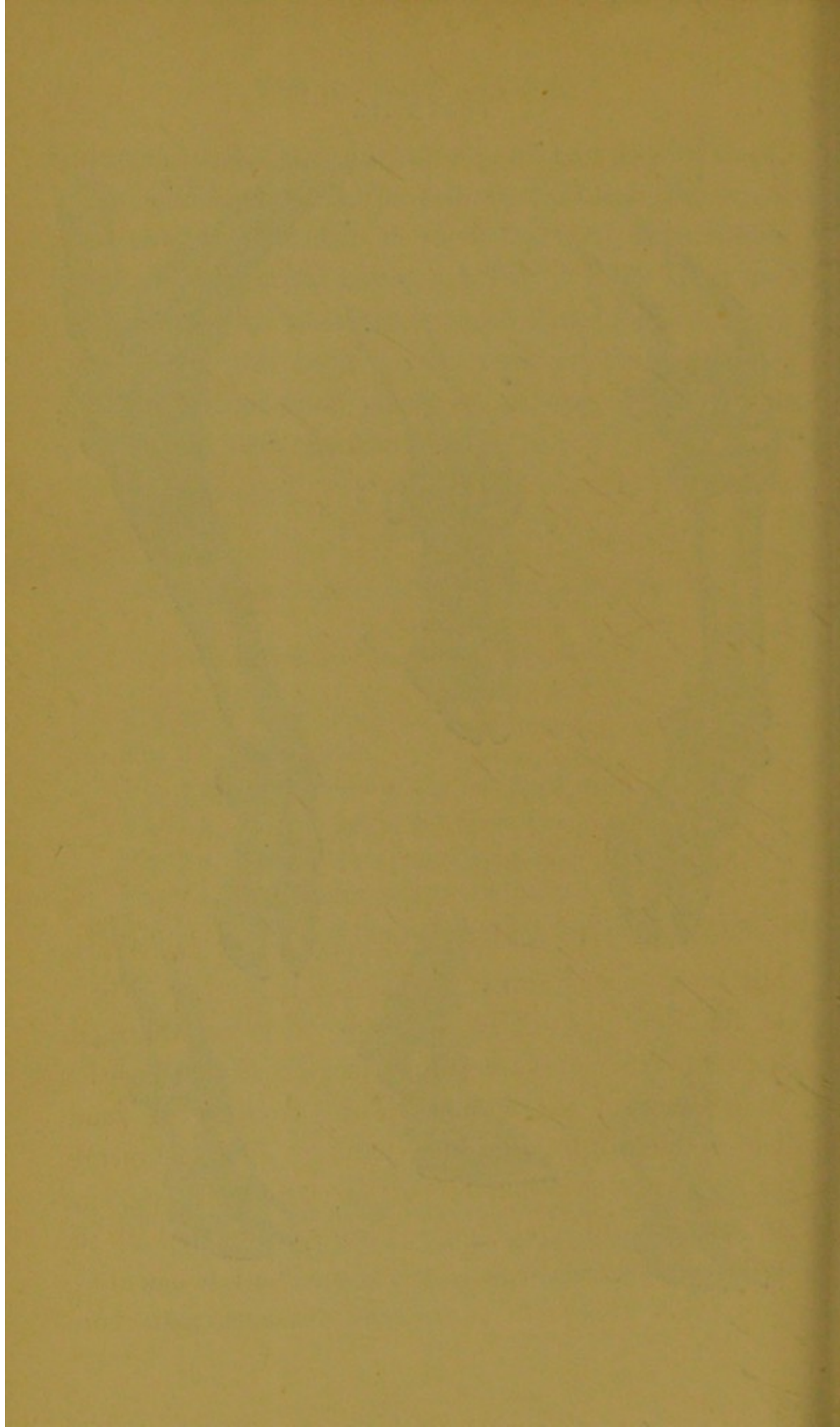


FIG. 1 *b*. Exhibits the posterior view of the same foot, together with a posterior view of each of the other bones.

FIG. 2. Front view of the hind limb from the os calcis or heel, (or point of hock) to the coffin bone, or ungueal phalanx of toes.

- cl.* Calcis.
- as.* Astragalus.
- tb.* Tibia.
- fb.* Fibula.
- cb.* Cuboid.
- cu.* Cuneiforme.

FIG. 2 *a*. Back view of the left hind foot.

- a.* Shank bone.
- b.* Large sesamoids.
- c.* Distal end of metatarsal, or shank bone.
- d.* The two larger pasterns.
- e.* The two smaller pasterns.
- f.* Coffin bones.
- g.* Navicular bone.

FIG. 2 *b*. Front view of the same foot.

In Plate III. the feet are represented in various attitudes, as seen from different points of view. Fig. 1 is the front leg of the left side as lifted from the ground in the act of stepping, as seen from a position in advance of the animal. The two rows of small bones constituting the knee-joint, as it is technically called (wrist or carpus proper) are here well seen, and the artist will find that a clear recollection of the relative places of these bones to the shaft bones above and below this point, will greatly assist him in repro-

ducing the natural appearance of any action of the front limbs. In the adult animal the details of the joint are no longer discernible in consequence of the thickness of the skin, induced by the habit of bending this joint of the front limb to receive the weight of the animal when about to lie down. The camel and the gnu have callosities on these joints; but with our domestic cattle it is only such an enlargement of the joint as obliterates the appearance of the several bones of the carpal joint which are so clearly discernible in the same joint of the front limb of the horse.

The bones of the carpal joint visible in Fig. 1, are the scaphoid *s*, lunare *l*, and cuneiforme *cu*, in the upper row. The pisiform bone *p* is seen attached to the ulna and cuneiforme, while in the lower row os magnum and ~~X~~cuneiforme articulate with the cannon or shank bone, which is composed of the anchylosed third and fourth phalanx of the metacarpals, to the upper and outer extremity of which the abbreviated fifth phalanx is attached, from the distal or lower end of the shank bone the pairs of fetlock pastern and coffin bones are articulated.

Fig. 1*a* is also a front view of the left fore foot, with the coffin bones or ungueal phalanges planted on the ground, as when the weight of the body is borne by the left foot, while the right is being lifted and carried forward.

Fig. 1*b* is the same foot in the same attitude, seen from behind.

Figs. 2, 2*a*, 2*b*.—The bones of the left hind leg of the ox from the hock to the hoofs seen from a position in advance of the animal.

Fig. 2.—The bones of the tarsal joint, the equivalent of the ankle, heel and instep with the third and fourth toe, when compared with the situation of the bones in the human foot. The distal end of the tibia *tb.*, *as.* astragalus, *cl.* calcaneum, *fb.* abbreviated fibula, *cb.* cuboid, *cu.* cuneiforme. In continuation is the cannon or shank bone, the fetlock lower pastern and coffin bones or ungual phalanges.

Fig. 2*a* is a back view of the same foot in the same attitude, showing the sesamoid bones at the fetlock joint and at the junction of the lower pastern and coffin bones or ungual phalanges.

Fig. 2*b* is a front view of the same foot as when planted on the ground bearing the weight of the body.

The details of the front limbs on a larger scale are represented in Plate IV., where the bones of the right front limb are figured with a diagram of the arrangement of the muscles of the same limb, see Plate IV. Figs. 1 and 2.

PLATE IV.

BONES AND MUSCLES OF THE FRONT LIMB OF THE OX.

FIG. 1. *Bones of the front limb.*

- sc.* Scapula, or shoulder blade.
- lm.* Humerus, or lower bone of the shoulder.
- ra.* Radius, chief bone of the arm.
- ul.* Ulna, its upper part forming the elbow.
- c.* Bones of the carpus, or knee joint.
- mc.* 1. Metacarpals.
- mc.* 2. For bones of the foot, See Plate III.
- cn.* Shank bone.

FIG 2. *Muscles of the shoulder and right fore-leg.*

- 1. Supra spinatus.
- 2. Infra spinatus.
- 3. Abductor brachii brevis.
- 4. Anconeus longus.
- 5. Extensor cubiti longus.
- 6. Anconeus externus.
- 7. Brachialis internus.
- 8. Levator humeri.
- 9 & 9. Extensor carpi radialis.
- 10. Abductor pollicis.
- 11. Extensor digitorum longior.
- 12. Extensor digitorum brevior.
- 13 & 13. Flexor carpi ulnaris externus.

PLATE IV.

FIG. 2

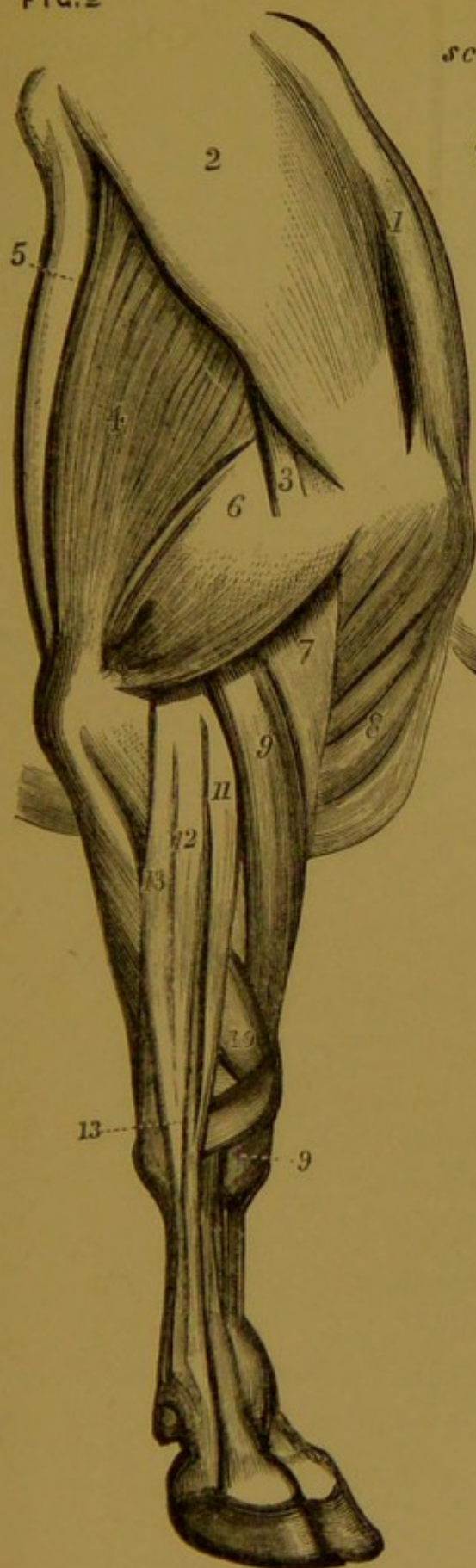
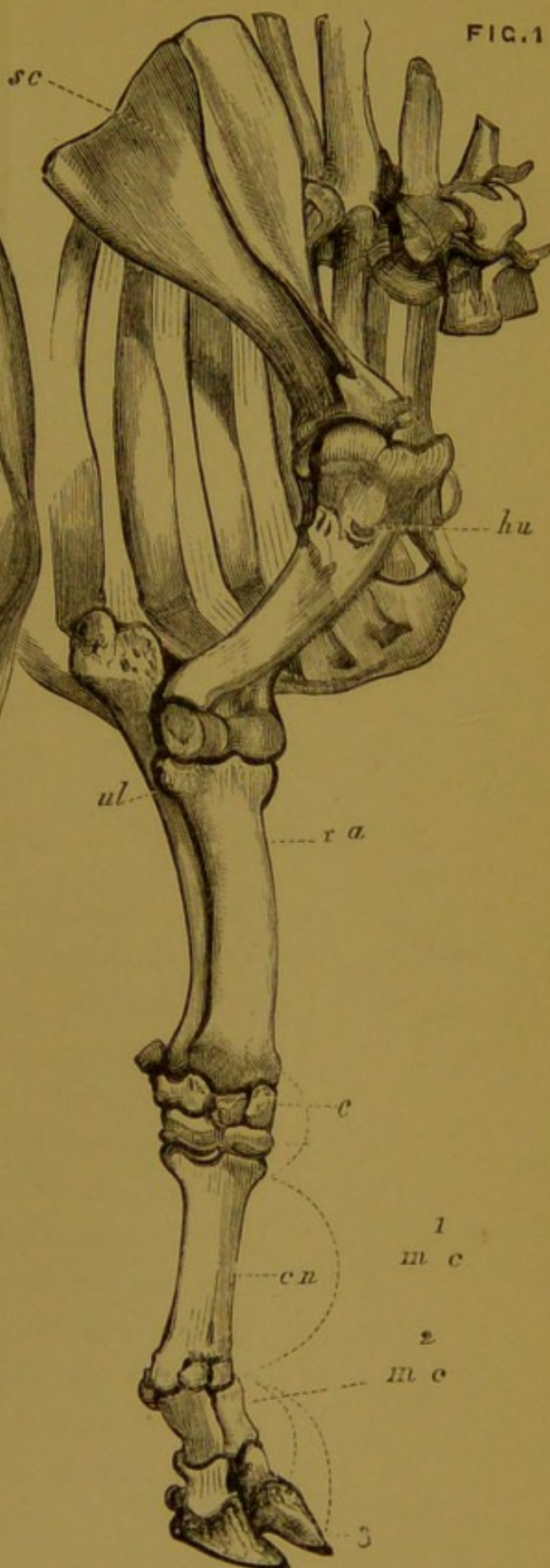


FIG. 1





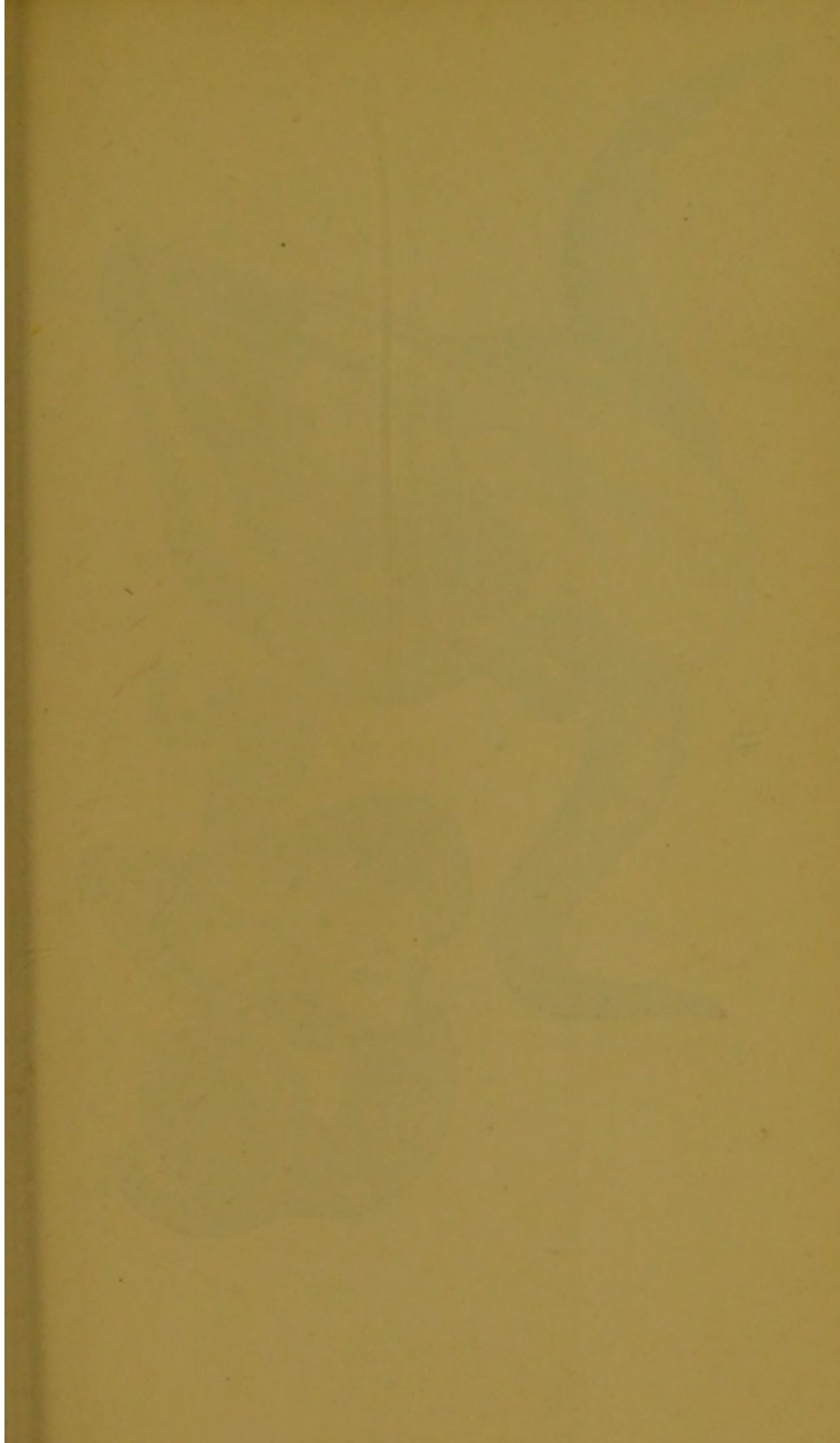


PLATE V.

FIG 1

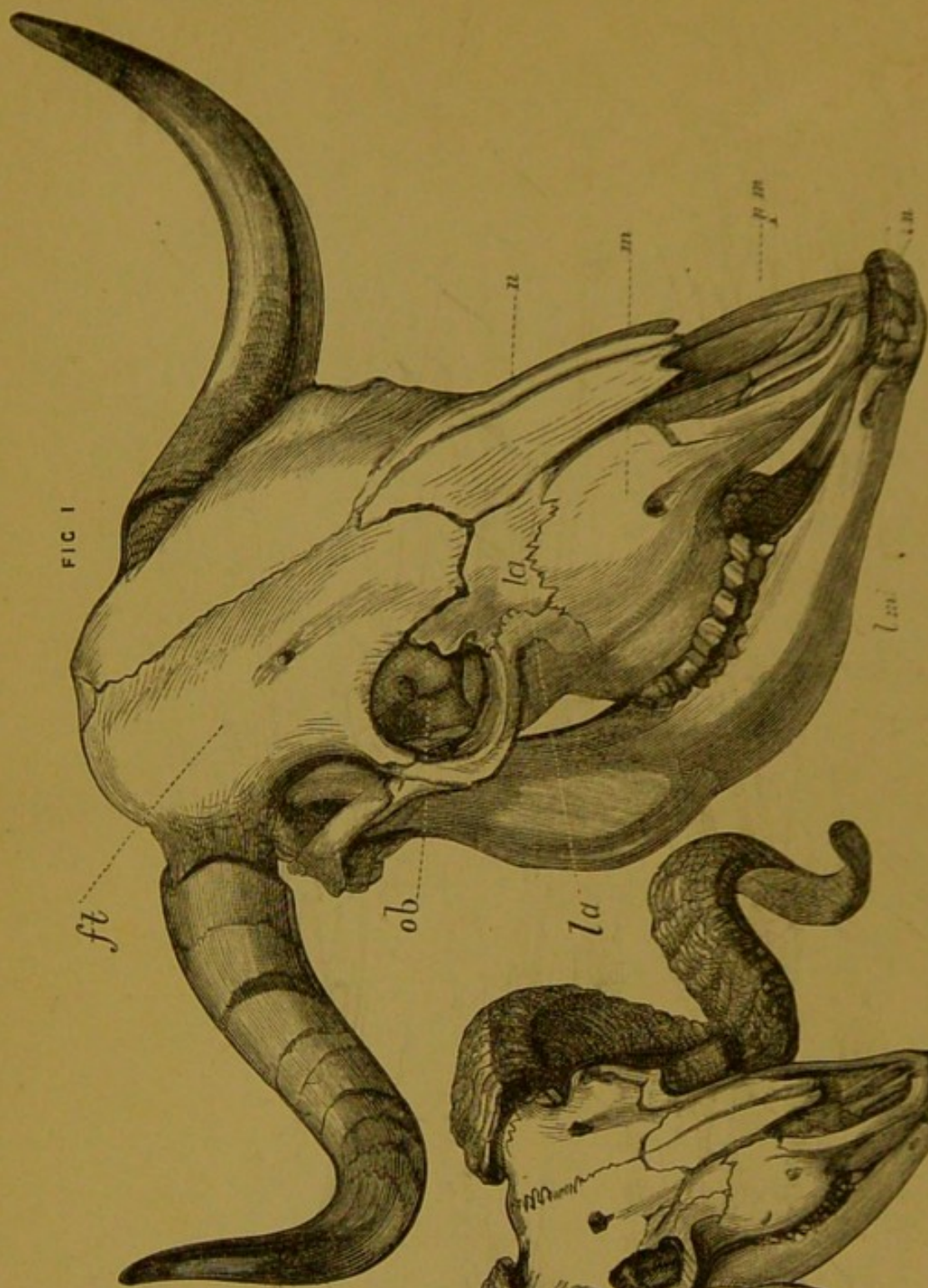


FIG 2

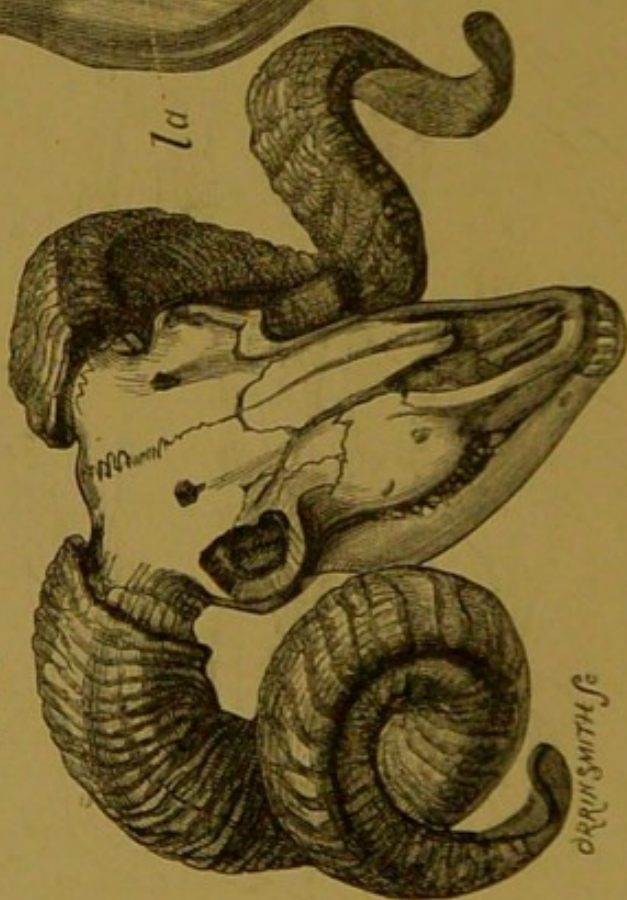


PLATE V.

BONES OF THE HEAD OF THE OX AND SHEEP.

FIGS. 1 & 2.

FIG. 1. *Bones of the head of the Ox.**ft.* Frontal.*ob.* Orbit.*n.* Nasal.*la.* Lachrymal.*m.* Malar.*pm.* Pre-maxillary.*lm.* Lower maxillary.*in.* Incisors or nippers, in lower jaw only.FIG. 2. *Bones of the head of the Sheep.*

The above references are applicable to both Figs. 1 and 2.

PLATE VI.

MUSCLES OF THE HEADS OF THE OX AND SHEEP.

FIGS. 1 & 2.

FIG. 1. *Muscles of the head of the Ox.*

1. Orbicularis oris.
2. Levator labii superioris alæque-nasi.
3. Zygomaticus.
4. Depressor palpebræ inferioris.
- 4 b. Risoris santorini.
5. Orbicularis palpebrarum.
- 5 b. Masseter.
6. Corrugater super-ciliorum.
7. Depressor auriculæ.
- 7a. Rotator longus auriculæ.
8. Sternus maxillaris.
- 9 9 & 9. The different portions of levator humeri.

FIG. 2. *Muscles of the head and neck of the sheep.*

1. Levator labii superioris alæque-nasi.
2. Pyramidalis nasi.
- 3 & 3. Palpebræ inferioris.
4. Orbicularis palpebrarum.
5. Orbicularis oris.
6. Zygomaticus major.
7. Risoris santorini.
8. Masseter.
- 8 b. Abductor auriculæ inferior.
- 10 & 10. Omo hyoideus.
- 10 b. Levator scapulæ major.
- 11 & 11. Splenius capitis.
- 12 & 12. Levator anguli scapulæ.
13. Serratus anticus major.

FIG. 1

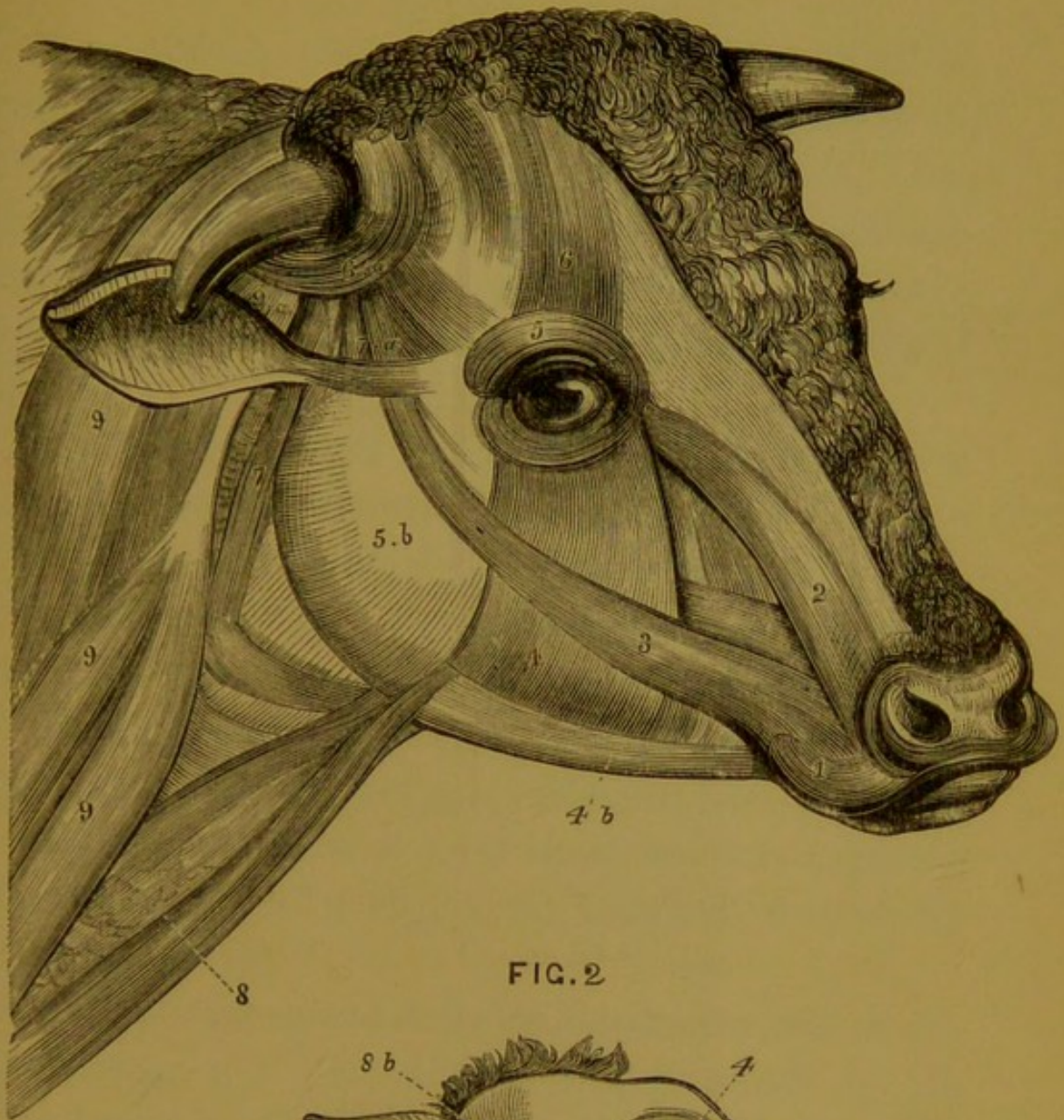
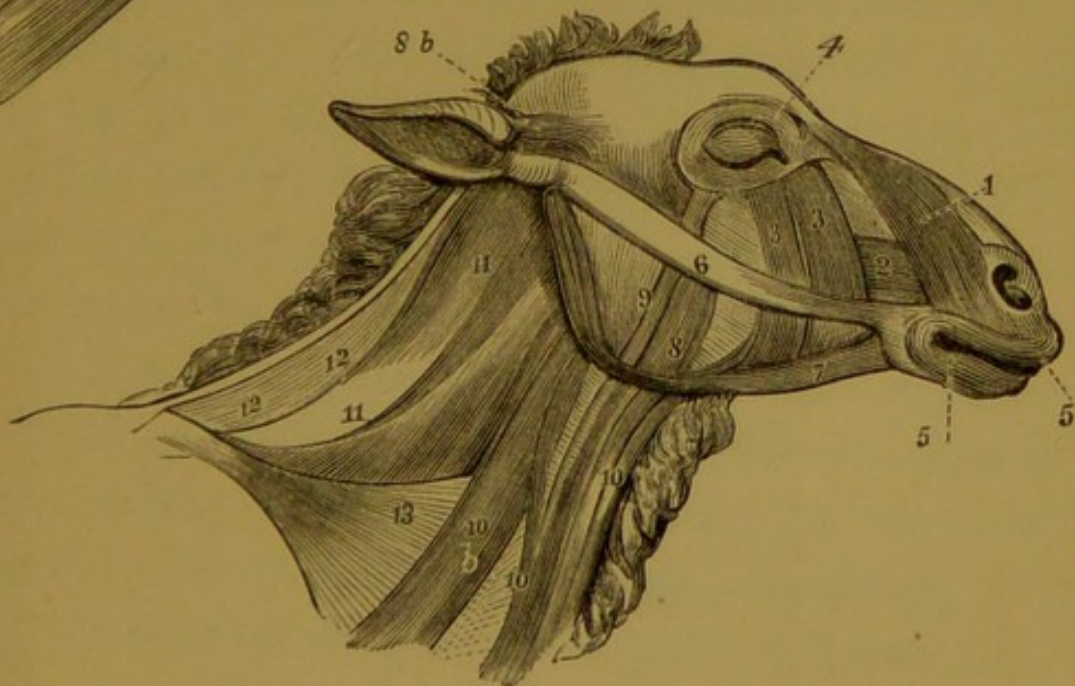
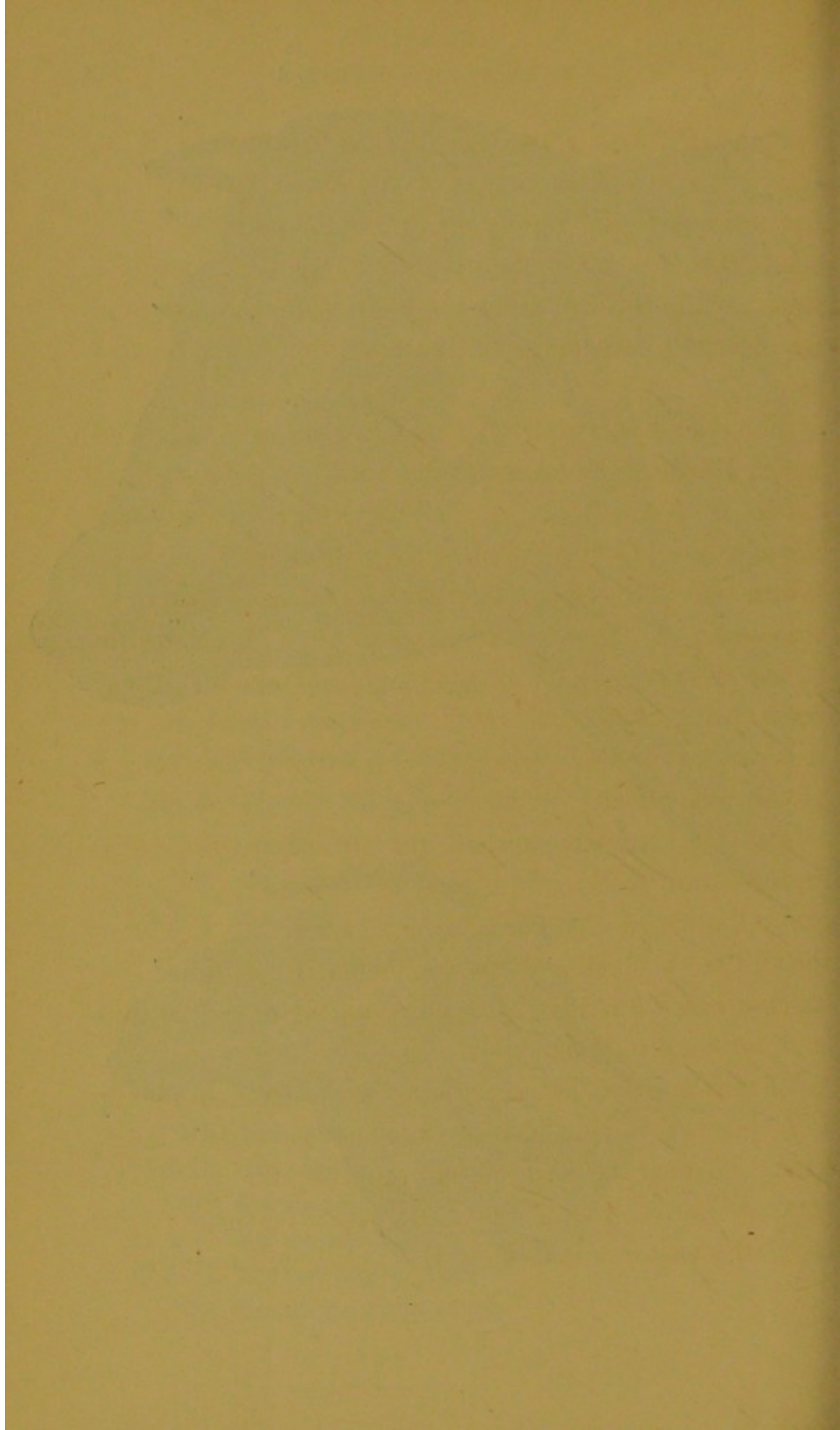


FIG. 2





The artist has fewer advantages to aid him in the study of cattle than in that of the horse, as there are few antique works representing Bovine animals. The celebrated Nineveh bulls are only symbolical combinations; while the Egyptian representations of cattle are, for the most part, pictorial figures of their domesticated race.

The bas-relief, said to have been an antique, from which Raphael quoted his centre group of the altar and cattle in his cartoon of the "Sacrifice to Paul and Barnabas at Lystra," shows that short horns were in favour for the ceremonial displays of sacrifices, and reasonably so as more manageable in a crowd, while at the same time the animals had horns enough to express the characteristics of the beast, and to receive the decorations of the garlands, &c., without loss to the picturesque effect.

The most conspicuous of the ancient works of art, representing a Bovine animal in full action is the group known as the Toro Farnese, where the figure of the bull is of colossal size, and sufficiently generalized in its character to render it a more useful model to the sculptor than to the painter.

Therefore, the painter must seek for standards and types of Bovine beauty among those of nature by which he may be surrounded; and as, for the most part, pictures requiring cattle as accessories will be of the pastoral character, the artist will have little

difficulty in selecting good models for his studies and sketches.

But should he desire to illustrate the wilder scenes of the Highlands of Scotland, he will there find the Bovine population, even when in a small enclosure, not so approachable or tranquil as to enable him to make imitative sketches or studies. It will be necessary, therefore, even for the experienced artist to have a standard in his own mind based upon a knowledge of the various parts, and their relative proportion to the whole figure, before he can secure from the living animal, those characters of life and motion that place the mere sketch of the true artist far above the value of the most elaborately finished picture produced by *imitation only*.

The head with its features, ears, eyes and nostrils, is the chief seat of animal expression. The eyes of cattle are placed so far below the forehead on the sides of the face as to allow of few positions in which both eyes can be seen at one view; consequently, the eye which is seen, must be well understood, and truly drawn, to produce any effect of expression.

The eye of the ox is more square than the eye of the horse. The bony orbit composed of the frontal, malar and lachrymal bones projects from the side of the face, and enables the ox to see behind him without turning his head while grazing.

The nature and food of the ruminating animals render them more liable to be pursued than to pursue.

The eyelids are well defined, and with the fringe of eyelashes the varying perspective of the moving forms around the globe of the eye are clearly discernible, so as to enable the artist to make careful studies of that feature which conduces most to the limited expression of the ox.

It is when the upper eyelid descends so low as to half veil the transverse, oblong pupil of the eye, that the almost sleepy appearance of perfect repose is so effectively expressed while the animal is ruminating in confident security.

When alarmed, the upper eyelid is suddenly lifted, and the ball of the eye with its convex lens is protruded, while the clearly defined pupil, the surrounding iris, and a portion of the white sclerotica, are in view. The latter is displayed on the upper margin in front or behind the iris, as the cause of the animal's fear or excitement may be from behind or in front.

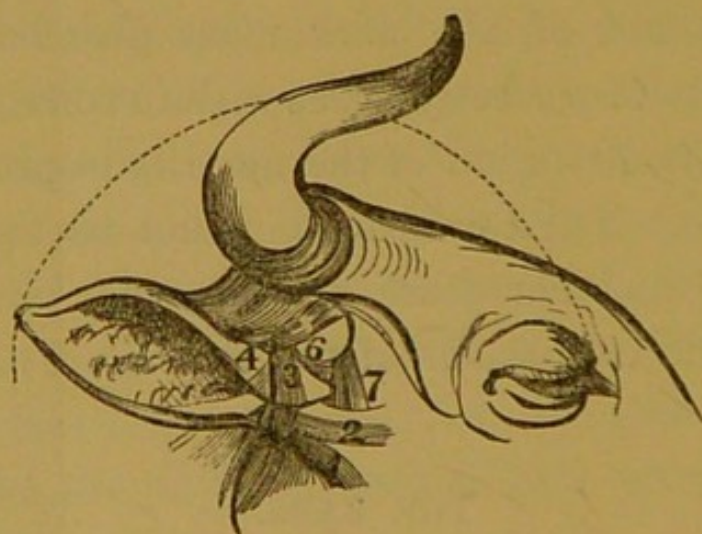
The position of the ears must also be carefully studied so as to perfectly agree with the direction of the eyes and the dilatation of the nostrils in proportion to the attitude. The tail also must not be forgotten as its attitude and curvature gives a most emphatic addition to the expression of the head.

THE EARS.

The outer ears (*conchæ auris*) of cattle have great freedom of action and though not taking so active a

part in the visible expression of the inner thoughts and emotions of the animal, as is the fact with the horse, yet they have a supplementary office to perform equally important in the economy of the animal. It is by the free movement of the ears that cattle remove flies from their eyes, particularly while standing still in shallow water, or reclining in a ruminating state when the tail is not eligible for the office. The artist may deduce from such Natural History facts, the average length and relative situation of the ears from the centre of their motion to the inner corner of the eyes.

He will also comprehend the importance of this external portion of the organ of hearing from the complicated machinery of those nicely adjusted sets of muscles, each to its appointed office, as those of the ear numbered 1, 2, 3, 4, 5, 6, 7, in the accompanying diagram.



- No. 1. Depressor auriculæ.
„ 2. Adductor inferior.
„ 3. Adductor medius.

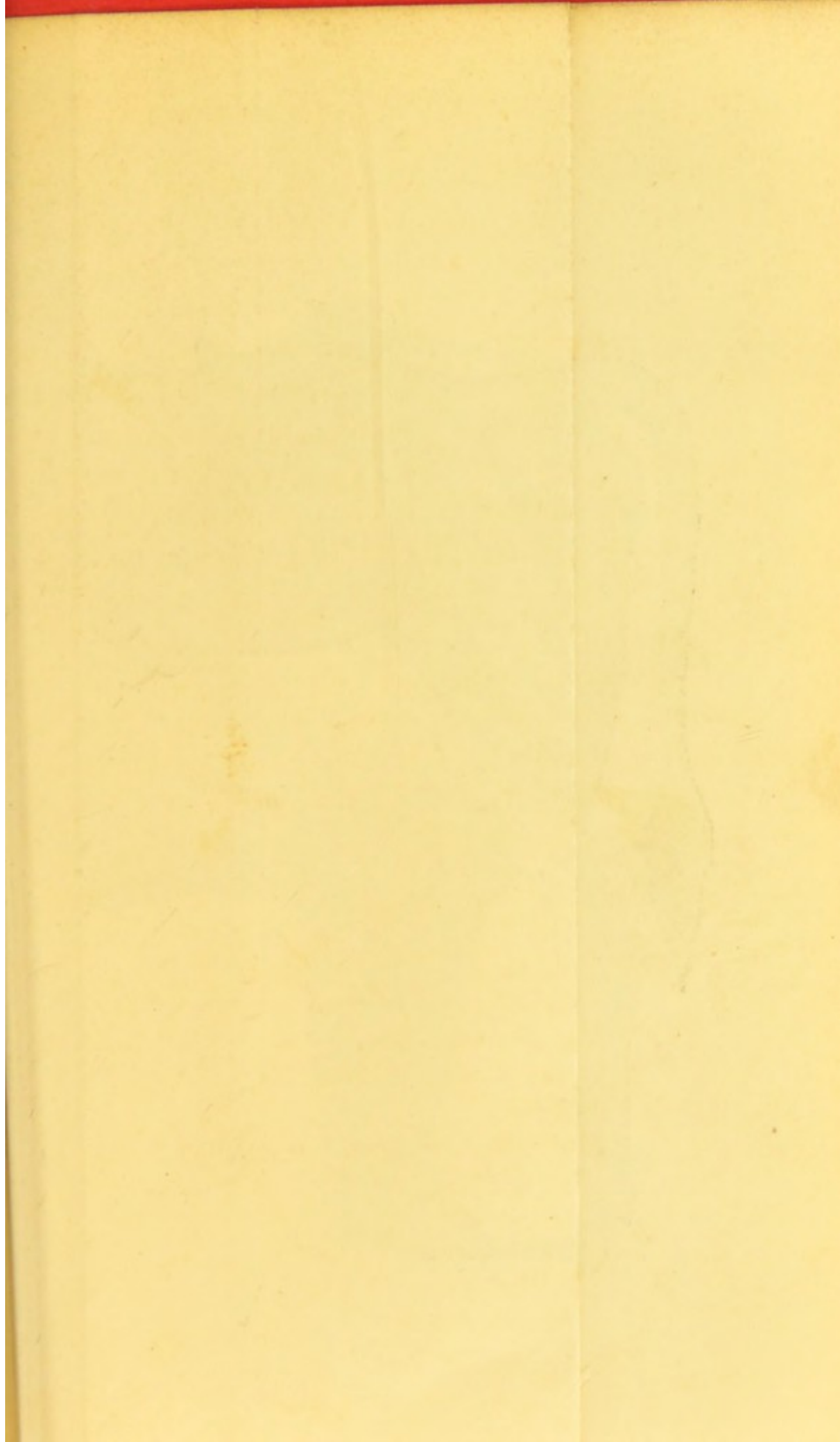
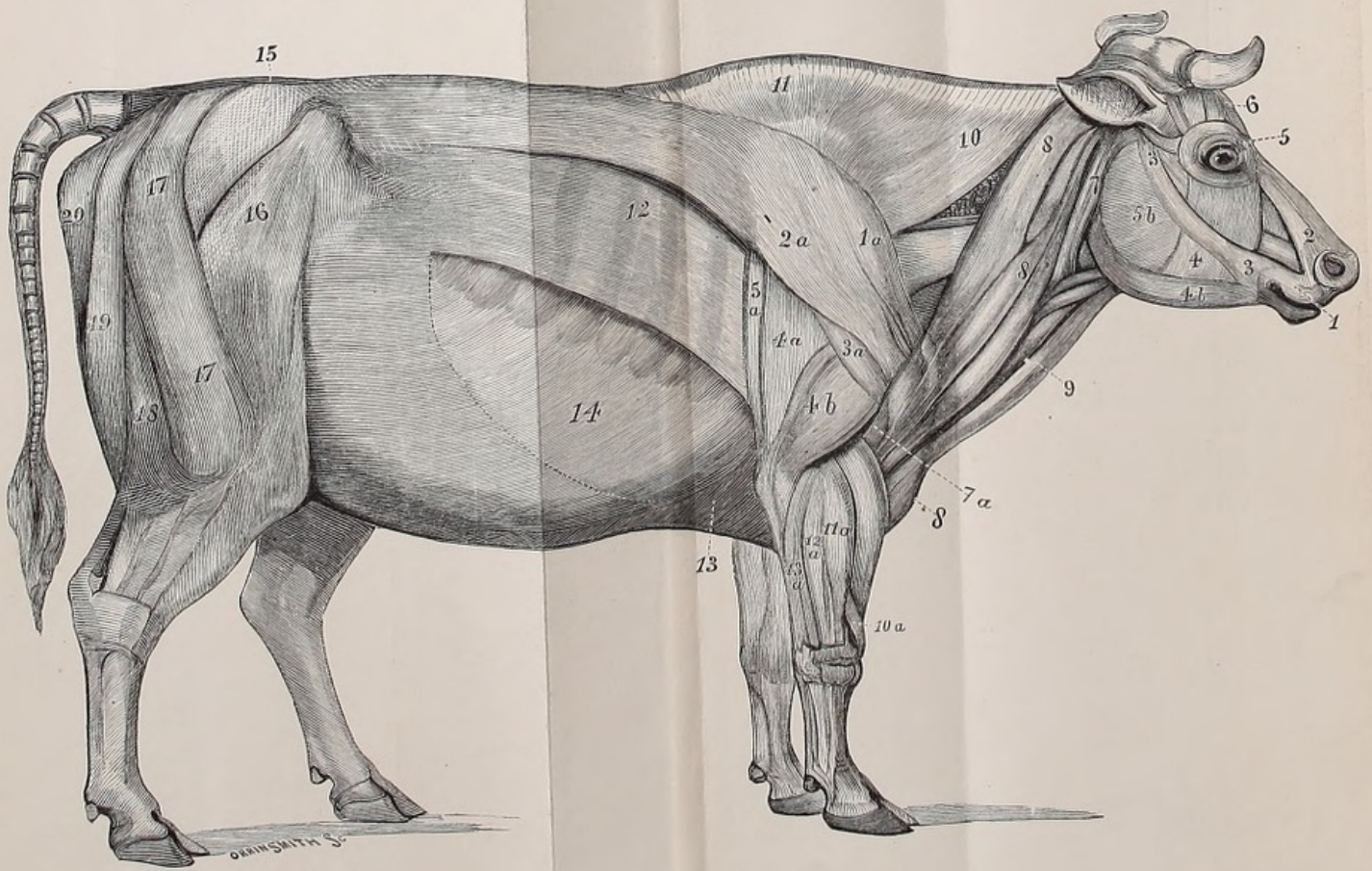


PLATE VII.



- No. 4. Adductor superior.
 „ 5. Levator auriculæ brevis.
 „ 6. Rotatus brevis.
 „ 7. Rotatus longus.

PLATE VII.

Muscles of the Ox.

1. Orbicularis oris.
2. Levator labii superioris alæque-nasi.
- 3 & 3. Zygomaticus.
4. Depressor palpebræ inferioris.
- 4 b. Risoris santorini.
5. Orbicularis palpebrarum.
- 5 b. Masseter.
6. Corrugator super-ciliorum.
7. Depressor auriculæ.
- 8 8 & 8. Levator humeri, or deltoides.
9. Sterno maxillaris.
- 10 & 11. Trapezius.
12. Lattissimus dorsi.
13. Pectoralis major.
14. Obliquus abdominis externus.
15. Gluteus maximus.
16. Tensor fascia-latæ.
- 17 & 18. Biceps femoris.
- 19 & 20. Abductor tibia longus and semitendinosus.
- 1 a. Supra spinatus.
- 2 a. Infra spinatus.
- 3 a. Abductor brachii brevis.
- 4 a. Anconeus longus.
- 4 b. Anconeus externus.

- 5 *a.* Extensor cubiti longus.
- 7 *a.* Brachialis internus.
- 10 *a.* Abductor pollicis.
- 11 *a.* Extensor digitorum longior.
- 12 *a.* Extensor digitorum brevior.
- 13 *a.* Flexor carpi ulnaris externus.

PLATES IV. VI. & VII.

MUSCLES.

In Plate V. Fig. 2, the muscles of the right fore limb of the Ox are represented by the side of the corresponding bones of the shoulder and limb.

Plate VII. is a diagram indicating the most prominent external muscles of the whole figure of the Ox, seen on the right side.

The Art Student is recommended to compare this figure with a similar diagram of the muscles of the horse, placed as frontispiece to the "Artistic Anatomy of the Horse."* By comparing these diagrams he will find the same plan and arrangement of muscles bearing the same names, yet so specially modified to the different form, habits and carriage of each animal, as not to be easily identified without the diagram, and consequently difficult to discern by superficial observation when sketching from life.

* Published by Messrs. Winsor and Newton, 38, Rathbone Place, London, 1865.

The contraction and expansion of the upper layer of muscles in the graceful neck and shoulder of the horse, may be seen beneath the skin when the animal is in high condition, and may be portrayed by careful imitation; but it is not possible so to detect the form and situation of the muscles of the fore quarter of the ox, where they are filled up with intervening tissues and fat, rendering their appearance flaccid and indefinite.

But the bulk of flesh still allows the leading points of the bony framework to be discernible, in both the fore and hind quarters of cattle.

It is, therefore, still more necessary for the artist to make himself intimately acquainted with the skeleton and muscles of cattle, to enable him to depict their form as they appear at a distance, and so to render them effective accessories in pictures of landscape.

On comparing the diagrams of the muscles of the horse and those of the ox, the head, neck, and shoulders will be found to contain the most salient points of difference. The bulk of muscle necessary to support the combined weight of the head and horns, have their greatest breadth at the junction of the neck and shoulders, the nearly horizontal position of the neck renders necessary the greatest development of the nuchal tendon, which, with the trapezius, splenius and rhomboideus longus, all contribute to fill up the space above the cervical vertebræ, so as to make a continuous

outline from the crest of the head to the dorsal vertebra behind the withers.

PLATES V. VI. VIII. IX.

THE SHEEP, BONES, MUSCLES, GROWTH OF WOOL.

Skull and horns of ram, Plate V.

Head of sheep, muscles, Plate VI.

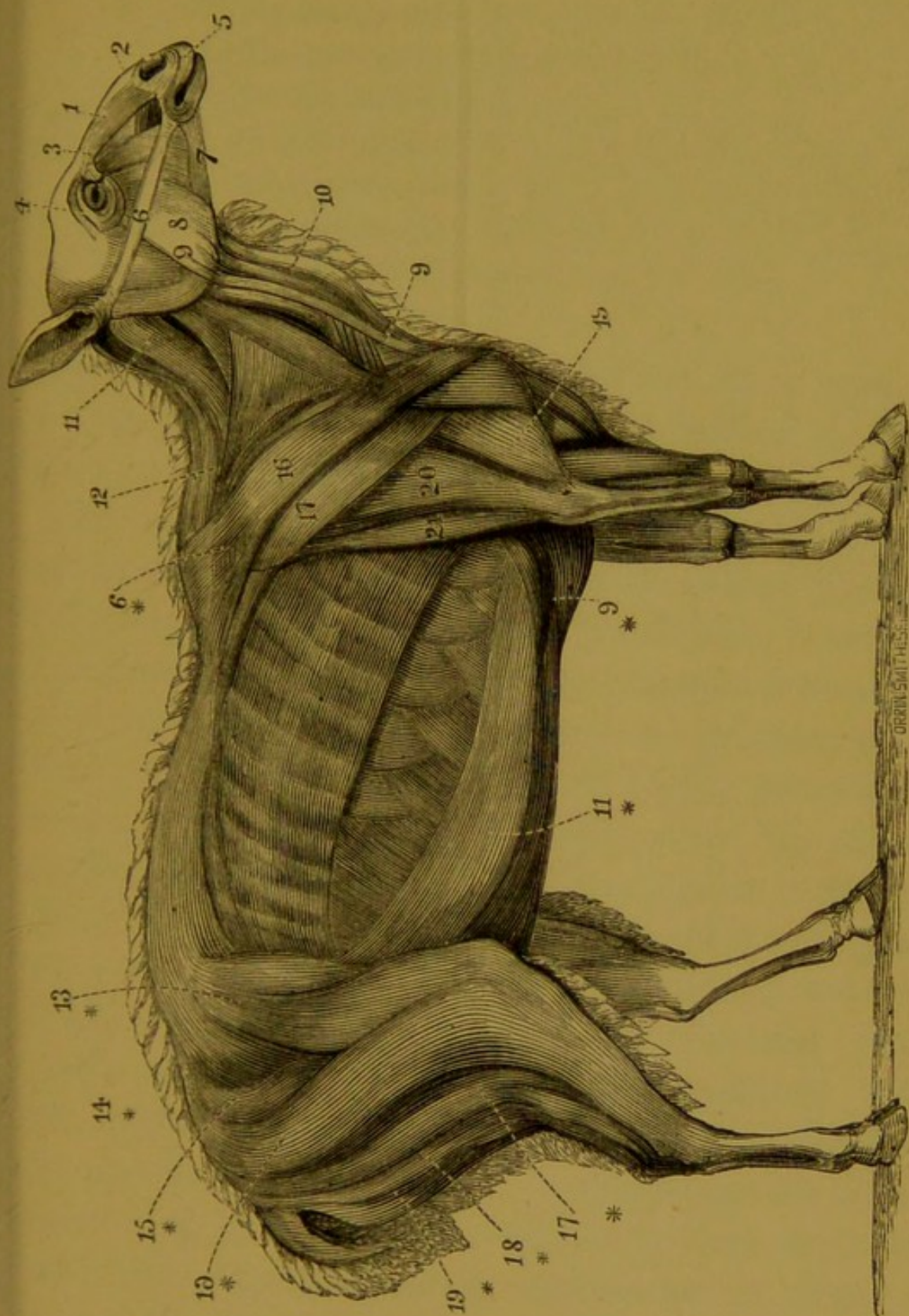
Whole figure, muscles, Plate VIII.

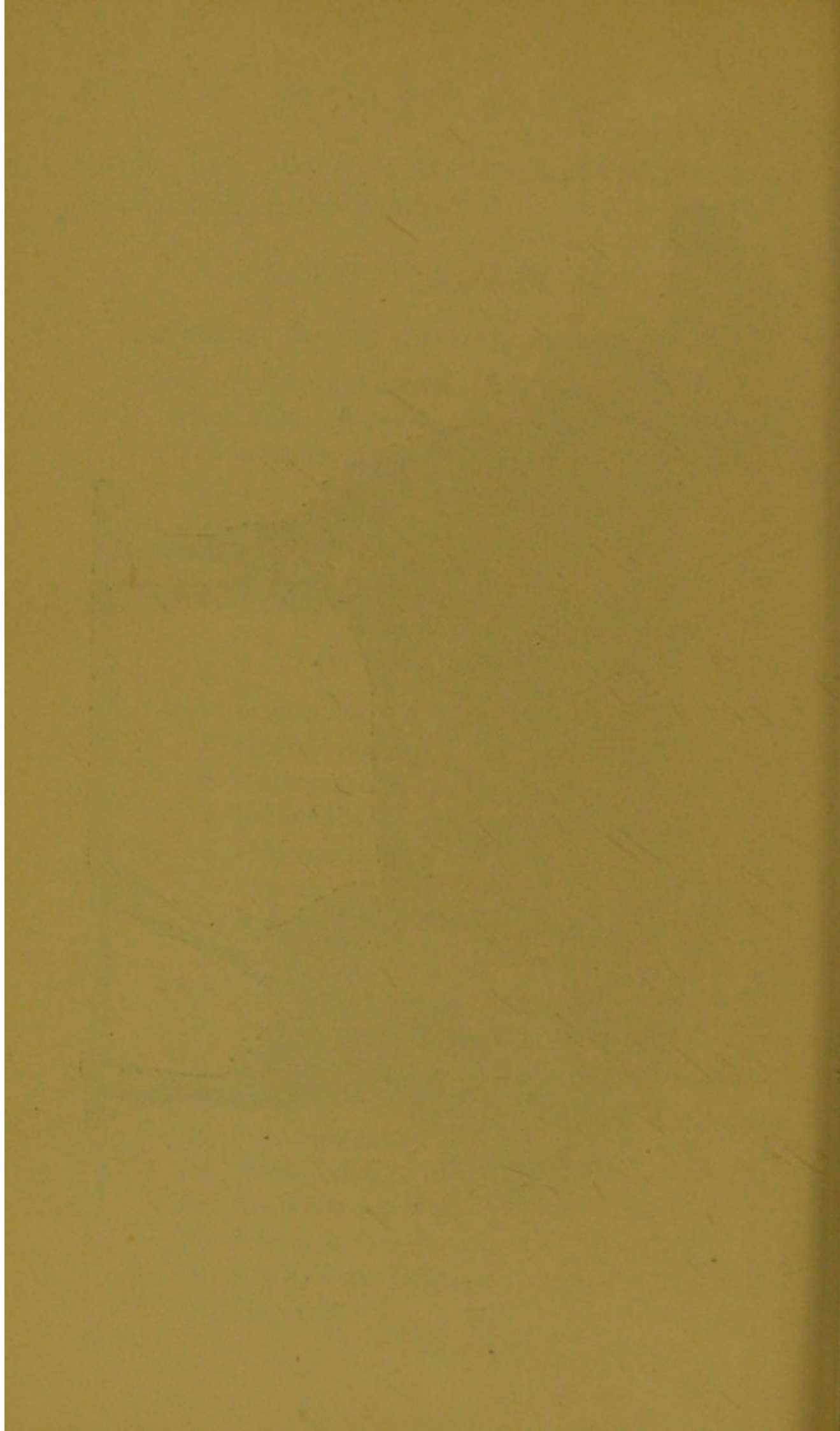
Fig. 1. Reclining figure skeleton, } Plate IX.
Fig. 2. Map of wool growth, }

PLATE VIII.

Muscles of the Sheep.

1. Levator labii superioris alæque-nasi.
2. Pyramidalis nasi.
3. Palpebræ inferioris.
4. Orbicularis palpebrarum.
5. Orbicularis oris.
6. Zygomaticus.
7. Risoris santorini.
8. Masseter.
- 9 & 9. Sterno maxillaris.
10. Omo hyoideus.
11. Splineus capitis.
12. Levator anguli scapulæ.
16. Supra spinatus.
17. Teres minor.
19. Anconeus externus.
20. Anconeus longus.
21. Extensor cubiti longus.
- 6*. Trapezius.





- 9*. *Pectoralis major.*
- 11*. *Obliquus abdominis.*
- 13*. *Tensor fascia-lata.*
- 14*. *Gluteus maximus.*
- 15*. *Gluteus externus.*
- 16* & 17*. *Biceps femoris.*
- 18*. *Abductor tibi longus.*
- 19*. *Semi-tendinosus.*

Side view of the whole figure of the sheep with a sectional margin of the growth of the wool of a short fleece projecting beyond the outline.

For the purpose of the Artist, the ancient genealogy of the sheep need not be traced to the ovibos, the so-called musk-ox, or any other great grandfather. It is only necessary to make the sheep's acquaintance intimately in so far as to understand his figure and proportions as they really exist under the external woolly garment in which, in this climate, he is generally seen. The object in placing before the artist the three figures of Plates VIII. and IX. is to vindicate the claim of the sheep to the same arrangement of bones and essential relation of parts as are possessed by his larger associates. The cattle whose coats being of thinner materials, and fitting their figures more closely, have been credited by the Art Student with having bones and muscles: facts that have been too frequently lost sight of when the sheep has been represented in many a well painted landscape, where they have been portrayed as a bundle of wool, with head and trotters attached.

PLATE IX.

Skeleton and wool of Sheep.

FIGS. 1 & 2.

FIG. 1. *Skeleton of the Sheep in reclining attitude.*

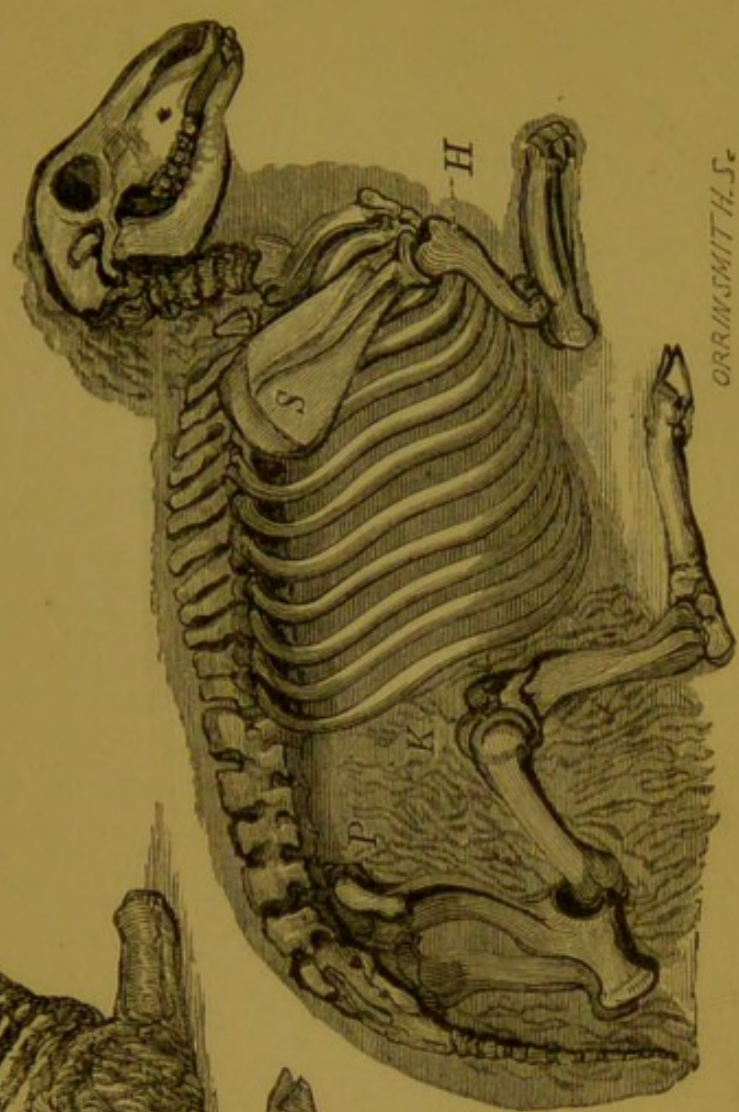
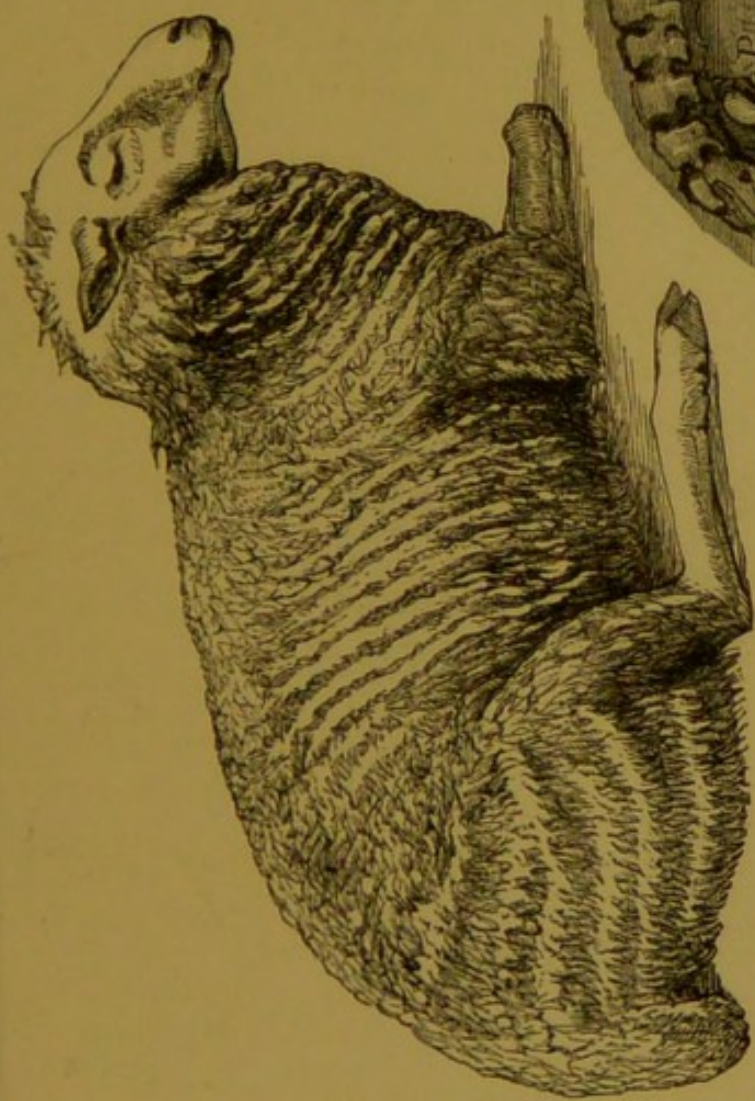
FIG. 2. *Map of the wool of the Sheep in the same attitude as the skeleton, Fig. 1.*

FIG. 1.

- h.* Humerus or shoulder.
- k.* Distal end of femur with proximal end of tibia—or knee.
- p.* Pelvis or haunch.
- s.* Scapula or blade bone.

Fig. 1 is the skeleton of the sheep in a reclining attitude for the purpose of better comparing the arrangement of the growth of the wool as shown in the map-like representation of the wool in Fig. 2. In the latter figure (2) the artist will detect the lines of growth in connection with the leading lines of structure seen in Fig. 1, and will believe, by comparing the two figures, that the longest fleece need not obliterate the leading features of the animal, any more than the largest flowing drapery conceals the proportions of the human figure when treated by the real artist possessing the requisite knowledge of its plan and structure.

THE END.



ORRINSMITH H.S.

