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VOL. IV.

ORGANS OF GENERATION.

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* κρυπτός, *occultus*; ἀνήρ, *vir*: in which the female or productive organs only are distinctly developed.

† ἑαυτοῦ, *sui ipsius*; ἀνήρ, *vir*: in which the male organs are distinctly developed, but so disposed as to fecundate the ova of the same individual.

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* ἀλλότριος, *alienus*; ἀνήρ, *vir*: in which the male organs are distinctly developed, but so disposed as to fecundate the ova of another individual.

CATALOGUE.

GALLERY.

Division II.

CONTINUATION OF THE SPECIES IN PLANTS AND ANIMALS.

Subdivision I.

ORGANS OF GENERATION.

" *Of the Reproduction of Vegetables and Animals.*

" THE power of reproduction or continuing the species out of itself, while itself exists, is peculiar to the vegetable and the animal. A plant has the power of producing out of itself a new plant, and an animal has the power of producing out of itself a new animal; but minerals have not been found to possess this property; for a mineral is only a compound, and before it can produce anything else it must be itself decomposed, and may go into the composition of a thousand other minerals*. By this power of reproduction, a succession of vegetables and animals

* [Or rather it is only the compound unorganized substances that can present a semblance of the reproduction of another body by decomposition and a new arrangement of the elementary parts.]

goes on, by which means these parts of the Universal System are constantly kept up ; because the originals are as constantly decaying, without in this decay producing anything similar to a vegetable or an animal, but taking on the character of a mineral.

" However, minerals are also decaying or changing their actual form ; but are either rising up in some other form, according to the new combination, or perhaps returning back to the first. But this is a change of the whole, not a production out of the old ; and the whole still retains the character of a mineral. The old is entirely cast out before the new is produced, and what shall rise in its place is not fixed by Nature, for it may have a new combination, which most probably it has ; for a decomposition most commonly leads to a new combination. The succession is in a certain degree similar to the original, by which means there is a regular and invariable system, upon the whole, preserved*.

" The progress of reproduction is not a spontaneous operation either of the vegetable or of the animal ; but it is an operation in both, arising out of the actions of the body, depending on many circumstances all concurring at one and the same time.

" Both vegetable and animal must be of an age suitable to each, before which age this operation does not take place. This age is when both have arrived to a certain degree of perfection in the formation of all their parts.

" As both vegetables and animals are variable in themselves, not being always in the same state of perfection respecting the actions of their parts, (which variation principally constitutes what is termed health or disease), they must be in the first of these states before they can propagate ; at least as regards the parts which are formed for such purposes ; which state is called health. They are also ruled by perfection in the formation of the frame, as well as health, which is the perfection of its

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* *i. e.* The new compound resulting from the decomposition of a mineral or inorganic substance, generally possesses properties very different from that of the original, but as the elements remain unchanged they may in succeeding decompositions revert to their previous state of combination ; and, as nothing perishes, there is, notwithstanding the ceaseless changes that take place in the mineral world, a regular, and, upon the whole, invariable system, preserved.

actions; and besides, they are influenced by external circumstances, such as heat and cold; for both vegetables and animals have their degrees of heat, which is conducive to health; and many different classes in both, vary very considerably in this respect, and as this circumstance is varying upon this globe, called seasons, most vegetables and most animals have their seasons of propagation*.

"Air or the atmosphere is another external influence which is necessary, but more in the vegetable than in the animal. Air is necessary for the first principle of action, viz. life; and it is necessary for health. Light is absolutely necessary for most vegetables, but not so much for many animals†. When all these necessary circumstances meet in each, generally they are fit for propagation.

"From what has been observed, it must appear that propagation is one of the completest operations of either an animal or vegetable. However, in vegetables it would appear that a strong state of health rather hinders the powers of the male and female; but we are to consider that what is termed a strong state of health in a vegetable is great growth; which might be reckoned one of the species of propagation. Animals have their limited growth; therefore that which was spent upon themselves while growing, may now be employed in propagation. But nature was not willing that either all vegetables or all animals should propagate,

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* The ideas in the preceding paragraph are more clearly expressed by Hunter, in his Observations on the *Vesiculæ seminales*, (Animal Œconomy, Ed. 2nd, p. 36.), in the following words: "Animals have their natural feelings (for procreation) raised or increased according to the perfection of the parts connected with such feelings; and the disposition for action is also in proportion to the state of the parts and the excitement of such feelings. But that these feelings may be duly excited, it is necessary that the animal and the parts should be healthy, in good condition, and in a certain degree of warmth suitable to that class to which the animal belongs. In the greatest part of the globe there is a difference in the warmth of the same district at different periods, constituting the seasons; and the cold in some of them is so considerable as to prevent those feelings or dispositions in animals from taking place, and to render them, for the time, unfit for the purposes of generation. This is owing to the testicles becoming at this season small, and being therefore unfit to give such dispositions, as is the case in very young animals. This fact is very obvious in birds."

† [Many Entozoa, *e. g.* live, grow and propagate in the dark recesses of animal bodies; where neither light nor air can penetrate.]

even under all the above conditions, more especially animals. It is necessary in most that there should be a union of two principles before a third can be produced; these two principles are distinguished by the parts which produce them, called male and female, and which in many, both of the vegetable and animal kingdoms, are separated, each part having its distinct individual, called the distinct sexes.

" But these parts, termed male and female, which produce the two opposite principles to form a third creature, are not to be found separate (and in distinct individuals) in all vegetables or in all animals; but they are both placed in the same (individual) in most vegetables and also in many animals. So far, vegetables and animals admit of being distinguished into three, viz. male, female, and mixed, or natural hermaphrodite. The latter is of two kinds, both in the vegetable and animal; in one the distinct parts or sexes are present in the same animal; in the other the same parts perform both actions: but I believe in the vegetable the parts themselves are distinct, only differently circumstanced.

" Besides these modes of propagation by means of male and female parts, and the different dispositions of these parts as above related, we find in many, both vegetables and animals, but especially in the first, that propagation or production can go on, without the actions or even the formation of such parts. How far this property is equally extensive and similar in both, I shall not at present determine. In the vegetable, this power or mode of propagation arises from two principles; one is, that every part of a vegetable is a whole; the second arises from some having the power in every part (under certain circumstances) of retaining life, bringing in nourishment at every part, and of producing parts called roots. So that a vegetable under these circumstances is capable always of being multiplied, as far as it can be divided into distinct plants, and thus such plants have a double power of propagation; but in this last mode, the original vegetable or stock must always lose so much as has been removed by division or propagation, but still it is a whole. However, they are not all so, for there are many vegetables that will not live when in parts; the life of every part of such vegetables depending on the whole, although perhaps not in the same way and degree as in animals.

" Animals have this" (*i. e.* gemmiparous mode of reproduction) " to a pretty extensive degree. How many animals are there which propagate their species from cuttings! But the curious thing is, that this property is only to be found in the more imperfect order of animals, while it does not appear to be necessary that vegetables should differ in their degrees of perfection in order to have this property, or that it is restricted to the more imperfect; but vegetables have but very few degrees of perfection with respect to each other, and the most imperfect animal is probably upon a par with the most perfect vegetable.

" *Of the disposition, in Vegetables and Animals, of the Male and Female parts.*

" In the vegetable we have the two sexes distinct, inasmuch as the parts which constitute the sex are distinct; but in the disposal of these parts upon the plant, nature has varied them as much as she could vary any three numbers. The plant is always one of the three; we find then the male upon one plant, while the female is on the other, as in that class called *Diœcia*, of which the palm tree, the lignum vitæ, are examples; but the male plant and the female are similar in every respect, except in this circumstance, which is known only by the flower. The reason of this is, because the plant produces the parts of generation, or forms them entirely; and it is not necessary that the plant should have any particular form to produce the parts of generation, nor can the parts of generation have any effect on the plant so as to alter its form.

" Another mode is, where the male and female flowers are in the same plant, but in distinct flowers, as in the class called *Monœcia*, of which the cucumber is an example.

" The third mode is, where both the sexes are in the same flower, which is the case with most plants; to which I shall at present add a fourth, and which is similar in some of its properties to the first (or lowest class) in the animal, viz. the *Polypi*. This is what may be called viviparous in the plant, of which mode many of the onion tribe are examples, such as the common onion, and it is often exhibited in the flower of leeks. How far we are to consider this as a kind of union of the plant with the animal I

will not say; but it is certainly not similar in all its parts, excepting we could conceive that in the Polypus, where a young one grew, it was somewhat similar to the flower in a plant*.

" Animals, like vegetables, have the two distinct parts in two animals; they have the two parts distinct in the same animal; and they have the same parts acting in a double capacity†.

" These observations only respect the parts, in vegetables and animals, producing the effects; but the different modes which these effects afterwards pursue" (*i. e.* the modes of development of the germ or embryo, or product of generation), " are another consideration. This comprehends the first mode of nourishment of every known vegetable and animal, with the structure suitable to that mode. These are very simple in the vegetable; a seed is produced, which is not an egg, but probably may be called a temporary root or stomach, till another is formed which shoots out from it; but this is not always the case; in some the seed becomes a leaf; however, not till the root is formed.

" In the animal they" (the modes of nutrition during development) "are divisible into three; the first is, where the young grows out of the old one, as in the Polypus; the second is, where the parent forms the mixture, for instance, an egg, as in the class called the oviparous; and the third is, where the two products of the male and female organs meet in the female, and the embryo is there nourished by the female till fit to take in its own nourishment, according to its nature.

" How far the first mode is divisible I do not know, but I should divide it into two; one where the young grows out of its body, as in the Polypus; the other when, by separating a part, that part becomes an animal‡.

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* [This is the case with the deciduous ovigerous cells of the *Corallines*, which frequently present the form of a polype, larger than the nutritious persistent polypi, and with shorter arms.]

† As Hunter has given examples of the corresponding conditions of the generative organs in vegetables, it may be stated that the Dicœcious animals are *Mammalia, Aves, Reptilia, Pisces, Crustacea, Arachnida, Insecta, Cephalopoda, Pectinibranchiata,* and certain *Lamellibranchiata.* The Moncœcious classes are the *Gastropoda,* except the *Pectinibranchiata, Pteropoda,* most of the *Lamellibranchiata, Palliobranchiata, Tunicata, Annulata, Cirripedia,* and the whole of the *Radiata.*

‡ [The first or simplest mode of continuing the species may be by spontaneous fission, as in many of the polygastric Infusoria; by external gemmation, as in the fresh-water Polype; and by internal

" The second or oviparous is divisible into two; one is where the egg is laid external to the animal, and is hatched there, as in many of the insects, fish and amphibia, and all the fowl; the other is where the egg is kept in the oviduct and is hatched there, as in some snails, some fish, and some amphibia.

" The third is where the embryo attaches itself to its mother, and derives its nourishment from her, as in all those called quadruped. It is curious to see, that the first" (*i. e.* the gemmiparous mode) " and the last" (or placental mode) " have a kind of similarity, the young in both being nourished immediately out of the old."

Hunterian manuscript Catalogue.

Subdivision I.

ORGANS OF GENERATION.

A. *FISSIPAROUS AND GEMMIPAROUS MODES OF GENERATION.*

Series I. In Plants.

2224. A section of the stem of a Sallow (*Salix Caprea*, Linn.), showing the effects of the inherent capacity for self-existence in the part, independently of the organized whole, from which it has been separated: this property, on which fissiparous generation depends, is here manifested in the development of roots, and leaf-bearing shoots.

2225. A similar section, showing an increased growth of the nutritive and respiratory organs, or roots and leaves, by which the part assumes the character of an organized whole, with the power of propagating its kind

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gemmation, or the separation of part of the internal substance of the parent; such part being endowed with a locomotive power, but having often a different form from the parent, and termed a gemmule, in contradistinction to a passive germ, or egg, which is secreted by a special organ or ovary.]

by the higher process of the development of organs of fructification and seeds.

2225 A. The leaf of a Bryophyllum (*Bryophyllum calycinum*, SALISB.), which has the power of developing buds from the angles of the marginal crenations.

Presented by Sir Everard Home, Bart.

2225 B. Another leaf of the same plant, from which sections have been taken, which show the progressive growth of the gemmæ or buds, pushed out from the situation above described.

Presented by Sir Everard Home, Bart.

2225 C. Another leaf of the same plant, with a detached section of the same, which shows a further development of two buds, each of which have put forth leaves, and have begun to send down roots, thus assuming the characters of distinct individuals. It may be observed, that the leaves having this property of gemmiparous reproduction, contain an abundance of the nutrient cellular substance and sap; from which the buds are supported until their own special organs of nutrition are formed.

Presented by Sir Everard Home, Bart.

2226. A portion of an Onion (*Allium Cepa*, LINN.), in which the reproductive energies of the plant have been expended in the development of bulbs instead of seeds; from which bulbs young plants may be observed to have grown. This is the mode of reproduction which Hunter, in the Introduction to the present Series, calls "Viviparous in Plants," and which he compares to the gemmiparous mode of reproduction in the Polype.

SERIES II. In Animals.

2227. A Keratophytous Polype (*Gorgonia verrucosa*, LAM.), in which the individuals propagated by gemmation are not cast off, as in the gelatinous freshwater Polype (*Hydra*), but are retained by a co-extension of the internal flexible axis; and which, by a continuity of the nutrient tubes with their digestive sacs, contribute, like so many mouths, to the support of the whole.

2228. "Hydatid from a Sheep's brain" (*Cœnurus cerebralis*, Rudolphi). The specimen is placed in this Series by Hunter, as illustrative of the development of new individuals, (as each vermicular body with its suckers and coronet of hooklets may be regarded,) by the process of gemmation, from the substance of the common uniting cyst.

B. *MONŒCIOUS OR HERMAPHRODITE CONDITION OF THE GENERATIVE ORGANS.*

Series III. Cryptandrous, or without distinct fecundating Organs.

1. *In Plants* (termed *Cryptogamia* by Linnæus).

2229. A branch of Fern (*Asplenium Adiantum nigrum*, Salisbury), in which the organs of fructification are developed from the under surface of the leaf or frond, and consist of capsules, containing the germs or "sporules" of the future plants.

2230. The frond of a prickly Shield-fern (*Aspidium aculeatum*, Swartz.), showing a similar position of the simple organs of reproduction; but they exist in greater number, and are arranged with much beauty and regularity.

2. *In Sponges.*

2231. A branched or digitate Sponge in which one of the digitations is laid open by a longitudinal section, showing the fæcal canal, and orifice by which the reproductive gemmules are expelled after having been separated from the tissue of the body of the parent.

3. *In Polypes.*

2232. A section of a Lobularia (*Lobularia digitata*, Lam.), showing the groups of gemmules at the base of each polype, and the canals (some of which are coloured by injection,) into which the gemmules pass after having been detached from the reproductive filaments: in these canals they acquire a certain consistence, opacity, and colour; move freely by means of superficial vibratile cilia; and are ultimately expelled through the stomachs and by the mouths of the polypi.

2233. A section of the kidney-shaped Sea-pen (*Renilla Americana*, Linn.), show-

ing the gemmules in the substance of the stem and below the polypes in the expanded part of the body of the specimen.

2234. A section of the Finger Sea-pen (*Veretillum Cynomorium*, LAM.), showing the groups of gemmules situated below the stomachs of the polypi; one of which is exserted, and its tentacles expanded.

4. *In Acalephes.*

2235. A Medusa (*Cyanæa aurita*, CUV.). The four circular opake white bodies in the substance of the disc, and seen in the interspaces of the oral tentacula are the *gemmaria*, or organs in which the reproductive ciliated gemmules are developed: each gemmary opens by a separate ciliated orifice in the ventral or inferior surface of the body.

5. *In Echinoderms.*

2236. A portion of a Star-fish (*Asterias rubens*, LAM.), prepared to show the ovaria, ten in number, attached on each side of the base of each ray, near the angle of divergence: the ova are not developed in the specimen.

2237. A Star-fish (*Asterias papposa*, LAM.), with the anterior parietes of one ray, and the posterior parietes of another ray, dissected off, showing the ovaria with the ova at the commencement of their development. The ovaria are two in number in each ray, as in the preceding species, and are similarly attached on each side of the base of the ray, where they may be distinguished from the digestive and locomotive cæca by their greater opacity and granular structure.

2238. The same species of Star-fish with the posterior parietes of the central disc removed, showing the commencement of the digestive cæca and the ovaries.

2239. A portion of one of the rays of a Star-fish (*Comatula solaris*, LAM.), showing the ovarian receptacles occupying the inner side of each of the pinnæ, or articulate processes sent off from the rays. Three of the receptacles are laid open to expose the contained ova.

2240. A Holothure (*Holothuria tremula*, LINN.) laid open to show the branched ovarium, into the excretory canal of which a bristle is placed. This canal opens near the mouth; but the elongated cæca of the ovary may be readily

distinguished from the salivary cæca by their branched structure, smaller diameter, and the greater opacity of their coats. (See Pl. XLIX., in which this specimen is figured, and a more detailed explanation of the various exposed parts is given.)

2241. Another species of Holothure (*Holothuria vittata*, Lam.), exhibiting the long, slender, slightly tortuous, ovarian cæcal tubes, situated at the anterior part of the body, and having their common excretory outlet near the mouth. The ovarian tubes, in the quiescent condition exhibited in the present specimen, contain a whitish opake secretion.

2242. The anterior part of a Sipuncle (*Sipunculus Phalloides*, Pallas), exhibiting the two ovaria, which are simple unbranched cæcal tubes opening by separate orifices about two inches behind the anterior extremity of the body: a bristle is inserted into each of these orifices.

6. *In Mollusks.*

2242 a. The ovarium of an Ascidian (*Cynthia tuberculata*, Owen). It is bilobed, and each division sends off short alternate branches. The ova exhibit the early stage of their development. *Prepared by Mr. Owen.*

2242 b. The imperforate valve and corresponding lobe of the mantle of a Terebratule (*Terebratula dorsata*, Lam.), showing the bilobed branched ovarium, the right division of which has been detached from the mantle.
Prepared by Mr. Owen.

2242 c. The separated valves of a Terebratule (*Terebratula psittacea*, Lam.). On the lower or perforated valve the two lobes of the ovarium may be seen attached to portions of the mantle. *Prepared by Mr. Owen.*

Series IV. Heautandrous, or with Male Organs so disposed as to fecundate the Ova of the same Individual.

1. *In Plants.*

a. Male and Female Organs in the same involucrum (*Hermaphrodite* Plants of Linnæus.)

2243. A portion of the Indian Flowering Reed (*Canna Indica*, Linn. var. *erecta*), showing the organs of fructification. In one of the flowers part of the

corolla is removed to expose to view the single fertile stamen or male organ, and the single pistil or female organ. The stamen is *petaloid*, or resembles in form one of the divisions of the corolla; the anther is linear, and one pollen-cell only is developed in it. The ovary or base of the pistil is of an oval form with a scabrous surface; it supports a thin and flattened style, which in the recent flower is coloured. The stigma, or naked secreting surface of the style, is adnate, and of a linear form. The ovarium of another and more mature flower is laid open, showing two of the cells, and an ovulum in each adhering to the septum or placenta.

The *Canna Indica* belongs to the Linnean class and order *Monandria Monogynia*, and to the natural group of *Cannaceæ* or *Scitamineæ*.

2244. A portion of a species of *Monarda*, with a cluster of flowers, showing the form of inflorescence which obtains in the natural order *Labiatæ*. Each flower is supported on a distinct stalk, the calyx of which is cylindrical, striated, and 5 dentate. The corolla is bilabiate, with the upper lip very narrow, and surrounding the stamens. These are four in number, but two only are apparent and developed for fertilization, the other two being abortive.

The genus *Monarda* ranks in the class and order *Diandria Monogynia* of the Linnean system.

2245. A portion of a Coix (*Coix lacrima Jobi*, Linn.), exhibiting the organs of fructification. A continuation of the stalk of this gramineous species serves as the common involucrum of the male and female flowers. The male flowers are superior, and possess each three stamens; the female parts are inferior, and are lodged in a bractea, which assumes a stony hardness. The plant belongs to the Linnean class and order *Triandria Monogynia*. Nat. Ord. *Gramineæ*.

2245 a. A portion of a stem with a terminal cluster of flowers of the præmorse Banksia (*Banksia marcescens*, Brown). Each flower is apetalous, or destitute of a corolla. The male organs, or stamens, are here seen as small yellow bodies, or anthers, situated on the slightly-expanded extremities of the lobes of the *perianthia* of Brown.

Presented by Sir Everard Home, Bart.

2245 B. A corresponding portion with a cluster of flowers of the *Banksia ericifolia*, BROWN. In this species the four anthers are concealed within a single envelope (perianth), from within which proceeds a large pistil, whose style rises by a loop, and afterwards disengages the stigma. It is the looped styles of the female organs which are here chiefly visible.

Presented by Sir Everard Home, Bart.

2246. A sprig of a species of *Apocynum*, LINN., with several campanulate flowers. The essential organs of fructification in number and arrangement accord with the type of the Linnean class and order *Pentandria Monogynia;* the anthers of the male organs are sagittate, and coherent with the base of the corolla. The style is rudimental.

2247. The organs of fructification of the Winter-cherry (*Physalis Alkekenji*, LINN.). A portion of the calyx and corolla has been removed to show the five stamens and the single pistil. The anthers or pollen-receptacles consist of two converging cells, which open with two valves by a longitudinal fissure extending from the base to the apex.

2248. A portion of the stalk of a Lobelia (*Lobelia cardinalis*, SALISB.), with several flowers; each of these has its essential organs of fructification, which in number accord with the type of the Linnean class and order *Pentandria Monogynia;* but the anthers of the five stamens are connate, or united into a tube bearded at the top, and the stigma of the pistil is bilobed and ciliate; the seminiferous capsule is two-celled and operculate; the placentation or adhesion of the seeds is at the periphery of the receptacle.

2249. The flower of a species of *Albuca*, with a portion of the calyx or external perianth removed, to show the thickened stamens, and the short pistil with its triquetrous stigma. This belongs to the Linnean class and order *Hexandria Monogynia*. Nat. Ord. *Liliaceæ*.

2250. A cluster of the flowers of the Umbelled Star of Bethlem (*Ornithogalum umbellatum*, LINN.), in which the organs of fructification are in number according to the type of the Linnean class and order *Hexandria Monogynia*. Nat. Ord. *Liliaceæ*.

2251. A portion of the flower of the *Pancratium Illyricum*, LINN., showing

the six long diverging stamens adhering to the internal surface of the tubular portion of the corolla. The parts of fructification accord with the type of the Linnean class and order *Hexandria Monogynia.* Nat. Ord. *Spathaceæ* or *Liliaceæ.*

2252. A portion of a Hyacynth (*Lilium Martagon,* Linn.), with two flowers, in each of which the revolute divisions of the campanulate corolla expose six stamens surrounding a single pistil. The fructification accords with the type of the Linnean class and order *Hexandria Monogynia.* Nat. Ord. *Liliaceæ.*

2252 a. Two portions of the Barberry (*Berberis vulgaris,* Linn.), with several flowers, each of which contains the essential organs of fructification, in number and disposition according to the type of the Linnean class and order *Hexandria Monogynia.* The stamens in this plant are remarkable for their irritability, bending with a sudden and conspicuous motion, and striking against the stigma, when the fecundating dust is ripe, at which time the anther or pollen-receptacle bursts, a portion of the parietes of the cell separating from the anther and curling outwards so as to adhere to it only at the apex. Nat. Ord. *Berberideæ.*

Presented by Sir Everard Home, Bart.

2253. The flower of the Meadow Saffron (*Colchicum autumnale,* Linn.), exhibiting the essential organs of fructification, which agree in number and arrangement with the preceding examples. The stamens present filiform styles and suberect anthers. Nat. Ord. *Coronariæ.*

2254. The flower of a Tropeole (*Tropæolum majus,* Linn.). The stamens and pistils in this genus are according to the character of the Linnean class and order *Octandria Monogynia.* Nat. Ord. *Tropæoleæ.*

2255. A longitudinal section of the flower of a Cactus (*Cactus grandiflorus,* Linn.), showing the monosepalous or single-leafed imbricated calyx, adhering to the polypetalous or many-leafed corolla. The numerous elongated slender filiform stamens are seen adhering to the inner surface of the base of the calyx and surrounding the thick cylindrical pistil, which is crowned with a multifid stigma. The ovarium and the immature ovula

are shown at the base of the calyx with which the seed receptacle is confluent. The parts of fructification correspond with the type of the Linnean class and order *Icosandria Monogynia*. Nat. Ord. *Cereæ* or *Cacteæ*.

2256. A transverse section of a flower of the same species, carried through the tubular part of the calyx, above the point of liberation of the greater number of the stamens; the central canal of the style, along which, in many plants, the pollen tubes have been observed to be conveyed, may be seen with the naked eye in this large and beautiful flower.

2257. A portion of the flower of a Wild Rose (*Rosa canina*, Linn.): most of the sepals and petals are removed, showing the numerous stamens and pistils which characterize the class *Icosandria* and order *Polygynia* of Linnæus. (Nat. Ord. *Rosaceæ*).

2258. The flower of the Lotus (*Nymphæa Lotus*, Linn.), part of the calyx and corolla has been removed to expose the essential organs of fructification. These present the conditions characteristic of the Linnean class and order *Polyandria Monogynia*. All the stamens adhere to or are inserted into the germen; the exterior ones are dilated at the base, as if in a transitional state between petals and filaments. The stigma or fertilizable surface of the pistil is of a stellato-radiate form, glanduliferous in the middle, and of such an extent as to require for the due fertilization of the ova the profusion of polliniferous organs which surround it.

The Nymphæa is remarkable for the obedience of its petals to the stimulus of light. It closes its flowers in the evening, and lays them down on the surface of the water till morning, when it expands them, and often in a bright day they are raised to several inches above the water. These actions are described by Theophrastus in the plant which he calls "Lotus," and which may have been the *Nymphæa Lotus* of Linnæus.

2259. The summit of a stem of *Cliffortia cuneata*, Aiton, with several flowers; these are apetalous, or devoid of a corolla; the essential parts of generation, according to Sprengel *, agree in number and disposition with the

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* See his edition of Linné's '*Systema Vegetabilium*,' vol. ii. p. 611, No. gen. 1977. (1825).

type of the Linnean class and order *Polyandria Digynia*; they are protected by a trifid calyx. By other Botanists the genus is placed in the Diœcious class, and in the present specimen the male organs or stamens are alone visible.

2260. A portion of the Deadly Nightshade (*Aconitum Napellus*, Linn.), with two flowers, exhibiting the condition of the stamens and pistils which characterizes the Linnean class and order *Polyandria Trigynia*. Natural order, *Ranunculaceæ*.

2261. A branch of the Hooded Scull-cap (*Scutellaria galericulata*, Linn.), with many flowers. In each of these the essential organs of generation exhibit the condition characteristic of the class *Didynamia*, order *Gymnospermia* of Linnæus, *i. e.* stamens four, 2 long and 2 short; seeds naked in the bottom of the calyx; corolla monopetalous and irregular, a little inflated at the base, and without a distinct nectarium. In the present genus the flowers are solitary and axillary. The style, which, in general has its point of origin from the apex of the ovary, proceeds in this species, as in other plants of the natural order *Labiatæ*, from the base of that part at its centre. Many of the flowers in the present specimen well exhibit the manner in which the lobe of the calyx protects the ova after the fall of the corolla.

2262. The termination of the stem of the Foxglove (*Digitalis purpurea*, Linn.), with several flowers, exhibiting that condition of the essential organs of fructification which characterizes the class *Didynamia*, order *Angiospermia* of Linnæus. In the lower flowers the corolla has fallen, leaving the ovary protected by the 5-partite calyx; in the upper flowers the campanulate corolla remains, and in two of these it is dissected so as to expose the declinate stamens and their bipartite anthers, together with the pistil, which is chiefly remarkable for the gradual passage of the style into the ovary. Owing to this structure, and its size, the Foxglove is a favourable subject for observing the passage of the pollen tubes along the canal of the style to the ovarium. Nat. ord. *Scrophularinæ*.

2263. A similar preparation of the Greater Toad-flax (*Antirrhinum majus*, Linn.). In one of the flowers the entire corolla is preserved, the upper

and lower sides of whose orifice are so pressed together as to cause the appearance called by botanists *personate* or *masked.* The fructification accords with the type of the Linnean class and order *Didynamia Angiospermia.* Nat. ord. *Scrophularinæ.*

2264. A flower of an Acanthus (*Acanthus mollis*, Linn.), from which a portion of the corolla has been removed to show the essential organs of fructification. The stamens are terminated each by a single or unilocular anther, which is pilose, or beset with hairs along the internal margin. A brush of fine shining hairs also projects from the inner surface of the circumference of the base of the corolla, and is applied to the origin of the style. The fructification here also accords with the type of the Linnean class and order *Didynamia Angiospermia.* Nat. ord. *Acanthaceæ.*

2265. A similar specimen, with the gynœceum or female organ removed.

2266. A flower of the blue Passion-flower (*Passiflora cærulea*, Linn.). The involucrum is remarkable for a circle of abortive petals, or filamentous rays, within the first or outer whorl of ordinary petals. The andrœceum, or male apparatus, includes, also, not only the true stamens, but the fringe at the mouth of the tube. The stamens are united by their filaments into one tube, according to the essential character of the Linnean class *Monadelphia*, and are five in number, as in the type of the order *Pentandria.* Some botanists refer the genus to the class *Pentandria*, (Smith's Botany, p. 438.). The ovarium is single but the styles are three in number, and each is terminated by a capitate stigma. Nat. ord. *Passifloriæ.*

2267. A portion of the stem, with a flower of the *Passiflora Vespertilio*, Linn. The organs of fructification are essentially the same as in the preceding species.

2268. The flower of a species of *Hibiscus*, from which a portion of the involucrum has been removed to expose the essential organs of fructification: these exhibit the conditions characteristic of the class *Monadelphia*, order *Polyandria* of Linnæus, *i. e.* the stamens, which are numerous, are united by their filaments into one mass, or tube, surrounding the pistil, which presents five *stigmata* or fertilizable surfaces; one of these is wanting in the specimen.

2269. A portion of the stem with a flower of a species of *Hibiscus*. The petals have been cut down to show the organs of fructification, especially the stigmata, which are large and entire.

2270. The flower of a species of *Hibiscus*.

2271. The flower of the common Mallow (*Malva sylvestris*, Linn.), showing a structure and arrangement of the essential organs of generation corresponding, as in the preceding species, with the characters of the Linnean class and order *Monadelphia Polyandria*. In this genus there is only a partial union of the styles at their base, while above that part they are distinct.

2272. The flower of a plant of the natural order *Malvaceæ*.

2272 a. A cluster of the flowers of a species of Milk-wort (*Polygala speciosa*, Sims.), each of which exhibit that condition of the essential organs of generation which characterizes the Linnean class and order *Diadelphia Octandria*, *i. e.* having eight stamens collected into two groups or brotherhoods. Nat. ord. *Polygaleæ*. *Presented by Sir Everard Home, Bart.*

2273. The summit of a branch of the Broom (*Spartium Scoparia*, Linn.), showing the form of the corolla peculiar to the Papilionaceous tribe of Leguminous plants, and the disposition of the stamens characteristic of the Linnean class and order *Diadelphia Decandria*, that is to say, with the filaments in two combinations, and most commonly, as in the present instance, nine in one set, and a single one separate.

2274. A flower of the Sweet Pea (*Lathyrus odoratus*, Linn.), showing a similar form of corolla and disposition of the stamens. The style is flattened at the apex.

2275. A flower of a species of St. John's-Wort (*Hypericum calycinum*, Linn.), showing that arrangement and number of the stamens which characterize the Linnean class and order *Polyadelphia polyandria*. Here the stamens are collected into five groups or brotherhoods, which may be termed a pentadelphous arrangement: the styles correspond in number to these groups. Some of the Hypericums are triadelphous, and have three styles. Nat. ord. *Hypericinæ*.

2275 a. A portion of the stem with flowers of *Stylidium graminifolium*. The

calyx is bilabiate, the corolla quinquefid, the fifth division being very small. The stamens are inserted upon, or closely adhere to, the germen, according to the essential character of the Linnean class *Gynandria*; they are terminated each by a two-lobed anther, with the lobes divaricate. This species is remarkable for the irritability of the style, which beats down, when touched, upon the corolla. Nat. ord. *Stylideæ*.

Presented by Sir Everard Home, Bart.

β. Male and female organs in separate involucra in the same individual.

2276. A specimen of the Three-lobed Arum, or Cuckowpint (*Arum trilobatum*, Linn.). The flowers are here of two kinds, male and female, but are not included in separate floral envelopes: they are numerous, sessile, growing round a fleshy central stem, or rachis, and surrounded by a large coloured bract or spathe. This has been laid open to show the unisexual flowers. The males form the superior group, and are situated immediately below the thickened part of the spadix, and above the constriction in the spathe. The stamens are very short, with sessile anthers, of an ovate form, transversely bivalved and turned outwards. The female flowers consist chiefly of the pistils, in which the stigma is sessile. They are arranged around the spadix, in the inferior dilatation of the spathe. The long terminal enlarged part of the spadix consists of a mass of cellular substance, which extends far beyond the flowers, and is entirely naked.

Arum was regarded by Linnæus as gynandrous. It has since been placed by Linnean botanists in *Monœcia Polyandria*. Nat. ord. *Aroideæ*.

2277. A portion of the stem of the Hazel (*Corylus Avellana*, Linn.), with several catkins or clusters of the male flower. In each of these there are eight stamens, arranged biserially, with the anthers bearded or filamentous at the extremity. The development of the male flowers usually precedes that of the female. Linnean class and order, *Monœcia Octandria*. Nat. ord. *Cupuliferæ*.

2278. A similar specimen.

2279. A portion of a branch of the Chestnut (*Castanea vesca*, Gaertner), with several male flowers, or catkins, and one female flower. The catkins are

cylindrical, the calyx quinquefid, the stamens numerous. Linnean class and order *Monœcia Polyandria.* Nat. ord. *Cupuliferæ.*

2280. The male flower of a Cucumber (*Cucumis sativus*, Linn.). A portion of the monopetalous corolla has been removed to expose the stamens, which are five in number, but with the filaments arranged in three bundles; these cohere by the anthers, which are very long and narrow, sinuously disposed, and folded back upon themselves.

2281. The male flower of a Cucumber, with the essential organs of fructification similarly displayed.

2. *In Entozoa.*

2282. Seven segments of a Tape-worm (*Tænia Solium*, Linn.), showing the male and female generative organs. Each segment has a distinct androgynous apparatus. The male organ consists of a minute opake oval vesicle, which may be seen by transmitted light with the naked eye, situated near the middle of the lower margin of each segment: its slender capillary duct curves towards the lateral generative pore, where it terminates. The female organ consists of a large dendritic ovary, occupying the greater part of the segment; in the third of which it is seen injected with mercury. A single oviduct, much wider than the vas deferens, leads from the middle of one side of the ovarium to the lateral pore. The marginal nutrient tubes are also injected with mercury in this preparation.

2283. Two segments of the same species of Tape-worm, in one of which the ovarian cæca have been filled with a red injection: the testicle and vas deferens are obscured by this mode of preparation.

2284. Three segments of the same species of *Tænia*, in two of which the nutrient canals are filled with red injection, and in the third the dendritic ovarium is similarly displayed.

3. *In Cirripeds.*

2285. A specimen of the common Barnacle (*Pentelasmis anatifera*, Leach), with a portion of the intra-pedicular ovarium exposed, together with the

commencement of the oviduct. The left lateral valves have been cut away, showing the testis of that side still covered with the thin investing membrane of the body. The articulated legs have also been cut off, the better to display the extensile tubular organ at the anal extremity or apex of the body, along which the vasa deferentia are continued.

2286. A specimen of the Vitreous Barnacle (*Pentelasmis vitrea*, LEACH), from which the dorsal and part of the lateral valves have been removed, and the corresponding part of the mantle dissected away to expose the whole course of the vasa deferentia, which may be distinguished by their dark colour. They receive at their enlarged and obtuse beginnings the capillary vasa efferentia from the lateral branched testes opposite the sides of the stomach, pass at first directly backwards to the dorsal aspect of the body, and then run in a slightly tortuous manner along that aspect, diminishing in size, converging, and finally uniting at the base of the extensible organ, which represents the penis: it is here laid open, showing the continuation of the united duct to its extremity. Although Hunter has termed the organ, along which the capillary vas deferens is continued, a penis*, there is no evidence that it is used to convey the fertilizing secretion of one individual to the packets of ova of another: on the contrary, it has been assumed, from the fixed condition of the Cirripeds, that they must be self-impregnative. It should be remembered, however, that the sessile species are generally aggregated close together: and that in the pedunculated species an approximation of the closely-crowded individuals is further aided by a more or less elongated and flexible muscular peduncle.

2287. A specimen of the Vitreous Barnacle, dissected to show the testis and vas deferens of one side.

2288. A specimen of the Vitreous Barnacle, with the valves of one side removed and the mantle dissected off to show the granular or follicular testis, which occupies the interspaces of the digestive organs, and extends into

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* See his explanation of figures 4 and 5, (Plate IV., vol. i,) the latter of which was taken from the present specimen.

the base of each of the feet. Those of the left side have been cut off to bring into view the impregnating organ.

2289. The soft parts of the Bell-barnacle (*Balanus Tintinnabulum*, Linn.), prepared and dissected to show the long and single tortuous vas deferens, which has been detached from its connexions and unravelled. (See vol. i. Pl. iv. fig. 6.).

Series V. Allotriandrous, or with Male Organs so disposed as to fecundate the Ova of a different Individual.

1. *In Anellides.*

2290. The anterior moiety of a Leech (*Sanguisuga medicinalis*, Sav.), from which a portion of the ventral parietes of the body have been removed to show the male and female organs of generation *in situ*. The testes in the entire leech are eighteen in number, arranged in two parallel rows of nine each, on either side of the nervous chord. Ten of the testes are here preserved. Each testis sends a short duct outwards which opens into a longitudinal vas deferens. This canal is continued forwards on each side, and terminates in a lobulated glandular body, or 'vesicula seminalis,' which appears to contribute some accessory secretion to the semen. The vesicula on the left side only is shown in the present preparation. Each vesicula communicates with the fundus of a mesial dilated pyriform glandular 'prostatic' sac, from the lower extremity of which a winding tube is continued, from which the filiform penis is protruded. It is retracted within the sheath in this preparation. Below the penis and seed-receptacle are situated the ovaria and ovarian receptacle, the latter of which has been laid open.

2291. The anterior moiety of a Leech, with part of the parietes of the body removed so as to expose the accessory lobulated gland on the right side and the mesial seed-receptacle; the filiform penis is exserted. The ovaria and the ovarian sac are seen below the male parts.

2292. A transverse section, including twelve segments of a Leech, from the upper

part of which the fundus of the seed-receptacle and the upper ends of the accessory glands are seen projecting; the ducts continued from the glands to the receptacle are well exhibited in this preparation.

2293. The anterior moiety of a Leech, with the dorsal parietes removed to expose the generative apparatus. Both the lobulated accessory glands and the intermediate receptacle and sheath of the intromittent organ are well displayed; the filiform penis is protruded externally. Below these parts may be observed the two small round ovaria; they are directly under the bend of the penis: the oviduct is continued from the interspace of the ovaria, having received a short duct from each; it here presents two dilatations from contained masses of minute ova before it finally expands into the receptacle for the ova, which opens externally at the twenty-ninth segment of the body.

2294. The anterior moiety of an Earth-worm (*Lumbricus terrestris*, Linn.), with the parietes of the body slit open along the back, and the two halves divaricated, so as to expose the alimentary canal, testes and ovaries. Four portions of black bristle indicate the four testes, which are the small white globular bodies immediately exterior to the bristles, two on each side. The ovaria are the larger oval bodies, of a less pure white than the testes, in the interspace between the bristles. They are four on each side, and increase in size as they are situated more posteriorly. Each of these essential organs of reproduction has a separate external aperture, which is very minute; and impregnation takes place by the apposition of the genital outlets of one individual to those of another, without intromission, as in the leech. In this state two earthworms are preserved in a succeeding series.

2295. The anterior part of an Earthworm, similarly prepared, to show the parts of generation. The ovaria appear to be collapsed, and both these and the testes are less distinctly shown than in the preceding preparation.

2296. An Earthworm, with the dorsal parietes dissected off from the anterior part of the body, exposing part of the alimentary canal, together with the testes and ovaria. The latter are well developed, and may readily be recognised by a reference to the preparation No. 2294.

2. *In Gastropods.*

2297. A Slug (*Limax ater*, Linn.), from which the dorsal parietes of the body have been removed to display the viscera, and principally the parts of generation, *in situ*. The latter will be understood from the description of the succeeding preparations, in which they are more distinctly displayed. The intromittent organ is partly everted and protruded from the orifice of generation on the right side of the neck: bristles are inserted into this orifice and that of the prostatic sac and rectum.

2298. A Slug (*Limax rufus*, Linn.), dissected to show the parts of generation.

The testis is that small, rounded, light-coloured, minutely granular body, which is attached to the dark-coloured hepatic lobes forming the apex of the visceral mass. A slender and almost capillary vas deferens may be traced upwards from the testis, passing through another portion of the liver, and becoming apparently lost in the upper part of an oblong lobulated greyish coloured body. This body is the ovarium; and its duct, together with the vas deferens, which has now become enlarged by the addition of a glandular substance to its parietes, ascend together to the common outlet on the right side of the neck. Here also may be observed a globular sac, called by Cuvier the 'Prostatic sac,' which may furnish some accessory secretion, or may receive the semen of another individual in the coitus, and which opens by a short duct, also into the common outlet.

Besides the generative organs, the alimentary canal and liver are well displayed in this preparation. Bristles are inserted into the anus, the vagina and the prostatic duct.

2299. A Slug, in which the alimentary canal and liver have been removed, the better to display the generative organs. The granular or racemose testis hangs suspended by the slender vas deferens. The ovarium is seen extending downwards from the parts where the oviduct comes into contact with the vas deferens; both canals are then continued upwards to the

common genital outlet, where a loop of the vas deferens may be seen to have separated itself from the oviduct before entering the base of the penis, which is partially everted and protruded. The line of demarcation between the oviduct and glandular vas deferens is more distinctly perceptible in this than in the preceding preparation.

2300. A Slug, with the dorsal parietes of the abdomen removed, and the large ovarium separated from the rest of the visceral mass: the different orifices are also shown, which open outwards at the right side of the neck. The two orifices next the middle of the body, in which bristles are inserted, lead to the prostatic sac and to the penis; the other two orifices at the enlarged extremity of the everted cloaca are, the one, the anal orifice, the other, with the inserted bristle, the termination of the oviduct.

2301. A Slug (*Limax albus*, Linn.) with the dorsal parietes of the body reflected upwards to expose the viscera, and especially the generative organs, *in situ*. The intromittent organ is protruded and everted. The prostatic sac is seen empty, and in that state its coats are thin and transparent; to the right of this sac may be observed the terminal loop of the vas deferens, expanding as it recedes from the genital outlet to become attached to the oviduct. The convolutions of the united oviduct and glandular vas deferens occupy the anterior part of the abdominal cavity. The small convoluted part of the vas deferens may be observed traversing the alimentary canal to join the testis, which is situated at the lower part of the visceral mass.

2302. A Slug (*Limax rufus*, Linn.), with the dorsal parietes of the body removed, exposing the prostatic sac, and portions of the oviduct and vas deferens, and showing the two horny filaments, secreted, the one in the prostatic sac, the other in the canal of the intromittent organ, and which are protruded and cast out after copulation.

2303. A Snail (*Helix pomatia*, Linn.), in which the visceral mass has been withdrawn from the shell, injected and dissected, to show the organs of generation.

The testis is impacted between the lobes of the liver near the apex of the spiral mass; it cannot be so distinctly discerned as in the Slug. The

vas deferens may, however, be observed, emerging at the concavity of one of the spiral turns, ascending and crossing the intestine in its convoluted course; it is seemingly lost in the large mass which constitutes the ovarium*, but passes through it to join the glandular part of the vas deferens. From the ovarium a glandular mass is also continued a little way upwards, and then changes into a flattened membranous canal or oviduct, disposed in short plaits, and enlarging as it passes towards the genital opening. A flattened glandular substance may be seen adhering closely to the concave side of the oviduct; this is the gland connected with the vas deferens, which at the termination of this glandular body leaves the oviduct to open into the penis. A small cylindrical duct into which a black bristle is inserted, and which forms, as it were, the concave margin of the meso-oviduct, may be traced downwards to the small spherical sac which hangs loosely by the side of the testis. This sac is the homologue of the prostatic sac in the Slug, from which it differs in the length of the excretory duct, and in the presence of a short cæcal appendage given off from the duct, and which is shown in the next preparation. Besides this, the Snail differs from the Slug, with respect to its generative organs, in having a long flagelliform appendage continued from the penis (which hangs freely downwards in the preparation), and in having an elongated thick muscular sac, containing a calcareous spiculum, (which is exposed in the preparation by the removal of part of the parietes of the sac); and lastly, in having a number of elongated glandular cæca, the multifid vesicles of Cuvier, (into the excretory orifices of which yellow bristles are inserted). These vesicles appear to relate to certain modifications of the ovum in the shell-clad Snail, which are not required in the naked Slug; they are called into activity at the period of oviposition, and may be seen enlarged and distended with their secretion in a preparation in a succeeding series. The muscular sheath and its contained dart are subservient to the purpose of preparatory excitement. The communication of the sheath with the va-

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* The *slime-secreting organ* of Swammerdam, *testis* of Cuvier, *Sac albuminipare* of Laurent, *Ovarium* of Treviranus.

gina, from which the spiculum is protruded, is indicated by a small black bristle. It is into the vagina also that the long prostatic duct opens, (contrary to what takes place in *Limax*,) and the two large black bristles in this part pass, the one into the oviduct, the other into the prostatic duct above described, which may thus be distinguished in the preparation from the vas deferens.

2304. The organs of generation of a *Helix pomatia*. The testis has here been detached from the liver, and the convoluted vas deferens may be traced, enlarging as it ascends, to the place where it adheres to the ovarium near the commencement of the plicated canal, in which the eggs receive their albumen and external covering. The large ovary, with its continuation into the oviduct, and the adherent glandular vas deferens, may be traced to the separation of the latter, which then proceeds singly to the penis. The flagelliform body is continued from the penis at the part where the vas deferens terminates. The prostatic sac is seen near the upper end of the ovarium, and its duct, and the short blind appendage continued from it are well displayed. The mode of union of the multifid vesicles, in groups of three, may here be observed. The muscular sheath of the spiculum amoris is preserved entire; a bristle is inserted into the common outlet of the various parts of this complicated generative apparatus.

2305. The parts of generation of a Snail (*Helix aspersa*, Linn.). They correspond so closely in structure, and in the manner of preparation, with those displayed in No. 2304, that the following differences need only to be mentioned. In tracing the duct of the spherical prostatic sac, it will be seen that the cæcal appendage is given off at a greater distance from the sac, and that it is considerably longer and wider: its blind extremity is closely attached to the plicated and dilated oviduct, of which it might seem to be a continuation, but is not. The multifid vesicles are less numerous, and relatively shorter. The cervix of the muscular sheath is laid open, showing the pointed extremity of the contained dart.

2306. A Snail, with the parts of generation dissected and displayed. Two black bristles are passed through the excretory orifice of the prostatic duct, one into the long cæcal appendix continued from that duct, which is

thereby bent outwards, the other into the duct itself. A thick white bristle is inserted into the penis, and a loop of thread is tied round its retractor muscle, which has been divided. The testicle is seen *in situ*, impacted in the visceral mass; it is separated from the ovary by the interposition of a bristle, in order to show the convolutions of the vas deferens. A white bristle is inserted into the rectum.

2307. The parts of generation of the *Helix aspersa*, with the exception of the testis. They are stained of a dark colour, from having been originally pinned down on a tablet of black wood. The elongated portion of the testicle, which is united to the enlarged oviduct, may be plainly distinguished; a bristle passes from the termination of the vas deferens through the whole length of the penis. The long cæcal appendage of the prostatic duct is here dissected from its attachments: the other parts may be recognised from the descriptions of the preceding preparations.

2308. A *Helix aspersa*, with the generative and digestive organs displayed; a black bristle is inserted into the penis, and white ones into the vagina. The flagelliform appendage exhibits the spiral disposition of its extremity, which is indicative of recent copulation.

2309. A similar preparation, with the muscular sheath of the calcareous dart laid open.

2310. The soft parts of the *Helix nemoralis*, with the flagelliform appendage of the penis, the prostatic cæcum, multifid vesicles, muscular sheath of the dart, and part of the oviduct, exposed.

2311. A portion of the generative apparatus of a Snail, including the muscular sheath of the dart, which is laid open; the multifid vesicles; the penis, along which is passed a white bristle; part of the oviduct, prostatic duct, and vas deferens.

2312. The soft parts of a Pulmonated Gastropod, with the parts of generation displayed. They resemble those of the *Helix aspersa*, except that the multifid vesicles are reduced to two in number, as in the genus *Parmacella*; from which, however, the present specimen differs in having a long cæcal appendage continued from the prostatic duct, as in *Helix aspersa*: a black

bristle is passed along the duct into the commencement of the cæcal appendage, and one of the accessory vesicles has been laid open. The muscular sheath of the spiculum amoris is also of very small size, and the flagelliform appendage is relatively shorter than in *Helix aspersa*.

2313. The soft parts of a Marsh-Snail (*Lymnea Stagnalis*, Lam.), prepared to show the generative, anal, and respiratory orifices. This Gastropod differs from the Slugs and Snails in the separation of the above orifices from one another. The male organs open externally below the right tentacle; a black bristle is inserted into that orifice. The female organs terminate at some distance below, by a round orifice with a slightly raised boundary, in which a white bristle is inserted. A portion of quill is placed in the respiratory opening; the brown bristle by the side of it indicates the excretory duct of the renal organ; and the white bristle below is placed in the rectum.

Owing to the wide separation of the outlets of the two sexual organs, it generally happens that while the penis of one Lymnea is inserted into the vagina of another, the latter receives the intromittent organ, and is itself impregnated by a third individual; a chain of some length is not unfrequently formed by this connexion of one individual with two others at the same time.

2314. The soft parts of a pulmonated Gastropod, prepared to show the parts of generation.

2315. A specimen of the 'spiculum amoris,' or calcareous dart of a Snail.

C. *DIŒCIOUS CONDITION OF THE SEXUAL ORGANS.*

Series VI. Male Organs.

1. *In Plants.*

2316. A twig bearing the organs of fructification of the male Misletoe (*Viscum album*, Linn.) The essential organs are protected by a rudimental calyx,

and a quadrifid corolla formed by the confluence of the four petals at their base: the anthers are adherent to the petals.

2317. A portion of a twig with two catkins or clusters of the male flowers of the Paper Mulberry (*Broussonetia papyrifera*, VENTENET.). The corolla is wanting in this plant, but its place is supplied by a quadrifid calyx; the number of stamens is four, whence the genus ranks in the Linnean order *Tetrandria*, of the class *Diœcia*. With reference to the natural group or order of plants, some botanists rank the *Broussonetia* with the *Amentaceæ*; others, on account of the tenacity of its fibre, with the *Urticeæ*.

2318. A twig with several catkins of the *Broussonetia papyrifera*. In some of these the calyces are closed, in others open, displaying the large bilobed anthers of the stamens.

2319. A portion of a twig with a cluster of the male flowers of the *Cliffortia cuneata*. The stamens are protected at their base by a calyx, but the corolla is wanting.

2320. A similar specimen from the male *Cliffortia cuneata*.

2321. A spadix, or cluster of the male flowers of the Maize (*Zea Mays*, LINN.). Each flower contains six stamens.

2322. Two portions of the organs of fructification of a male Palm.

2. *In Entozoa.*

2323. A portion of the intestine of a Piked Whale (*Balænoptera rostrata*, LACÉP.), to which a male specimen of the *Echinorhynchus glandiceps* is attached. Part of the parietes of the body has been removed to expose the generative apparatus. The testes are the two oval bodies situated near the anterior end of the abdominal cavity. The ducts of these bodies are enlarged, and descend, slightly twisted round each other, to the whitish glandular body at the base of the intromittent organ; this is retracted, and one of the retractor muscles is preserved.

2324. A male specimen of the *Ascaris lumbricoides*, with the visceral cavity laid open, the alimentary canal removed, and the testis displayed.

This organ consists of a long, slender, cylindrical tube, which is continued from a reservoir at the base of the penis, at first straight and slightly dilated, but suddenly diminishing to capillary tenuity at a distance of an inch and a half from the seminal reservoir ; and becoming disposed in a series of convolutions and loops which surround and conceal the intestine at the middle of its course : the minute cæcal termination of the seminiparous tube is closely attached to the inner surface of the parietes of the body, but has been detached, and the intestine removed in the preparation. The penis, which is here retracted, projects from the anterior part of the anus on the concave side of the incurved anal extremity of the body.

2324 A. A male specimen of a *Filaria*, from the American Ostrich, (*Filaria Rheæ*), with the abdominal cavity laid open, the alimentary canal displayed *in situ*, and the male organ, a single filamentary tube, which extends, without convolution, from one extremity of the body to the other, removed, and separately displayed, by the side of the specimen.

Prepared by Mr. Owen.

2324 B. A specimen of a small Nematoid Worm from the stomach of a Tiger (*Gnathostoma spinigerum*, Owen), with the abdominal cavity laid open, the alimentary canal bent to one side, and the convolutions of the long seminal tube or testis unravelled. This terminates in a dilated receptacle at the base of a single penis ; from this receptacle the secerning tube is continued forwards, and soon begins to be disposed in numerous folds and convolutions, gradually diminishing to the blind extremity, which is attached to the middle line of the ventral surface of the abdominal parietes, half-way between the two extremities of the body.

Prepared by Mr. Owen.

3. *In Insects.*

2325. A male House-fly (*Musca domestica*, Linn.), with the anterior part of the abdominal parietes, and the intestine removed, and the two testes brought forward into view. These present a large proportional size and a pyriform figure : they consist of a group of spherical packets, containing almost innumerable convolutions of a single spermatic

tubule, connected together principally by the ramifications of extremely fine tracheæ, and the whole enveloped in a common capsule. From each testis a vas deferens is continued, which soon unites with its fellow, and the single excretory duct is continued to the base of the short bifid horny penis. The two tubular vesiculæ seminales observable in the Hippobosca and other Diptcrous insects have not been preserved in this dissection.

2326. A male Silk-Moth (*Bombyx Mori*, Latr.). It differs from the female in having the teeth of the pectinated antennæ longer, and the abdomen more abruptly truncated posteriorly. At this part may be observed the two horny hooks or claspers.

2327. A male Silk-Moth "ready for copulation," according to the original Catalogue. The abdomen has been laid open and the testes removed. The vesicular bag attached to the anus is the terminal dilatation of the rectum.

The following is Mr. Hunter's description of the male organs of generation in the Silk-worm Moth.

"*Of the Male.*

"The termination of the belly of the male is not so pointed as in the female; it appears as if one ring had been cut off short, whose edges had pretty long hair, somewhat like a short tail.

"*Of the external Parts of the Male.*—On the edge of the termination of the last ring, and on its under surface, are two horny substances, (I believe the remains of the last feet or holders on the tail when in the caterpillar state) whose business it is to hold in the time of copulation. At the anus are two horny hooks for the same purpose, for when they copulate they hold the female so fast as to allow her to hang by this hold; and I have seen them lay hold of another by the wing so fast that they could be lifted up by it.

"*Of the internal Parts.*—The internal parts consist of two testicles, one on each side, situated about midway between the anterior and pos-

terior end of the belly, and near to the upper surface of the back. The two together would make about one-tenth of the size of the whole animal. They appear as if composed of three or four smaller bodies, rounded, and a little compressed together. Each testicle has a duct which emerges out of it in the hollow on their inner side, very similar to the ureter in the kidney. These ducts pass towards the anus in a convoluted course, and then the two unite into one duct. At this part they are considerably enlarged. At this union enters a duct which is formed of two blind beginnings. The common duct, or union of the whole is of considerable length and is coiled up with the others in the natural state, and terminates at last in the penis. The penis is a horny substance which is capable of being projected and drawn in, and is in a distinct part, not in the anus as in birds, yet they both open between the two last scales."

Hunterian Manuscript.

2328. A male Silk-Moth, with the penis exserted.

2329. A male Cicada or Tree-hopper (*Cicada Australasiæ*, Donovan), with the ventral parietes of the abdomen removed to expose part of the male organs of generation. The large intromittent organ is protruded. The two triangular yellow plates between the posterior pair of legs and the abdomen, cover and constitute part of the apparatus for producing the chirping sounds for which the Cicadæ have been in all ages celebrated. This apparatus is peculiar to the male.

2330. The male organs of a large species of Cicada. The common duct leading from the penis rapidly dilates, and divides into two wide tubes, which are principally the terminations of large convoluted accessory ducts, but also receive the capillary vasa deferentia. These perform many convolutions before joining the testes, which are large rounded masses, each consisting of an aggregate of almost innumerable short cæca.

2330 a. A small species of *Cicada*, with the penis protruded; and the dorsal parietes of the body removed, to display the testes *in situ*.

Prepared by Mr. Owen.

2331. Three Hive-bees (*Apis mellifica*, Linn.), showing the three kinds of indi-

viduals which constitute the community of these social insects. The lower specimen is the male, or 'drone'; the next the prolific female, or 'queen'; the upper one the unprolific female, nurse, or 'labourer'.

It is an established law that no prolific insect should breed up, or perform the duties of the parent towards her offspring, and most insects die soon after the eggs are extruded, apparently exhausted by the vast number which are developed. When therefore the larva does not possess independent powers or means of support, a third kind of individual is generated, which is a sterile female; and as the powers of this individual are not exhausted by the generative process, she is enabled to collect the nourishment, and nurse and attend to the helpless offspring of the fertile individual. This is generally done in concert, and the neuters or labourers are peculiar to the ants and bees.

The external characters of the three individuals of the species *Apis mellifica* are thus described by Hunter.

"*Of the Male Bee.*

"The male bee is considerably larger than the labourers: he is even larger than the queen, although not so long when she is in her full state with eggs: he is considerably thicker than either, but not longer in the same proportion: he does not terminate at the anus in so sharp a point; and the opening between the two last scales of the back and belly is larger, and more under the belly than in the female. His proboscis is much shorter than that of the labouring bee, which makes me suspect he does not collect his own honey, but takes that which is brought home by the others; especially as we never find the males abroad on flowers, &c. only flying about the hives in hot weather, as if taking an airing; and and when we find that the male of the humble bee, which collects its own food, has as long a proboscis or tongue as the female, I think it is from all these facts reasonable to suppose the male of the common bee feeds at home. He has no sting.

"The males, I believe, are later in being bred than the labouring bee. As they are only produced to go off with a hive, they are not so early brought forth; for in the month of April I killed a hive, in which I found

maggots and chrysalises, but did not find any males among the latter: the maggots are too young for such investigation; but about the 20th of May we observed males: they are all very much of the same size. In the month of August, probably about the latter end, we may suppose they impregnate the queen for the next year, and about the latter end of the same month, and beginning of September, they are dying, but seem to be hastened to their end by the labourers. In 1791, as early as the 19th of June, I saw the labourers killing the males of a hive, or rather of a swarm, that had not yet swarmed, but was outhanging; this, however, was out of the common course. They appear to be sensible of their fate, for they hurry in and out of the hive as quick as possible, seemingly with a view to avoid the labourers; and we find them attacked by the labourers, who pinch them with their forceps, and when they are so hurt, and fatigued with attempts to make their escape, as not to be able to fly, they are thrown over on the ground and left to die. That this is the fate of every male bee is easily ascertained, by examining every bee in the hive when killed for the honey, which is after this season; no male being then found in it. Bonnet supposes them starved to death, as he never saw wounds on them. In the course of a winter I have killed several hives, some as late as April, and in such a way as to preserve every bee, and after examining every one entirely, I never perceived one male of any kind; although it has been asserted there are two sizes of males, and that the small are preserved through the winter to impregnate the queen."

"*The Queen Bee.*

"The queen, the mother of all, in whatever way produced, is a true female, and different from both the labourers and the male. She is not so large in the trunk (abdomen) as the male, and appears to be rather larger in every part than the labourers. The scales on the under surface of the belly of the labourers, are not uniformly of the same colour over the whole scale; that part being lighter which is overlapped by the terminating scale above, and the uncovered part being darker; this light part does not terminate in a straight line, but in two curves, making a

peak, all which gives the belly a lighter colour in the labouring bees; more especially when it is pulled out or elongated.

" The tongue of the female is considerably shorter than that of the labouring bee, more like that of the male ; however, the tongues of the labourers are not in all of an equal length, but none have it so short as the queen.

" The size of the belly of the female of such animals varies a little, according to the condition they are in ; but the belly of the male and the labourer has but little occasion to change its size, as they are at all times nearly in the same condition with regard to fat, having always plenty of provision ; but the true female varies very considerably ; she is of a different size and shape in the summer to what she is in the winter ; and in the winter she has what may be called her natural size and shape ; she is upon the whole rather thicker than the labourer, and this thickness is also in the belly, which probably arises from the circumstance of the oviduct being in the winter pretty large, and the reservoir for semen full. The termination of the belly is rather more peaked than in the labourers, the last scale being rather narrower from side to side, and coming more to a point at the anus. The scales at this season are more overlapped, which can only be known by drawing them out. In the spring and summer she is more easily distinguished ; the belly is not only thicker, but considerably longer than formerly, which arises from the increase of the eggs. We distinguish a queen from the working bee simply by size, and in some degree by colour ; but this last is not so easily ascertained, because the difference in the colour is not so remarkable in the back, and the only view we can commonly get of her is on this part ; but when a hive is killed, the best way is to collect all the bees, and spread them on white paper, or put them into water in a broad, flat-bottomed, shallow white dish, in which they swim ; and by looking at them singly, she may be discovered. As the queen breeds the first year she is produced, and the oviducts never entirely subside, an old queen is probably thicker than a new-bred one, unless indeed the oviducts and the eggs form in the chrysalis state, as in the silk-worm, which I should suppose they did. The queen is perhaps at the smallest size just as she has done breeding ;

for as she is to lay eggs by the month of March, she must begin early to fill again; but I believe her oviducts are never emptied, having at all times eggs in them, although but small."

"*Of the Labouring Bee.*

"This class, for we cannot call it either sex or species, is the largest in number of the whole community; there are thousands of them to one queen, and probably some hundreds to each male, as we shall see by and by. It is to be supposed they are the only bees which construct the whole hive, and that the queen has no other business but to lay the eggs: they are the only bees that bring in materials; the only ones we observe busy abroad; and, indeed, the idea of any other is ridiculous, when we consider the disproportion in numbers as well as the employment of the others, while the working bee has nothing to take off its attention to the business of the family. They are smaller than either the queen or the males; not all of equal size, although the difference is not very great.

"The queen and the working bees are so much alike that the latter would seem to be females on a different scale; however, this difference is not so observable in the beginning of winter as in the spring, when the queen is full of eggs. They are all females in construction, having the female parts, which are extremely small, and would be easily overlooked by a person not very well acquainted with the parts in the queen." *Hunter on Bees, Phil. Trans.* 1792, p. 173.

2332. A male Hive-bee, with the sheath of the penis, everted.

2333. A male Hive-bee, with the dorsal parietes of the body dissected away to show the organs of generation. The two elongated bodies on each side which are next the back are the dilated vasa deferentia; the two larger elongated bodies, of which the obtuse blind extremities are seen rising above them, are the vesiculæ seminales. The testes themselves are not here displayed.

2334. A similar preparation.

2335. A male Hive-bee, with the ventral parietes of the body removed to show the dilated vasa deferentia and the vesiculæ seminales.

2336. A similar preparation, in which the vesiculæ seminales are drawn aside to show their common duct, the inverted sheath of the penis, with its small inferior cæcal appendage, and the two large lateral sacculi, which open near its termination.

2337. A male Hive-bee, with the dorsal parietes of the abdomen dissected off, and the male organs reflected downwards. The testes have been removed, but the slender convoluted, as well as the dilated, portion of each vas deferens is preserved. It will be seen that they open into the anal extremity of the vesiculæ seminales, and that these are joined together before the common excretory duct is sent off.

2338. A small Hive-bee, with the two vesiculæ seminales and one vas deferens exposed, together with the excretory duct and sheath of the penis, of which the horny portions may be clearly discerned.

2339. The male organs of generation of the Hive-bee displayed on a tablet of black wood; the vesiculæ seminales project forwards; the testes have fallen to the bottom of the bottle.

2340. The male organs of generation of two Hive-bees, similarly displayed: on one side the left testis, vas deferens, and vesicula are all preserved; on the other side only the vesiculæ seminales and common excretory duct remain. The appendages of the sheath of the penis are carefully displayed.

2341. A similar preparation, but with the testicles and one vas deferens deficient. The different relative sizes of the several parts in the preceding preparations would indicate that they were designed to exhibit the seasonal changes in the male apparatus; but there are no original records authenticating the periods at which, or the views with which they were prepared.

The following is Hunter's decription of the male organs of the Hive-bee.

"*Male Organs.*

"The Drone bee is the male of that genus. The parts of generation consist of two testicles, one vas deferens to each; two vesiculæ, the ductus communis, and the penis, with its apparatus for projecting. The testicles are very large for the size of the animal, lie in the back, are oblong, one end towards the thorax, the other towards the anus. The vasa deferentia come out, at first small, near the lower and inner side, pass towards the anus, becoming something larger, and open obliquely near the termination of an oblong bag. The oblong bag or vesicula lies more towards the belly and laterally, and in the direction of that cavity terminates in a duct, which uniting with the fellow duct of the other side form the ductus communis, which is of considerable length. At the termination of the ductus communis there is an apparatus somewhat similar to a larynx*, which lies between the two bags and is the first thing seen on opening the abdomen. It is only attached to the abdomen by means of the air-cells, vessels, &c. From this part goes towards the tail an irregular body which I suppose to be the penis in its prepuce. Near to the opening of the prepuce are two large processes which do not appear to be cavities; at least I have not found them to contain any thing."

Hunterian M S

2342. A male Humble-bee (*Bombus terrestris*, Linn.), with the intromittent organ exserted and the two holders divaricated.

2343. A male Humble-bee, with the anterior parietes of the abdomen removed, showing the vesiculæ seminales; which are relatively smaller than in the Hive-bee.

2344. The anal segment of a male Humble Bee (*Bombus*), showing the copulative claspers of this genus.

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* The sheath of the penis is supported by two lateral pairs of horny pieces, and a series of horny semicircles situated on the anterior or under surface. The terminal processes are hollow flattened sacculi, having their excretory orifices ciliated, and placed close to the outlet of the penis.

Mr. Hunter has left the following account of the male organs, which agrees with their appearance in the common species *Bombus terrestris*.

" *Humble Bee.*

" The male parts may be divided into external and internal, although the external are commonly concealed by the two last scales of the abdomen. The external parts consist of a pair of holders, or two horny substances, each of which is forked, and curved towards each other at their projecting parts or points, which lay hold of the female when in copulation. These horny parts are broad at their base, inclosing the penis, as in the Silk-moth.

" Between these are two other horny substances projecting nearly as far as the outer. They are small, and between them is the duct, or penis, adhering to them: or this may be viewed in another light; the penis has these two horny substances on each side to support it, as a projecting part, incapable probably of erection, only of protrusion: the soft part between or duct, projects a little, which may probably enter the female. The semen may be squeezed out at this part. This horny substance can be made to project beyond the two last scales of the abdomen, which is probably the case in copulation. At the base of this horny part it is attached forwards to the last scale of the belly, and behind to the rectum. Immediately behind this attachment, which is the cavity of the belly, and just under the last scale, on the fore part of the abdomen, are two oblong bags, each coiled up upon itself, and full of a mucus, which are either reservoirs for the semen, or are glands similar to the vesiculæ seminales in other animals. The testicles are bodies lying in the abdomen higher up among the intestines, being attached to them by the air vessels. In some I have observed two testicles on each side, and a small body a little higher up, communicating with the upper part of the other by a small duct. The large one is oblong, very tender, and has a duct passing from its lower end, which enters the above described canal near their entrance into the horny substance or penis. In some I have not been able to dis-

cover the small testes, but suppose all have them. These parts are hardly dissectable with the naked eye, but require a magnifying glass of about two inch focus. The semen is of a pale wheyish colour."

Hunterian MSS.

2345. A male Wasp (*Vespa vulgaris*, Linn.), with the anterior parietes of the abdomen removed, to show the small vasa deferentia and the vesiculæ seminales, situated at the lower part of the abdominal cavity.

2346. The male organs of a Wasp, removed and displayed on a piece of ebony. The testes have fallen to the bottom of the bottle; the vasa deferentia, at first small, gradually enlarge to their union with the small cæcal processes, which represent the vesiculæ seminales. These vesiculæ are not united at their posterior extremities as in the hive-bee, but each sends out a duct, common to it with the vas deferens, and these common ducts unite just before entering the base of the penis.

2347. The anal segment and copulative claspers in a Wasp.

2348. The male and female of a species of Wasp (*Vespa*).

2349. A male Hornet (*Vespa Crabro*, Linn.), showing the structure of the anal segment adapted for the retention of the female during the coitus.

2350. A Locust (*Acrida viridissima*, Kirby), with the dorsal parietes of the abdomen removed, the intestine dissected away, and the male organs displaced and turned down.

There are two testes on each side, one large and one small, which consist of an aggregate of closely compacted cæcal tubes. The vasa deferentia are small; they communicate with the excretory canals of an extensively developed accessory apparatus of branched cæcal tubes, which have four times the diameter of the seminiferous tubules. At the base of the penis there are two secreting sacs, analogous to those on each side the penial sheath in the bee, but relatively shorter and wider,—(are these attractive or odorous glands?) The sheath of the penis is terminated by two lateral hold-fasts, and the anal segment of the abdomen sends off two corresponding but shorter processes.

2351. The testes and vesiculæ seminales of a Locust (*Acrida viridissima*).

Mr. Clift has preserved a copy of the following note by Hunter, which relates to one of the preceding preparations: "In a large male green Grasshopper the termination of the upper and last scale? was in two points, or forked, as also was the lower, but not so long; and between these two were the anus and external parts.

"The whole belly almost was filled with cæca, all terminating in one central duct. On each side was a part that seemed to be composed of a duct or ducts coiled up into an oblong body, which I suspect are the testicles." *Hunterian MSS.*

2352. A male Summer-chaffer (*Melolontha solstitialis*, Linn.), with the intromittent organ exserted. This is of a large relative size and horny texture, slightly curved, and terminated by two strong hooks; above and between which may be seen the soft expanded glans penis. At the posterior third of the sheath is a transverse articulation, adapting it to its destined movements.

2353. A male specimen of the Cock-chaffer (*Melolontha vulgaris*, Linn.), with the generative organs displayed. The testes consist on each side of six orbicular seminiparous cæcal glands, from each of which proceeds a capillary efferent vessel; these converge and terminate on each side in the extremity of the vas deferens, which unites with its fellow and the corresponding vesicula seminalis at the same place, to form the common excretory canal. The vasa deferentia consist of innumerable convolutions of a capillary tube. The organ of intromission is very large, and of a horny texture, and is accompanied, as in most other insects, with a pair of incurved holders.

Hunter has left the following note on the male Cockchaffer: "The feelers (*antennæ*) terminate in three branches, which are flat, and which close upon one another. Those of the males are larger than those of the female, and when in copulation they spread them out, but the female does not.

"The males are smaller than the females. They have more hairs on their posterior thoracic scales. The thoracic scale in the female is mottled, like tortoise-shell.

" The penis is horny and terminates in two hooks, which, I imagine, lay hold of some part of the vagina.

" Towards the latter end of the season I found a vast number of males whose holders were separated, and the penis projecting."

Hunterian MSS.

2354. A male specimen of the *Blaps mortisaga*, with the ventral parietes of the abdomen and the alimentary canal removed, to display the parts of generation. These consist of two testes and their vasa deferentia; two subspherical vesiculæ seminales, and two tubular vesiculæ or accessory glands. The testes are the larger and more opake rounded bodies; they consist essentially (as shown by microscopic examination of recent specimens,) of an aggregate of small ovoid sessile capsules.

2355. A male Dung-chaffer (*Geotrupes stercorarius*, FABR.), with the ventral parietes of the abdomen removed to show the parts of generation *in situ*.

2356. A male Beetle (*Scarabæus*), with the intromittent organ protruded.

2357. A male Rose-beetle (*Cetonia aurata*, FABR.), similarly prepared. The numerous testes may be seen hanging by their slender ducts on each side, and the convolutions of the long tubular accessory vesicles in the midspace. The preparation is suspended by the horny sheath of the penis.

2358. The male organs of a Rose-beetle displayed on a piece of ebony. The twelve capsules, or masses of seminiparous cæca of which each testis is composed, are separately displayed on the left side; their respective excretory ducts successively unite to form the common vas deferens, which joins its fellow of the opposite side after a tortuous course of more than double the length of the entire insect. Their point of union is also that to which three pair of accessory secerning tubules or vesiculæ seminales converge, to become united. One of these is here unravelled; its length exceeds that of the beetle itself by twelve times. The other two vesiculæ, on each side, are blind floating tubes of less extent. The common canal of all these parts becomes much dilated, and is twisted upon itself, before terminating at the base of the penis.

2359. A Rose-beetle (*Cetonia aurata*, FABR.) with the ventral parietes of the

abdomen removed, from which the male parts appear to have been originally displaced, but are now decayed and fallen to the bottom of the bottle. The dilated common terminal duct of the male secerning apparatus, the intestinal canal, and intromittent organ are clearly exhibited.

2360. A male Beetle (*Megasoma Titanus*, KIRBY), with the ventral parietes of the abdomen removed and the retracted penis and part of the secreting apparatus turned down.

Here the male sex is distinguished by the development of two incurved horn-like processes upon the sides of the thorax, and one recurved and bifurcate process rising from the anterior part of the thorax above the head.

2361. A mutilated specimen of the male apparatus of some large Coleopterous insect.

2361 A. A male Gideon Beetle (*Dynastes Gideon*, KIRBY), in which the dorsal parietes of the abdomen have been dissected away, the intestinal canal turned aside, and the male organs reflected downwards.

The testes consist of an irregular mass of closely aggregated circular flattened lobes, each composed of a distinct cluster of seminiparous tubules. A slender capillary vas deferens is formed by the union of their several ducts on each side, and is continued in a convoluted course, widening as it proceeds, to the place where the duct of the elongated tortuous vesicula seminalis joins it. The common duct of the vesiculæ and vasa deferentia becomes suddenly expanded, is bent upon itself, and terminates at the base of the incurved horny sheath of the penis.

Prepared by Mr. Owen.

2361 B. Two of the lobes of the testes of the Gideon-Beetle removed from the body and prepared for microscopical examination. They consist each of a series of cæcal follicles radiating from the circumference to the centre.

Prepared by Mr. Owen.

2362. A male Glow-worm (*Lampyris splendidula*, LINN.). The elytra and wings are developed for flight in this sex only.

2363. A male Musk-beetle (*Cerambyx moschatus*, LINN.), with the penis protruded.

4. *In Arachnidans.*

2364. A male Spider (*Mygale cancerides*, Walcknaer), suspended by the tumid unarmed extremities of the elongated maxillary palps, or feelers, the last joint of which contains an erectile apparatus, which is the organ of excitement in the male. In the female the corresponding parts are more slender, and are armed with a small horny hook.

2365. A Scorpion (*Buthus africanus*, Leach), with the ventral parietes of the abdomen removed to expose the male organs of generation *in situ*. A bristle is inserted into the termination of the excretory duct on the left side. The external orifices are situated close to the base of the pectinated processes, which are present in both sexes.

5. *In Crustaceans.*

2366. A river Craw-fish (*Astacus fluviatilis*, Fabr.), with part of the thoracic parietes removed to expose the testes and vas deferens of the left side. The testis is a compact glandular body, consisting of innumerable minute secerning cæca, widest at its anterior extremity, and sending a long narrow process backwards along the middle line of the body. The vas deferens leaves the upper part of the gland, and, forming numerous convolutions, enlarges as it proceeds to the posterior part of the visceral cavity, whence it extends in a straight line to the base of the fifth pair of legs, where it finally terminates, without communicating, in any part of its course, with its fellow of the opposite side.

2367. The male organs of a Lobster (*Astacus marinus*, Fabr.). The testes are two elongated, subcylindrical lobulated bodies, commencing each by an obtuse extremity anteriorly, where they are thickest, and are joined together by a transverse band about three lines behind these extremities. They then again become separate, and descend parallel to, and in contact with each other, immediately beneath the heart, giving off, opposite its posterior apex, the vasa deferentia; after which they make a curve downwards, and pass backwards in a somewhat irregular course for the extent of two or three inches. Each vas deferens comes off from the outer side of its respective testis; it is at first very narrow, but gradually widens as

it extends straight backwards for two thirds of an inch ; then it makes a turn upon itself and becomes suddenly dilated, whence it continues, with a few slight windings, to the basal joint of the fifth pair of legs, which it finally perforates to open on the external surface. The termination of the duct being loosely connected with this part, and susceptible, from its length, of eversion, thus forms on each side a sort of intromittent organ, which is applied, in the coitus, to the vulval orifices on the third pair of legs in the female. The granular or follicular structure of the testes may be readily discerned with a pocket lens in the preparation ; they exhibit the quiescent or unexcited condition.

6. *In Mollusks.*

2368. The soft parts of a male Pterocera (*Pterocera Scorpio*, Lam.), prepared to show the urethral groove and intromittent or exciting organ. The orifice of the respiratory cavity is laid open ; the termination of the rectum is exposed, and a bristle is inserted into the anus : the termination of the vas deferens is seen below the rectum, and the groove leading from it to the base of the penis, which is the slender elongated subcompressed organ by which the preparation is in part suspended : the urethral groove, here exclusively devoted to the passage of the semen, is widened by portions of bristle ; the penis terminates above the canal in a small lanceolate process.

2369. The soft parts of a small Pectinibranchiate Gastropod, showing the large and long intromittent organ protruded from the right side of the neck ; a bristle is inserted into the seminal passage which is here a complete canal.

2370. The soft parts of a small Pectinibranchiate Gastropod, in which the mantle has been dissected away from the dorsal region of the body, to show the male organs of generation ; the course of the slender vas deferens from the testicle to the penis is well displayed. The latter part is of great relative size, and projects as usual from the right side of the neck.

2370 a. A male Carinaria (*Carinaria mediterranea*, Lam.). The testis is the elongated gray-coloured body which occupies the superior or convex margin of the visceral mass, or the part corresponding with the apex of

the shell in the turbinated Gastropods: the dark substance between the testis and the body is the liver, through which the intestine and vas deferens may be seen to pass, the one towards the mouth, the other to the base of the bifid intromittent organ: this projects from the right side of the body, half way between the visceral mass and foot.

Prepared by Mr. Owen.

2371. The male organs of a Cuttle-fish (*Sepia officinalis*, Linn.). The testis is single; it is the large, oval, compressed glandular body, which is the lowest of the suspended parts. The vas deferens is the short narrow tube continued from the upper extremity of the testis; it enters a glandular sac, which is twisted upon itself, and presents a close laminated structure internally, and terminates in an obtuse blind extremity. A wide duct is continued from the commencement of the above glandular cæcum, which sends down a large membranous sac; a lobulated glandular body is attached to the parietes of this sac, which is continued above into the terminal tube, by which the products of the male generative apparatus are finally emitted.

2372. The male accessory glandular organs, with the convoluted sac containing the elastic self-moving filaments described by Swammerdam and Needham, and the terminal ejaculatory tube, or penis, of a Cuttle-fish (*Sepia officinalis*, Linn.).

2372 a. The male organs of a Sepiole (*Sepiola Rondeletii*, Leach). The testis is irregularly ovate, smooth, and slightly convex externally, and with two facets on the opposite side, which meet and form a middle ridge, from the upper part of which the vas deferens is continued; this tube soon enters a thick irregular glandular canal, which, after a tortuous course, suddenly becomes filamentary, and communicates with the duct of a globular and glandular prostatic sac: the canal, formed by the conjoined ducts of this sac and the testis finally enters the lower part of a long and wide sac, which contains the elastic filaments. In the Sepiole the above sac contains two kinds of bodies; first, a number of long filamentary transparent tubes, obtuse and enlarged at one extremity, and gradually diminishing to the opposite end, which is slightly twisted, as if

broken off; secondly, long pyriform cysts, containing each a small amber-coloured conical substance, having an opake filament attached to their apex, which passes into the interior of the first described tubes; the second bodies are surrounded by an opake mucus. *Prepared by Mr. Owen.*

7. *In Fishes.*

2373. The trunk of a male Lamprey (*Petromyzon marinus*, Linn.) with the ventral parietes of the abdomen dissected away to show the testes, *in situ*. These are situated between the kidneys, and consist each of a tæniæform substance of considerable length, but adapted to the extent of the abdomen by being folded upon the duplicature of peritoneum which attaches the testis to the region of the spine. There is no excretory duct or vas deferens continued from the testis to the external surface, but the fecundating fluid passes immediately from the testis into the cavity of the abdomen, and is thence expelled by the contractions of the surrounding parietes from the peritoneal openings in the cloaca: into these large bristles have been placed.

2374. The corresponding part of a male Lamprey (*Petromyzon fluviatilis*, Linn.), in which the testes and intestine have been removed, and the kidneys alone preserved, which have been partially injected. It is these organs which have been described as testes by some anatomists who have considered the Cyclostomous fishes as Hermaphrodites, confounding the true testes with the ovaria. Three bristles project from the cloaca: the thick white bristle passes through the rectum; the black bristle is inserted into the left ureter; the small white bristle penetrates the abdominal cavity by the left peritoneal outlet from which the semen is expelled.

2375. A male Pipe-fish (*Syngnathus Ophidion*, Bloch), with the ventral parietes removed from the lower part of the abdominal cavity to expose the testes: these present the form of slender elongated straight tubes, pointed, and closed at the anterior extremity; they are very small in proportion to the size of the fish, being in the unexcited condition. The long slender tail of the specimen has been cut off.

2376. A portion of a Pipe-fish (*Syngnathus Acus*, Linn.), including the ter-

mination of the abdomen and the commencement of the subcaudal marsupium, or egg-pouch. Both cavities are laid open; in the abdomen may be perceived the rectum, the slender elongated allantoid bladder, and the two tubular testes, which are more attenuated than in the preceding specimen, having discharged the fecundating fluid. In the subcaudal pouch there are portions of two packets of ova, which undergo their development, and are probably impregnated as they pass from the abdomen of the female into this receptacle, which is peculiar to the male.

2377. A male Hippocampus (*Hippocampus guttulatus*, Cuv.), with the parietes removed from the right side of the abdominal and marsupial cavities. In the abdomen may be seen the testis of the right side, having a similar simple elongated cylindrical form as in the *Syngnathi*; the pouch, which still contains some of the ova, is divided by an incomplete longitudinal septum descending from the middle line of the upper surface of that cavity. The orifices of the abdomen and pouch are close together; there are no anal fins, the absence of which characterizes externally the male sex in the genus *Hippocampus*.

2378. A Sand-eel (*Ammodytes Tobianus*, Linn.), with the abdominal cavity laid open to expose the milt, or soft roe, as the testicles of fishes are commonly called; the testicle in this species is single, of an elongated triedral form, partially divided along the middle line by a longitudinal fissure.

2379. The viscera of an electric Eel (*Gymnotus electricus*, Linn.), preserved chiefly to show the testes, which are two oblong triedral bodies, attenuated at both extremities.

2380. The rectum, kidneys, and testes of the electric Eel. A black bristle is inserted into the rectum, or white one in the common duct of the generative and urinary glands.

2381. The testes with the cloaca, termination of the rectum, and urinary bladder of the Pike (*Esox Lucius*, Linn.). The secretion of each testis is conveyed along a central longitudinal canal, which in the right testis is exposed through nearly its whole length; a bristle is inserted into the cor-

responding efferent canal of the left testis: the outlets of these canals are situated in the cloaca close to that of the allantoid bladder, into which a portion of quill has been passed. A dark and apparently fatty substance, perhaps the remains of the Wolffian body, may be observed to be attached to each testis.

2382. One of the testes of an osseous Fish.

2383. A similar preparation.

2384. The testes of a Mackerel (*Scomber Scombrus*, Linn.). They are partially injected, and a slice has been removed from one of them to show the vascularity and structure of the gland. A bristle is inserted into the short common duct by which the fecundating fluid is expelled. The period of the full development of the testes in this fish is the month of June.

2385. A portion of one of the testes of a Mackerel (*Scomber Scombrus*, Linn.), with the short common excretory duct laid open.

2386. A Trout (*Salmo Fario*, Linn.), with the parietes removed from the right side of the abdomen to show the right testis, and the straight and short vas deferens continued from its lower extremity to the cloacal outlet, where it terminates immediately posterior to the anus.

2387. One of the testes of a Trout, in which fine injection of size and vermilion has been thrown in the retrograde direction into the vas deferens, from which it has passed into the tubuli testis, in many parts; and has penetrated as far as their blind extremities at the superficies of the gland.

2388. Two transverse sections of the testis of a Trout, similarly injected, showing the central canal containing the vas deferens, and the radiated disposition of the secerning cæca, or tubuli.

2389. The testes and air-bladder of the Salmon (*Salmo Salar*, Linn.). A portion of the œsophagus is preserved, showing the orifice by which the air bladder communicates with it. The anterior and larger extremities of the testes are situated close to the termination of the ductus pneumaticus; they proceed backward, gradually diminishing in size for about six inches, then suddenly become much smaller, and so continue to the

cloacal outlet, where the vasa deferentia terminate by a common opening behind the anus. An attempt has been made to inject the glands by the vasa deferentia.

2390. The testes, and air-bladder, of a Cod (*Gadus Morrhua*, Linn.). The testes are elongated, flattened and compressed, and a great extent of the glandular substance is brought into a small space by being disposed in convolutions upon the edge of a duplicature of peritoneum like the small intestines.

2391. A portion of the testis of a Cod.

2392. A Gold-fish (*Cyprinus auratus*, Linn.), with the parietes of the right side of the abdomen removed, together with the digestive organs, to show the testes and their excretory ducts. They present an irregular lobulated texture, and the vasa deferentia are relatively longer than in the Trout.

2393. One of the testes of a Cephaloptera (*Cephaloptera Manta*, Bancroft). It is attached to the margin of a duplicature of the peritoneum, and slightly bent upon itself in an undulating manner. It has been partially injected, and a section of the upper lobe has been made to show its texture. An accessory glandular body is attached to the concave side of the testis.

2394. The cloaca of a Male Ray (*Raia Batis*, Linn.) laid open to show the rudimentary penis, perforated by the canal continued from the two cavities into which the valvular terminations of the vasa deferentia open; these cavities, which serve as a species of seminal reservoir, and are surrounded with muscular fibres, are laid open, and bristles are inserted into the terminations of the vasa deferentia.

2395. A portion of the trunk of a Picked Dog-fish (*Spinax acanthias*, Cuv.) injected, with the testes exposed *in situ*. They appear, in their present unexcited state, as moderately elongated compressed vascular glands, situated at the anterior part of the abdomen; they are attached by their mesial edges to a duplicature of the peritoneum, which connects them to the region of the spine. A bristle is inserted into the common outlet of the seminal ducts, which open into the posterior part of the rectum. The copulative holders are preserved, which are situated on each side of the cloacal aperture; these are present in the males of all the plagio-

stomous fishes; for in them the ova are impregnated internally, and in some species, as the present, are also developed within the oviducts.

2396. The head and trunk of the Small-spotted Dog-fish (*Scyllium canicula*, Cuv.), with the abdomen laid open, and the digestive organs removed to show one of the testes *in situ*. It presents an elongated form, but is thicker and larger than in the preceding specimen. The cloaca is laid open, showing the common outlet of the vasa deferentia and ureters: below the papillary eminence on which this orifice is situated, there is a transverse valvular fold of the lining membrane of the rectum, and below this fold are the orifices of the two peritoneal canals, into which bristles are inserted. The claspers, or holders, are shown attached to the mesial margins of the ventral fins, and strong bristles are passed into the cavities at the base of the claspers which are subservient to their erection: the cavity on the right side has been laid open.

2396 A. One of the lobes of the testis of the Basking Shark (*Selache maxima*, Cuv.). It is of a circular compressed figure; flat and impressed on one side with a semilunar groove; convex on the opposite side, and there covered by so thin a tunic, that the convolutions of the tubes of which it is composed are plainly discernible; these tubes have a diameter of about two lines. *Prepared by W. Clift, F.R.S.*

2396 B. A portion of the secretion contained in the vas deferens of the Basking Shark. *Presented by W. Clift, F.R.S.*

8. *In Reptiles.*

a. Metabolian Subclass, in which copulation takes place without intromission.

2397. The posterior moiety of an Amphiume (*Amphiuma didactylum*, Cuv.), with the abdominal cavity laid open, and exposing to view the termination of the intestinal canal supported by its broad and simple mesentery, the termination of the right lung, the long allantoid bladder attached by a duplicature of peritoneum to the mesial line of the abdomen, and the testes with their adipose appendages: the latter may be observed projecting on each side of the root of the mesentery, and behind them are the testes, which are ash-coloured bodies of an elongated subcylindrical form,

tapering at both extremities: the vasa deferentia descend in the form of white ligamentous tubes, and finally open into the posterior part of the termination of the rectum, which is laid open. The renal organs are almost concealed by the above described parts; they have been injected.

2398. The male organs, kidneys, allantoid bladder, and large intestine of the Menopome (*Menopoma Alleghanniense*, Bl.). The testes here present a less elongated and more compact oval figure, and thus indicate a further stage of advancement above the class of Fishes. The vasa efferentia leave the testis at a longitudinal groove at their posterior and internal surfaces, at the line of reflection of the supporting processes of peritoneum, and on each side unite to form a vas deferens, which descends along the edge of a process of peritoneum, external to the kidneys, and finally opens into the termination of the rectum, as in the Amphiume. The kidneys are the opake white bodies which, beginning by small extremities near the lower end of the testes, slightly enlarge as they descend to the cloaca. The aorta, injected, may be observed to occupy their posterior interspace, and there to send off the arteries for the hinder extremities.

2399. The testes, vasa deferentia, kidneys, allantoid bladder, rectum, and cloaca of a Newt (*Triton*). The testes consist here of three separate glandular masses on each side. The vasa deferentia have a more convoluted course than in the Menopome.

2400. A similar preparation, in which the rectum and allantoid bladder are removed, to bring into view the elongated wavy capillary cæca developed from the extremity of the vas deferens, and representing the accessory generative glands called 'vesiculæ seminales.' A bristle is passed through the termination of the rectum and cloaca.

2401. A Newt, with the ventral parietes of the abdomen and most of the abdominal viscera removed, to expose the testes, which form a single reniform body on each side. The cloaca, bounded by the two tumid glandular labia, characteristic of the male sex, has been artificially dilated, to show the valvular projection formed by the rectum after it has received the vasa

deferentia. The dentated cutaneous crest is beginning to be developed along the back.

2402. A Newt (*Triton punctatus*, MERREM.), similarly prepared, showing the testicles consisting of a single lobe on each side. The dorsal crest is here developed; it is a temporary organ characteristic of the male, and supposed to be serviceable in the manœuvres required by the act of copulation, which takes place in the water, but is unaccompanied by intromission.

2403. A young Newt (*Triton palustris*, LAUR.), with the ventral parietes of the abdomen removed, to show the testes *in situ*, which at this immature stage are flaccid, and of diminished size, and consist only of a single lobe on each side. On the right side may be seen the group of short capillary cæca given off from near the extremity of the vas deferens, and representing the vesiculæ seminales.

2404. A Newt (*Triton palustris*), at a more advanced period, with the ventral parietes of the abdomen removed, to show the testes beginning to enlarge, but still flaccid, and simple in form; they are indicated by the insertion of bristles.

2405. A crested Newt (*Triton cristatus*, LAUR.), fully grown, with the anterior parietes of the abdomen removed, to show the male organs of generation *in situ*. Both testes consist of two principal subspherical lobes, above which is a smaller glandular body. The left is situated a little more forward than the right. The vasa deferentia are distended with semen, and much convoluted. The dorsal crest and tumid labia of the cloaca show that the animal has been dissected at the season of procreation.

2406. A Crested Newt, killed at the season of procreation, and similarly prepared; with the allantoid bladder turned to one side, and the rectum and cloaea laid open to show the termination of the convoluted vas deferens, and the group of straight capillary cæca, or vesiculæ seminales.

2407. A Salamander (*Salamandra maculosa*, LAUR.), similarly prepared, to show the male organs. The testes are irregular elongated bodies, consisting of four lobes on each side, attached to the spine by a broad duplicature

of peritoneum; the vasa deferentia are of a dark colour, as are also the cæcal vesiculæ which communicate with their extremities. The rectum and cloaca are laid open to show the two longitudinal folds of membrane or rudimental penes, upon which the vasa deferentia terminate; a bristle is passed into the allantoid bladder.

2408. A variety of the same species of Salamander (*Salamandra maculosa*), similarly prepared, to show the testes *in situ*: that on the right side exhibits five distinct lobes. The accessory tubuli or vesiculæ are relatively larger than in the preceding specimen.

2409. The male generative and urinary organs, with the allantoid bladder, rectum and cloaca of a Frog (*Rana temporaria*, Linn.). The testes are single reniform bodies of a grey colour. The kidneys are of a more elongated and flattened form; they are minutely injected; as are also the appendiculæ adiposæ. The vasa efferentia are the white capillary vessels passing from the mesial border of the testis into the substance of the kidney; they traverse that gland, and open into the vessel which runs along its outer border, and which is common to both the renal and spermatic efferent tubes. The vessel or canal, which thus combines the function of vas deferens and ureter, opens into the middle of a large and simple compressed pyriform vesicula seminalis, which corresponds with the more complicated multifid vesiculæ of the Newts and Salamanders; the common excretory ducts are finally continued from the apices of the vesiculæ, and open into the posterior part of the rectum. The large bifid allantoid bladder is here turned down.

2410. A similar preparation, uninjected.

2411. A Frog with the ventral parietes of the abdomen removed, and the stomach raised, to show the testes, *in situ*. They are here seen of small size; and have their arteries partially injected.

2412. A Frog, similarly prepared, and with the digestive organs removed to show the testes *in situ*; they exhibit their period of enlargement and activity. The appendiculæ adiposæ at their anterior extremities are injected.

2413. A Frog of a different species, similarly prepared, showing the testes of a more globose figure.

2414. A Frog, with the abdomen laid open, and all the viscera removed except the heart, and the urinary and genital organs. The parts are minutely injected by the arteries, but the testes, as in the preceding preparations, have admitted little of the colouring matter. They are drawn laterally apart from one another, to show the vasa deferentia passing to the kidneys. In this and the preceding preparations may be observed the change which takes place in the size, shape, and colour of the radial digit of the anterior extremity, by which it is converted into an instrument for more effectually retaining the female in the long-continued embrace during which the fecundation of her numerous ova is effected.

2415. A Toad (*Bufo fuscus*, Cuv.), with the testes and urinary organs exposed; the testes present an elongated and more regular reniform figure than in the frog. The one on the right side is coloured with injection. The rectum is laid open, and a bristle is inserted into the common terminal orifice of the urinary and seminal ducts.

2416. A Surinam Toad (*Pipa monstrosa*, Laur.), dissected to expose the testes; they resemble in figure those of the Toad, but, being in the unexcited state, are of small size in the present specimen.

b. Ametabolian Subclass, in which copulation is attended with intromission.

2417. The posterior part of the body of a Snake (*Coluber Natrix*, Linn.), with the ventral integuments dissected off from the abdomen and tail to show the testes and the two penes *in situ*. The testes are small, slightly-compressed, oblong bodies, situated anterior to the kidneys, the right about an inch in advance of the left, corresponding to the difference in the relative position of the kidneys: the penes, which consist almost wholly of a preputium, or invertible sheath, and a small glans, are retracted within their subcaudal cells; bristles are inserted into the outlets of these receptacles, and pass into the cavities of the inverted preputia. The muscles which retract the penes and invert the sheaths, are exposed, as they pass backwards to their origins from the inferior spines of the caudal vertebræ.

2418. The termination of the abdomen and the tail of a large Coluber, in which the left preputial sheath is laid open, showing the intromittent organ in the retracted state; and the right preputium everted, the glans protruded, and the long retractor muscle dissected. The urethral groove and retroverted papillæ on the preputial membrane and glans may be noticed in both the penes. The termination of the rectum in the cloaca, and its vascular lining membrane, are displayed by injection: below the rectum are shown the terminal orifices of the ureters, into which bristles are inserted.

2419. A Rattle-snake (*Crotalus horridus*, Linn.), with the whole of the thoracic abdominal cavity laid open, and the viscera exposed *in situ*. The testes present a more elongated form, and are situated nearer to the anterior extremities of the kidneys than in the *Natrix*; but the chief difference in respect to the generative apparatus is manifested in the structure of the intromittent organs; these appear to be double on each side, from the great development of the bifurcations of the glans penis; those of the right side are here protruded; the left bifurcate penis is retracted, the preputium inverted, and its retractor muscle displayed *in situ*.

2420. A Coluber (*Elaphis quadrilineatus*, Bonap.), with the two penes everted and protruded, showing the urethral grooves, the large retroverted papillæ on the preputial vascular membrane which constitutes the body of the penis, and the small flattened wrinkled processes which beset the glans.

2421. A Coluber (*Periops Hippocratis*, Bonap.), with the penes inverted; bristles are placed in the outlets of the preputial sheaths.

2422. A Slow-worm (*Anguis fragilis*, Linn.), with the ventral parietes of the abdomen dissected off, and the viscera displayed *in situ*. The testes are situated a little anterior to the dilated rectum, the right in advance of the left; their peritoneal capsules, which are somewhat collapsed, present a brownish tinge. The small allantoid bladder which distinguishes the *Angues* from the true *Serpentes* is here preserved; the right penis is retracted, the left protruded; the retractor muscles of both are displayed.

2423. A Slow-worm, similarly prepared, but with the liver and large intestine removed. The testes are more distinctly shown; their posterior extremities are on the same transverse line, and rest on the anterior extremities

of the kidneys, but the right testis extends further forwards, and exceeds in size the left. A bristle is inserted into one of the inverted penial or preputial sheaths.

2424. The American Slow-worm, or Ophisaur (*Ophisaurus ventralis*, Cuv.), with the posterior part of the abdomen laid open, the intestinal canal removed, and the testes and kidneys displayed *in situ*. The short transverse folds or convolutions of the vasa deferentia may here be observed continued along the mesial edges of the kidneys towards the cloaca. The termination of the rectum is exhibited with part of the allantoid bladder, and the right penis everted. The intromittent organs are of smaller size than in the typical Serpents.

2425. A small specimen of Ophisaur, with the ventral parietes of the abdomen reflected to show the testes and other viscera *in situ*.

2426. One of the testicles of the large New Holland Scincus (*Tiliqua scincoides*, Cuv.), with the tunica albuginea laid open, to show how loosely, in the present unexcited condition of the testicle, the tubuli are contained within it.

2427. A species of Scincus (*Tiliqua*), with the ventral integuments dissected off from the posterior part of the abdomen and base of the tail, to expose the testes and penes. The right testis is more advanced in position than the left. The structure of the penes, and the provision for their safe inversion when not in use, are the same as in the Serpents, for the short legs of the lizard tribe serve only for progression, not for support, and, when the animal is at rest, the belly is in contact with the ground. The right penis is here protruded: it consists in great part, as in the Serpents, of an elongated preputium, or invertible sac, connected at its moveable extremity with a short sub-bifurcate glans; the retractor muscle is similarly disposed.

2428. A portion of the integuments and muscles of the base of the tail, including part of the cloaca and one of the penes, of a large Scincoid Lizard. The penis is everted, showing its urethral groove, transverse rugæ, and the short retroverted papillæ of the glans; the retractor muscle is also displayed.

2429. The posterior moiety of the common or Ocellated Lizard (*Lacerta ocellata*, Cuv.), with the testes and vasa deferentia exposed *in situ*. The testes are flattened oval bodies, the right being anterior to the left. Below the valvular fold which indicates the termination of the rectum, may be observed the orifices of the ureters, in which bristles are placed. One of the inverted penes or prepuces is laid open, showing the glans; and the retractor muscles of both penes are displayed.

2430. A portion of an Ocellated Lizard, showing the testes, vasa deferentia, and kidneys, *in situ*. The semen is conveyed from the testes by several extremely minute vasa deferentia, to the commencement of the vas deferens; the close-set transverse folds of which might be mistaken for an epididymis*. Bristles are inserted into the ureters. The right penis is everted, the left inverted, and its retractor muscle protrudes from the cut surface of the tail.

2431. Two male specimens of *Lacerta agilis*, Linn., with the testes exposed in each, showing two stages of their increase; in the specimen with the largest testes the two penes are also shown, one protruded, the other retracted.

2432. The viviparous Lizard (*Podarcis muralis*, Wagler), with the ventral parietes of the abdomen removed to show the testes *in situ*; they have a nearly parallel position.

2433. An Agama (*Agama atra*, Daud.) with the ventral parietes of the abdomen and the digestive viscera removed to show the testes *in situ*: the cloaca is dilated and both penes are everted, showing the urethral grooves leading from the cloaca to the bifid glans of each intromittent organ.

2434. A section of an Iguana (*Iguana tuberculata*, Linn.), including the posterior part of the abdomen and the commencement of the tail. The testes and the broad band continued from each of them, and formed by the alternate transverse folds of the vas deferens, may be observed in the abdomen. The cloaca is laid open, and a great part of the allantoid bladder is cut away, but one of the large appendices adiposæ is preserved (see No. 1820, a.). The

* A true epididymis is formed by the convolutions of several efferent tubes prior to their union to form the vas deferens.

termination of the rectum may be seen behind the large orifice of the allantois; immediately posterior to this orifice are situated the outlets of the ureters, and in the interspace a ridge is continued downwards, on esch side of which are placed the orifices of the vasa deferentia; from these orifices the urethral grooves commence, which are continued along each penis to its papillose glans. The right penis is protruded, the left retracted, and the retractor muscles of both are displayed.

2435. A part of the cloaca with one of the penes of the Iguana, everted and distended.

2436. An Anolis (*Anolius*, Cuv.), with the testes and vasa deferentia, and the retracted penes exposed *in situ*.

2437. The posterior part of a Chameleon (*Chameleo planiceps*, Merrem.), with the testes, vasa deferentia, and kidneys displayed *in situ*: the testes are remarkable for their very dark colour. The cloaca is laid open, the left penis everted, showing its bifid glans; and a bristle is inserted into the right penis, which is retracted and inverted.

2438. The termination of the rectum and the cloaca of a young male Crocodile (*Crocodilus acutus*, Cuv.), laid open: small brown bristles are inserted into the terminations of the ureters, and larger black bristles into the terminations of the vasa deferentia; these are situated just above the base of the penis, which is a single and simple, short, conical organ, grooved along the middle of its inferior surface.

2439. A similar preparation from a larger Crocodile. Bristles are inserted into the ureters: the crura of the two fibro-cartilaginous bodies, which represent the corpora cavernosa of this single penis, are displayed; together with the commencement of the peritoneal canals which lead to the valvular papillæ situated on each side of the base of the penis.

2440. The penis of a Crocodile, showing the urethral groove, continued forwards on a slender elongated conical process which seems to represent the glans, and is given off a short distance from the end of the fibro-cartilaginous substance. The individual from which this specimen was taken measured fourteen feet in length.

2441. A longitudinal section of the testis, convoluted vas deferens and kidney of a large Turtle (*Chelonia imbricata*, Brongn.). The testis is an elongated rounded body, bent in a semilunar form, and decreasing in size as it descends towards the cloaca. Its tubular structure is with difficulty discerned in the present preparation. The vasa efferentia leave it near the upper part of its concavity, and soon join the vas deferens, which forms a large and compact body by its numerous convolutions situated between the testes and kidney; the vas deferens is about the tenth of an inch in diameter, and is filled with a caseous secretion.

2442. A portion of the opposite section of the same testicle and convoluted vas deferens.

2443. One of the testicles of a Tortoise, injected, and divided by a longitudinal incision; a bristle is inserted into the vas deferens.

2444. The cloaca and penis, with the allantoid bladder and termination of the rectum of a Turtle (*Chelonia Mydas*, Brongn.). The bladder is small in proportion to the size of the animal, especially as compared with its condition in the Land Tortoises; it is laid open as far as its communication with the cloaca, and on one side may be seen the terminations of the vas deferens and ureter, which are situated upon a valvular papilla, the spermatic duct opening nearer the bladder than the urethra. The penis is short, and is indicated chiefly by the urethral groove; it is only the glans and the pointed extremity of the fibro-cartilaginous body immediately above it that project from the surface of the cloaca; these are partly inclosed by a thick duplicature of the lining membrane of the cloaca, which represents a preputium.

2445. The external compartment of the cloaca, laid open, and the penis *in situ*, of a large Turtle.

2446. The penis of a Turtle, as it appears when protruded from the cloaca, which is effected by an eversion of the external membranous or preputial fold of that passage.

2447. The generative and urinary organs, cloaca, and tail of the European Fresh-water Tortoise (*Emys Europæa*, Brongn.).

The testes and convoluted vas deferens are separated from the kidneys by the peritoneum, which, after having given an entire investment to the testis, is then reflected over the flattened or slightly concave surface of the kidney. The testis presents a compact rounded figure; the peritoneum covering the vas deferens, and the uniting membrane of the convolutions of that tube, are stained with a dark pigment; the large veins and spongy bodies at the base of the penis are filled with red injection. The cloaca is laid open, showing the terminations of the allantoid bladder and rectum, and the commencement of the urethral groove of the penis; this organ is protruded, exhibiting the pointed form of the glans, and the urethral groove.

2448. A similar preparation from a Land Tortoise (*Testudo*, Cuv.). A thick bristle is placed in the orifice of the allantoid bladder at the commencement of the urethral groove: the temporary conversion of this groove into a complete canal by the apposition of its margins, consequent upon distension of the corpora cavernosa, is here well exhibited; as are also the two transverse semilunar ridges with which it is bounded anteriorly. A bristle is passed on the right side from the cavity of the peritoneum into the canal, which is continued thence into the substance of the corpus cavernosum penis; the peritoneal canal is laid open in the middle of its course, and again near its blind termination; the bristle protrudes from the incision made into the latter part.

2449. The right kidney, testis, vas deferens, with the termination of the rectum, the cloaca, penis, and tail of the Tabulated Tortoise (*Testudo tabulata*, Schweigger.). The peritoneal canal, which extends through the left corpus cavernosum penis, is laid open through its whole extent; a bristle is inserted into the commencement of the corresponding peritoneal canal of the left side.

2450. A longitudinal section of the penis of the Great Tortoise (*Testudo Indica*, Vosm.), showing the entire length of the peritoneal canal, and the reticular sinuses in which it finally terminates in the glans penis.

2451. The corresponding section of the same part, showing the opposite side of

the peritoneal canal, and the orifices which lead from it into the contiguous sinuses.

2452. The male generative and urinary organs of a Tortoise. The bifid allantoid bladder is distended with horse-hair. The testes, which resemble the kidneys in shape, and equal them in size, are distinguished by their smooth, white, unconvoluted surface. The large penis has been injected, and a small bougie is placed in the urethral groove: the glans penis which bounds the urethral groove anteriorly, presents a crescentic figure, and projects from the under surface of the fibrous corpus cavernosum, which terminates in a point projecting beyond the glans.

9. *In Birds.*

2453. The posterior part of the abdomen of the common Fowl (*Phasianus Gallus*, Linn.), showing the testes and kidneys *in situ.*

The testes are situated upon the anterior extremities of the kidneys; they have an entire investment of peritoneum, and are suspended by a duplicature of the same membrane to the sides of the spine.

The vasa deferentia proceed toward the cloaca, forming a series of short and close-set transverse folds; they terminate on papillæ, which are external and anterior to the ureters; white bristles are inserted into the seminal, and black ones into the urinary outlets. The compartment of the cloaca into which the above ducts open, is separated by a transverse valvular fold from the rectum above and by a similar fold from the external outlet below, with which the glandular cavity, called "bursa Fabricii," communicates.

See the Figure and further description of this preparation in Plate L. Fig. 1.

2454. One of the testicles, with the remains of the corpus Wolffianum, of a Bustard (*Otis tarda*, Linn.). The parts have been injected with mercury from the vas deferens. In tracing this tube towards the testis, it will be seen about two inches from that gland, to send off from one side tortuous branches which penetrate the Wolffian body, and there subdivide to great minuteness: similar branches continue to be given off from the

remainder of the vas deferens which is continued to the anterior extremity of the Wolffian body; most of the branches thus sent off from the vas deferens terminate and are lost in the Wolffian body, but others are continued across the anterior part of that temporary gland, and penetrate the testicle, constituting the vasa efferentia. A very small proportion of the testicle has been penetrated by the mercury through these vessels: a portion of the gland has been removed, so as to expose a few of the tubuli testis so filled, which shows that they divide or branch in the substance of the testicle, as is the case in some of the rodent mammalia.

2455. The testicles of a Bird, with the plicated vasa deferentia injected with mercury; the tortuous branches penetrating the remains of the Wolffian bodies are also filled, and these bodies, (which are much smaller here than in the Bustard,) may be observed extending beyond the testis to the suprarenal glands.

2456. The testicles and remains of the Wolffian body of a Bird. Mercury has been thrown into the vas deferens, and half the substance of the gland has been removed, but the tubuli testis have not been filled.

2456 A. The testicles of a Java Cassowary (*Casuarius galeatus*, VIEIL.). They are of a more elongated form than in the Fowl, and the bird having died before the season of sexual excitement, they present a relatively small size. *Presented by Mr. Owen.*

2457. A House-sparrow (*Pyrgita domestica*, CUV.), killed in the month of January, and prepared to show the minute size of the testes at that season; they may be discerned of the size of pins-heads, in the same relative position as in the common Fowl.

2458. A House-sparrow, killed at the beginning of February, when the testes generally present, as in this instance, a slight increase of size.

2459. A House-sparrow, killed at the latter end of February, when the testes exhibit a further increase.

2460. A House-sparrow, killed in the month of March, showing a still greater enlargement of the testes.

2461. A House-sparrow, killed in the month of April, showing the full development of the testes. Their large proportional size at this period corresponds with and accounts for the frequency and rapidity with which the coitus is repeated at the procreative season in the passerine birds, in which the seasonal changes of the testes are most conspicuous.

2462. The posterior part of the body of a House-sparrow, killed in May, when the testes begin to be on the decline.

Hunter alludes to the preceding series of preparations in the following passage in his paper on the glands called Vesiculæ Seminales.

"In the greatest part of the globe there is a difference in the warmth of the same district at different periods, constituting the seasons; and the cold in some of them is so considerable, as to prevent those (the procreative) feelings and dispositions in animals from taking place, and to render them, for the time, unfit for the purposes of generation. This is owing to the testicles becoming at this season small, and being, therefore, unfit to give such dispositions, as is the case in very young animals. This fact is very obvious in birds, of which the Sparrow may be produced as a proof. For if a cock-sparrow is killed in winter, before the days have begun to lengthen, the testicle will be found very small; but if that organ is examined at different times in other sparrows, as the warmth of the weather increases, and if this examination is continued to the breeding season, the difference in the size of the testicles will be very striking."

Animal Œconomy, p. 41.

The testes of the Sparrow are represented at their different stages of development in Plate L.

2462 A. The posterior part of the body of a Cuckoo (*Cuculus canorus*, LINN.), prepared to show the testes, which are smaller than those of the House-sparrow, though the bird was killed in the beginning of May, when the testes are in full activity. *Prepared by Dr. Jenner.*

2462 B. A similar preparation from a Cuckoo, killed at the latter end of June, when the testes have begun to diminish in size. *Prepared by Dr. Jenner.*

In both specimens the left testis may be observed to be larger than the right; and the same approach to a correspondence with the peculiar

condition of the female apparatus in birds may be noticed in the preparations of the Sparrow: but the following specimen offers an exception to the rule.

2462 c. The posterior part of a Rook (*Corvus frugilegus*, Linn.), prepared to show the testes, of which the right presents the maximum, and the left the minimum of development. *Prepared by Dr. Jenner.*

2463. The cloaca and penis of a Bird: the latter is of very small size and grooved longitudinally as in the Reptile.

2464. A similar preparation.

2465. The cloaca and penis of the Gander (*Anser palustris*, Briss.). Bristles are placed in the terminal orifices of the vasa deferentia; the penis is in its retracted state, and is spirally twisted like a corkscrew. The wide triangular depression at its base, into which the seminal secretion must first pass, leads to the commencement of the urethral groove which traverses the whole length of the penis, and is bounded laterally by transverse ridges beset with retroverted papillæ.

2466. A similar preparation of the penis of a Gander.

2467. The termination of the rectum with the cloaca and penis of a Swan (*Cygnus Olor*, Briss.). The intromittent organ presents a similar structure to that of the Gander, but is of smaller size. Bristles are passed through the ureters and left vas deferens, the latter opens close to the base of the urethral groove: the termination of the rectum and extent of the urinary receptacle may be distinguished by the character of the lining membrane of the two parts.

2468. A similar preparation, showing the penis of the Emeu (*Dromaius Novæ Hollandiæ*, Latham.). It resembles in structure that of the Anserine birds, and the elastic ligamentous substance which enters into its composition is also disposed so as to retract it into a spiral figure.

2469. The penis of an Ostrich (*Struthio Camelus*, Linn.), injected, showing the two fibro-cartilaginous substances, commencing by separate crura, and forming the principal part of the body of the penis; between which, and along the upper surface of the penis, is continued the groove, representing

the urethra; the true corpus cavernosum is situated on each side of this groove; the part, which is reflected back from the extremity of the penis, and seems to represent the glans, consists of the elastic ligament which effects the retraction of the penis. At the commencement of the urethral groove the papillæ are preserved on which the vasa deferentia terminate: bristles are passed through these papillæ.

2470. A transverse section of the injected corpus cavernosum of the same penis. The Ostrich, from which the present and preceding preparation were taken, stood eleven feet high.

10. *In Mammals.*

a. Ovoviviparous Sub-Class.

2471. A male Opossum (*Didelphis dorsigera*, Linn.), preserved to show the form and position of the pendulous scrotum, and the single cloacal outlet from which the penis is protruded during erection; the bifid glans only is visible in the preparation.

2472. The hinder parts of a male Opossum (*Didelphis brachyura*, Pall.), to show the same peculiarities in the structure of the male generative apparatus.

2473. The pelvis with the termination of the rectum, the urinary bladder, and a portion of the ventral integuments, including the pendulous pedicellate scrotum, testes, and cloaca, of an Opossum.

2474. The male organs, urinary bladder, and rectum of a young Kangaroo, (*Macropus major*, Shaw.). The testes in this, as in all other known Marsupials, are contained in a pedicellate scrotum, which is situated anterior to the penis. The vasa deferentia are here shown passing from the scrotum to the neck of the bladder, and bristles are inserted into the peritoneal canals of the spermatic chord leading to the tunica vaginalis of each testicle. A bristle is passed into the left ureter; Cowper's glands are also shown on the same side. The penis projects from the anterior verge of the cloaca; a bristle is inserted into the urethra.

2475. The testes and spermatic chords, with the blood-vessels injected, of a Phalanger, or 'Wha Tapoua Roo' (*Phalangista vulpina*, Geoffr.). The tunica vaginalis has been laid open on both sides, showing the elongated epididymis and its large globus major: one of the peritoneal canals forming the communication between the cavity of the tunica vaginalis and abdomen is laid open through its whole extent: a bristle is inserted in the other.

2476. A portion of the scrotum of an Opossum (*Didelphis Virginiana*, Shaw,), showing the cavity of the tunica vaginalis, and part of the canal leading from it to the abdomen.

2477. The ossa innominata and marsupial bones of a male marsupial animal. Their office in this sex will be explained in the following preparation.

2477 a. The corresponding bones, and the portions of the abdominal muscles attached to them, of a male Phalanger (*Phalangista fuliginosa*, Ogilby.). The marsupial bones extend into and seem to be developed in the substance of the tendon of the external abdominal muscle forming the mesial or internal pillar of the external abdominal ring. The cremaster muscles are given off from the inferior border of the internal oblique, pass out by the external abdominal rings, and wind round the marsupial bones, before being expanded to embrace the testis; (their insertions are not shown, in consequence of the testes having been removed in the specimen here dissected). The marsupial bones are always developed to a length corresponding with the position of the scrotum, so as to serve as fulcra to the cremaster muscles, and enable them to act with great force in the compression of the testis; a circumstance which is probably required in consequence of the length and tortuosity of the double vagina, along which the semen has to be propelled. The coitus in the Kangaroo, and probably in other Marsupials, is of long duration, and the scrotum during that act disappears and seems to be partially inverted during the forcible retraction of the testes against the marsupial bones.

Prepared by Mr. Owen.

2478. The parts of generation and rectum of a male Potoroo (*Hypsiprymnus murinus*, Illig.). The rectum is laid open, together with the cloaca, to

show the penis, continued, as in Birds, from the anterior part of the latter cavity. The penis in this, as in other Marsupiata, differs from that of Birds and Reptiles, chiefly in being perforated by a true urethral canal. The large anal glands are here dissected.

2479. The hinder parts of a small Opossum (*Didelphidis species*), dissected to give a side view of the termination of the rectum and cloaca. The penis seems here to emerge from a special compartment at the anterior part of the cloaca; a bristle is inserted in the orifice of the urethra at the base of the bifurcate glans, along the inner surface of each division of which a groove is continued from the urethra. The cremaster is shown passing to the scrotum.

2480. The urinary bladder, urethra, penis, and accessory generative glands, together with the rectum and cloaca, of the 'Wha Tapoua Roo' (*Phalangista Vulpina*, Cuv.). The ureters and vasa deferentia are shown, joining the neck of the bladder; a bristle is placed in one of the vasa deferentia, and the urethra is laid open at its commencement, showing the longitudinal ridge, at the sides of which the semen enters that canal. The commencement, or first part of the urethra, corresponding to the prostatic and muscular* portions in other mammalia, is of great length, and of a pyriform figure, being at first much enlarged, but gradually diminishing in diameter as it approaches the bulbous and cavernous constituents of the penis. The enlargement arises chiefly from a thickening of the parietes of the canal, which consist of an internal glandular substance compared by some anatomists to the prostate, and surrounded by a thin external stratum of transverse muscular fibres; the canal itself is also here slightly dilated. The crura of the corpus cavernosum are enlarged, and each is surrounded by a strong compressor muscle†, but, as in other Marsupials, they have no ligamentous attachment to the ischial bones. Two small accessory glands may be observed immediately anterior to the junction of the crura of the corpora cavernosa, and two

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* This is called the membranous portion in human anatomy.

† *Erector penis* in human anatomy.

larger accessory glands are situated immediately beyond that junction: two other still larger glands, of an oval form, are placed nearer the cloaca; these communicate by slender subelongate ducts with the preputium: lastly, there are two anal follicles opening near the verge of the cloaca, the right of which is here laid open. The penis is bent upon itself in a sigmoid form, when retracted, as in the present specimen: the retractor muscles pass backwards on each side of the rectum, meet behind it, and join together before passing to their bony insertion: the preputial division of the cloaca is laid open, showing the bifurcate termination of the glans penis, and the small retroverted papillæ on the body of the glans.

2481. The male organs of generation of an Opossum (*Didelphis Virginiana*, Shaw), showing the relative position of the scrotum and penis characteristic of the Marsupiata. The urinary bladder is preserved entire; a longitudinal section has been removed from the whole of the right side of the prostatico-muscular parts of the urethra, showing the relative thickness of the muscular and glandular parietes, and the capacity of the urethral canal. A black bristle is inserted into one of the vasa deferentia, and a brown bristle into the corresponding ureter. The two dilated crura of the corpus cavernosum penis, and the two distinct bulbous enlargements with which the corpus spongiosum commences, together with their separate compressor muscles, are well displayed; two of the accessory Cowperian glands are preserved on the left side. The penis is injected, showing its form and size when erect, and the vascularity of the bifurcate glans. The grooves continued from the termination of the urethral canal, along the two portions of the glans, render the resemblance very close between these parts and the double penis of Reptiles. The office of the bulb of the urethra in relation to the distension of the glans penis is well illustrated in this preparation, in which we find a separate bulb or posterior enlargement of the spongy body on each side, prepared as a reservoir of blood to be propelled into the corresponding anterior enlargement forming the glans of the same side during the period of erection, and of the ejaculation of the semen.

2482. The urinary bladder, prostatico-muscular part of the urethra, and two pairs

of Cowperian glands, of a young Kangaroo: bristles are placed in the terminations of the vasa deferentia.

2482 A. The bladder, urethra, and penis, of a Koala (*Phascolarctos fuscus*, Bl.). The musculo-prostatic part of the urethra presents the same form and development as in the other Marsupiata. The crura of the corpus cavernosum, and the large double bulb of the urethra, with their investing muscles, are shown; the urethra opens into the bottom of an expanded cavity formed by an infundibular glans, the sides of which are flattened and produced, corresponding to the bifurcation of the glans in the Opossum. *Presented by Sir Everard Home, Bart.*

2482 B. The corresponding parts of a Wombat (*Phascolomys Vombatus*, Blainv.). In addition to the two crura and two bulbs, there are here preserved six Cowperian glands, each invested, like the preceding parts, with a capsule of muscular fibres. The glans penis, which is laid open by a longitudinal incision, ends obtusely, and the bifid division is only slightly indicated. The urethral grooves continued to the termination of each of these divisions subdivide them so as to give the termination of the glans a four-lobed figure. It is interesting to observe, in relation to the affinity of the Wombat to the Rodent order, that the exterior of the expanded glans is here beset with retroverted horny spines.

Prepared by Mr. Clift, F.R.S.

b. Placental Sub-Class.

2483. The integuments of the perinæum and base of the tail, with the anal glands and cloaca of the Beaver (*Castor Fiber*, Linn.). In the cloaca may be observed the orifices of the anus and prepuce, into which quills are placed, and the orifices of the preputial or castor pouches, which are indicated by bristles.

This preparation is figured at Pl. XLVIII. fig. 1. vol. iii.

2484. The male organs, urinary bladder, rectum, castor-bags, and cloaca of a Beaver. The testes, which are small for the size of the animal, are situated here between the castor-bags and bladder. The tunica vaginalis and its continuation with the peritoneum are laid open, showing the great

width of the canal of communication, which is in relation to the passage of the testicles from and their return to the abdominal cavity. The vasa deferentia are short, but tortuous, so as to allow of a variation of length corresponding to the periodical changes in the position of the testes. The vesiculæ seminales are proportionally smaller than in some other Rodentia, as the Cavies: they are two in number, of an elongated form, and are described by Hunter as convoluted bags, their ducts having no communication with the vasa deferentia, but opening, both the one and the other, upon the verumontanum*. The penis has been injected; the rectum is laid open, and the flattened termination of the glans with its crenate border may be seen just projecting from the preputial compartment of the cloaca. The castor glands on the right side are preserved entire.

2485. The testicle and one half of the tunica vaginalis of a Beaver. The peritoneal canal which forms the communication between the cavities of the tunica vaginalis and abdomen is left entire, to show its great width; a structure which is common to all the rodent, and other mammalia in which the testes escape periodically from the abdomen, and return again to that cavity after the season of sexual excitement is past. The cremaster, which is the principal agent in these movements, is largely developed, and forms a complete muscular sac for the testis when the latter is out of the abdomen.

2486. The opposite testis of the same Beaver, with the tunica vaginalis and muscular sheath of the cremaster inverted. The epididymis and spermatic chord are attached to the tunica vaginalis by a broad duplicature of peritoneal membrane:

2487. The cloaca, castor-bags, termination of the rectum, and protruded penis, of a Beaver. The rectum is laid open. The urethra terminates by a transverse slit in the centre of the truncated termination of the glans. The preputial gland is laid open on the right side.

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* See 'Animal Œconomy,' p. 39.

2488. The bladder and commencement of the urethra, with the dilated terminations of the vasa deferentia, the vesicular glands, and prostatic glands of a large Rodent. The cavity of the enlarged vasa deferentia, which is laid open on the left side, is occupied by transverse folds of the mucous lining membrane, which are very numerous and close set: this part of the duct may, therefore, be regarded in the light of an accessory glandular organ of the male apparatus. The structure of the vesicula seminalis is exposed by the removal of a longitudinal section, showing it to be composed of an aggregate of enlarged follicles, which are distended with their amber-coloured semitransparent secretion. The prostatic glands are four in number, two on each side; they consist of a congeries of tortuous cæcal tubes, which, in the outer gland of the left side, have been unravelled. The urethra is laid open, showing the large cæcal depression containing the verumontanum; and the orifices of the glands above described are indicated by the insertion of bristles.

2489. The testis, spermatic chord, and tunica vaginalis of a Hare, (*Lepus timidus*, Linn.). The tunica vaginalis is inverted, as in the preparation of the Beaver's testicle (No. 2486), showing the great capacity of that part which surrounds the chord, and the corresponding free communication of the vaginal canal with the abdomen. The principal difference here observable is in the superior size of the epididymis, which is much enlarged at both extremities, and is folded upon itself before it is continued into the vas deferens.

2490. The bladder and penis with the large vesicula seminalis, and Cowper's glands of a Hare. The chief peculiarity in the male generative apparatus of this Rodent is the confluence of the vesiculæ seminales into one large bag; it is slightly bifid at the fundus, and its coats acquire a spongy glandular structure at its cervix; which seems to answer to a prostate. The vesicula communicates with the urethra by a pretty wide opening, situated on the middle of the verumontanum; and the vasa deferentia, which become enlarged near their termination, communicate with the outlet of the vesicula. Cowper's glands are two small pisiform bodies, whose ducts terminate in the dilated commencement of the urethra,

which is here laid open, showing the extremities of bristles passing through the orifices of the vasa deferentia and vesicula seminalis.

2491. The male organs of generation of a Guinea-pig (*Cavia Porcellus*, Linn.). In one of the testes the globus major of the epididymis rests in the cremasteric pouch, in the other it is drawn out, and the cremaster is inverted. The course of the vas deferens is shown on the right side, and it is laid open near its termination, exposing the secretion with which it is distended; a bristle is passed through the duct into the urethra to show its separate opening into that canal. The corresponding vesicular gland is also laid open to show the compact mass of secreted matter with which it is distended. Cowper's glands are also exhibited, and the sigmoid course of the penis, as it is disposed in the retracted state.

2492. The male organs of generation *in situ* of an *Acuchi* (*Dasyprocta Acuchi*, Illig.). The right testis is exposed in its temporary receptacle in the perinæum, where it lies parallel with and immediately above the terminal reflected part of the penis; the communication of the tunica vaginalis with the abdomen is by the wide canal and aperture usual in this order of Mammalia. Within the abdomen may be observed the adipose appendages of the spermatic chords, a portion of the rectum and bladder, and, on each side of the interspace of the preceding parts, the extremities of the large vesiculæ seminales. The penis in the retracted state describes a sigmoid flexure; the long prepuce is laid open to show the extremity of the penis bent back towards the anus, and armed on each side with a dentated horny ridge. The large anal gland and its muscular capsule are shown on the right side; and above it, near the tuber ischii, may be seen one of Cowper's glands.

2492 a. The ossa innominata and male organs *in situ* of an Acuchi. On the right side the external abdominal ring is turned down, and the mode of formation of the cremaster by the sacciform development of the inferior fibres of the internal oblique is shown, the testis having been protruded from the abdomen. On the left side the testis is retracted, and the cremasteric muscular pouch inverted. The bladder and rectum are removed, exposing the tortuous course of the vasa deferentia, together with the

vesicular and prostatic glands. The commencement of the urethra is laid open, and the separate terminations of the left vas deferens, and corresponding glandular vesicula, are shown; the former having a bristle passed through its orifice, while the duct of the latter is occupied by the projection into the urethra of a portion of the firm, brittle, amber-coloured substance which characterizes the secretion of the vesicular glands in the Cavies. The prostatic cæca are external to the ducts of the vesiculæ, and may be distinguished by their lighter colour. A portion of the penis is preserved, and the muscles compressing the corpora cavernosa and bulb, (*erectores penis* and *acceleratores urinæ*) together with the muscle which unbends the penis during erection, and at the same time compresses the venæ dorsales penis, are shown; the latter muscle arises from the lower part of the symphysis pubis and sends its tendon along the dorsum penis to be inserted into the ossicle of the glans.

Prepared by Mr. Owen.

2493. The parts of generation *in situ* of an Agouti (*Dasyprocta Agouti*, Illig.). The testes are retracted within the abdomen; the vasa deferentia, vesiculæ seminales, and prostate, which closely resemble those of the Acuchi, are seen in their relative positions. The muscular part of the urethra is exposed, and Cowper's glands are shown sending their ducts to terminate in the bulb. The penis first advances forward in front of the pubis and abdominal muscles, being closely attached to those parts; it then bends backwards, and enters the preputial sheath, whose orifice, together with the glans, is directed towards the anus. The prepuce is laid open to show the dentated horny plates attached to the sides of the glans penis. The right anal gland is exposed, and a bristle is inserted into its excretory duct.

2494. The penis of an Agouti, showing its bent figure in the retracted state, and the lateral armature and terminal cavity of the glans.

2495. The penis of a Spotted Cavy (*Cœlogenys subfusca*, F. Cuv.), in which the glans is armed with two strong horny spines, directed forward, in addition to the small retroverted spines, and the two lateral dentated horny plates which it possesses in common with the Agouti. The ter-

minal horny processes are ordinarily retracted out of sight within the depression or sac at the extremity of the glans.

2496. The termination of the penis of a Spotted Cavy, with the terminal fossa of the glans everted, and the large and strong horny spines protruded.

2497. The male organs of generation of a Cavy, prepared principally to show the separate orifices by which the vasa deferentia and ducts of the vesicular glands open into the urethra; bristles are placed in these ducts, and into the orifice of the duct of the left prostatic gland. The penis, anus, and large anal glands are also preserved.

2497 A. One of the testes of a Capromys (*Capromys Fournieri*, Desm.), with the large adipose appendage attached to the epididymis. The globus major is surrounded by the remains of the cremasteric pouch: it was found projecting through the external abdominal ring: the tunica albuginea has been removed from one half of the testis.

Prepared by Mr. Owen.

2497 B. The bladder, penis, vesicular and prostatic glands of the Capromys (*Capromys Fournieri*, Desm.). The bladder and muscular part of the urethra are laid open to show the separate terminations of the ducts of the testes, glandulæ vesiculares, and prostatic cæca. A small quill is passed through the duct of the vesicular gland of the right side; a black bristle through the vas deferens of the same side, and another bristle through the duct of the prostate of the left side. The vesicular glands present a white and glistening exterior; they are of an elongated form, with thin parietes, and send off, on one side principally, from fifteen to twenty obtuse cæcal processes: the one on the right side is laid open. The prostate gland consists of four principal masses or lobes, each composed of a number of flattened tubular cæca, with thin and easily lacerable parietes, compacted together by cellular tissue.

The urethra at its commencement forms a small cul de sac with the blind end projecting behind the neck of the bladder, and separated from the orifice of the bladder by a transverse ridge; the ducts of the testes, prostatic and vesicular glands terminate separately in a depression on each side of the verumontanum. The muscular part of the urethra is closely embraced

by a thick stratum of muscular fibres, diverging in a double oblique or penniform manner from a middle longitudinal inferior raphe: the 'acceleratores urinæ' have been dissected away from the bulb of the urethra, which is of large size: the crura penis are embraced by short but strong 'erectores;' the 'levatores' muscles, or 'compressores venæ dorsalis,' are here seen terminating in a single tendon, which runs along the dorsum penis, to be inserted into an elongated flattened ossicle which lies in the glans above the termination of the urethra. The glans, in this genus, is unprovided with the horny armature which gives it so remarkable a character in the Cavies. *Prepared by Mr. Owen.*

2498. The male organs of generation of the Gray Squirrel (*Sciurus cinereus*, Linn.). The testes, which, as in most other Rodentia, are alternately abdominal and scrotal, and which have consequently the canal of the tunica vaginalis of great width, have been retracted from the scrotum, and the cremasteric pouch has been inverted. The vasa deferentia pass with a slightly wavy course to the base of the prostate. The vesicular glands are remarkable in the Sciurine family of Rodents for their small size; they are slender, somewhat elongated bodies, bent upon the base of the prostate, through the substance of which their comparatively long ducts pass, together with the vasa deferentia. The prostate is a relatively large elongated compact body, simply applied, and loosely attached to the posterior part of the neck of the bladder and muscular part of the urethra. Cowper's glands are also relatively of large size; they are situated at the sides of the rectum; of a rounded conical form, with the base bent forwards upon the apex, from which a long, thick duct, with glandular parietes, is continued into the bulb of the urethra: this structure is displayed on the left side, and a bristle inserted into the duct. It is interesting to observe here, that the diminutive size of the so-called vesiculæ seminales is not compensated by a dilatation of the vasa deferentia, as might have been expected had their office been to serve as a reservoir for the secretion of the testes, but by the magnitude of the other glands, viz. the prostate and Cowper's, the admitted function of which is to add some accessory fluids to the semen; and this argument

is of greater weight, because the squirrels do not differ either in the mode or duration of the act of copulation from other Rodents in which the vesicular glands are largely developed.

2499. The male organs of a Squirrel (*Sciurus affinis*, Raffles.). The testes are here situated in the scrotum, which forms a more pendulous sac than in the Rodents generally; the right compartment has been laid open, showing the testis *in situ*, and the enlarged inferior extremity of the epididymis, which makes a distinct projection at the bottom of the scrotum: the constituents of the spermatic chord may be observed separating from each other at the internal ring, which is widely open, and situated immediately external to the recti abdominis muscles. The spermatic artery and vas deferens are connected on each side by a duplicature of peritoneum with the sides of the prostate gland: the vesicular glands are relatively larger than in the Gray Squirrel, and are lobulated. The penis passes forwards in front of the symphysis pubis and recti muscles, and then bends downward to terminate in a small pendulous prepuce above the scrotum. The rectum and anal glands, in some of which a bristle is placed, are also preserved in this preparation.

2500. The testicle of a Rat (*Mus decumanus*, Linn.). The epididymis is connected to the testis by a slender fasciculus of vasa efferentia, and in the rest of its course by a duplicature of the tunica vaginalis. It is of great length, with both extremities enlarged, and bent upon themselves.

2501. The testes, vasa deferentia, accessory generative glands, and urinary bladder of a Rat (*Mus decumanus*, Linn.) The tunica albuginea is reflected from one of the testes, showing the large size of the tubuli testis, which are partially unravelled: the epididymis has been injected with mercury, its peculiarities of form, size, and connection with the testis are described in the preceding preparation. The vasa deferentia are short and unconvoluted. The glandulæ vesiculares are elongated sacs, curved forwards and inwards at their upper extremities, and giving off a single series of short and wide cæcal processes from their convex margins: their concavity is occupied by a tubular gland, analogous to the pro-

state of the Cavies; but an accessory secretion is also prepared by two rounded compact glands, situated at the sides and in front of the neck of the bladder, and similar in structure to the prostate of the Squirrels.

2502. The pelvis, tail, and hinder extremities, with the male organs, of a Murine quadruped. The testes are within the abdomen; portions of brown bristle are placed behind them: the prepuce is laid open, and portions of black bristle are placed behind the glans penis, which is bent down close to the verge of the anus.

2503. A Mouse (*Mus musculus*, Linn.), with the abdominal cavity laid open, and the digestive viscera removed to show the testes and kidneys *in situ*. The testes are within the abdomen, and exhibit the atrophied condition characteristic of them in the winter season; the abdominal apertures or rings, through which they escape when enlarged during the period of sexual excitement, are seen immediately behind them, and the gubernacula and reflected cremaster muscles may be observed passing through the abdominal openings. It is interesting to perceive the correspondence between the testes and kidneys in their obedience to the laws which influence their relative position in the abdomen, both glands of the right side being advanced in the same degree anterior to those of the left.

2504. A Mouse, killed in spring, when the testes, like those of the sparrow, have acquired an inordinate magnitude; in which state they are extruded from the abdomen into temporary receptacles in the perinæum: the testis on the right side has been purposely drawn forwards into the abdomen to show its large size; the vesicular glands, which are simple elongated cæca curved outwards like the cornua uteri, exhibit a corresponding enlargement.

2505. A Mole (*Talpa Europæa*, Linn.), with the abdomen laid open to show the testes, as they appear in winter. They are lodged in large cremasteric pouches in the perinæal region, making no projection externally. The right testis is drawn into the abdomen by the side of the bladder, and its posterior extremity may be seen attached to the inverted cremaster; the left testis has its anterior extremity projecting into the abdominal

cavity. The prostatic glands, which consist of an aggregate of cæcal tubes, are just visible behind the bladder.

2506. A Mole, killed in February, and prepared to show the increased size of the testes, and the commencing sexual development of the prostatic cæca.

2507. A Mole, killed in the beginning of March, and prepared to show a further increase of the testes and accessory prostatic glands; the latter have now advanced forwards on each side of the urinary bladder, so as to encompass its cervix: the left testis has been drawn back into the abdomen, and its attachment to the inverted cremasteric pouch displayed.

2508. A Mole, killed about the latter end of March, and dissected to show the complete development of the testes and prostatic glands; the latter have acquired an enormous size, and now quite conceal the urinary bladder. The thickened muscular part of the urethra is laid open, a white bristle is passed into the bladder, and two brown bristles into the ducts of the prostatic glands. The long penis, and its two crura, surrounded by the erectores muscles, are also shown.

2509. A Mole, which was killed in autumn, prepared to show the collapsed state of the testes, and the atrophied condition of the prostatic glands, (the testes, however, have not yet returned to the small size which they exhibit in winter).

Mr. Hunter observes in his work on the Animal Œconomy (p. 41.) that the seasonal or periodical changes in the size of the testes is not peculiar to birds, but is common to all animals which have their seasons of copulation. "In the buck," he says, "we find the testicles are reduced to a very small size in winter; and in the land-mouse, mole, &c., this diminution is still more remarkable. Animals, on the contrary, who are not in a state of nature, have no such change take place in their testicles; and not being much affected by seasons, are consequently always in good condition, or in a state to which other animals that are left to themselves can only attain in the warmer season. Therefore in man, who is in the state we have last described, the testicles are nearly of the same size in winter as in summer; and nearly, though not exactly, the same thing may

be observed in the horse, ram, &c., these animals having their seasons in a certain degree.

" The variation above taken notice of is not confined to the testicles, but also extends to the parts which are connected with them. For, in those animals that have their seasons for propagation the most distinctly marked, as the land-mouse, mole, &c., the vesiculæ are hardly discernible in the winter; but in the spring they are very large, varying in size in a manner similar to the testicle. It may, however, be alleged, that the change in these bags might naturally be supposed to take place even admitting them to be seminal reservoirs; but what happens in the prostate gland, which has never been supposed to contain semen, will take off the force of this objection; since in all animals which have such a gland, and which have their season for propagation, it undergoes a limited change. In the mole, the prostate gland in winter is hardly discernible, but in the spring becomes very large and is filled with mucus."

2510. The posterior part of the body of a Mole, prepared to show a side view of the male organs of generation. The right testis is seen just within the abdomen; behind it is the prostatic gland of the same side, at about the middle period of its development; a bristle is placed in its duct. Behind the prostate gland is seen the small and contracted urinary bladder. The muscular part of the urethra is laid open; Cowper's gland of the left side is here shown situated at some distance from the urethra, covered by the common integument above the root of the tail. A section has been taken from this gland, showing its follicular structure and small central cavity; the course of its duct is traced to its termination in the bulb of the urethra. The left crus of the penis has been detached from the ischium, and the whole course of the intromittent organ is displayed; it at first advances forwards, and is then suddenly bent backwards upon itself, as in the Rodentia; but ends in a free projecting cutaneous preputial sheath at a little distance from the anus. A bristle is placed in the urethra.

2511. The male organs of generation of the Cape-Mole (*Chrysochlorus Capensis*, Cuv.). The testes are situated in the abdomen a little below or posterior to the kidneys, which they resemble in form, but are somewhat

more compressed. The epididymis begins as usual at the upper or anterior end of the testis, and immediately recedes from the gland to which it is connected by a narrow fold of peritoneal membrane; it passes insensibly into a large vas deferens, which pursues a loosely convoluted course to the neck of the bladder; behind the bladder may be seen the obtuse rounded ends of two vesiculæ seminales. The correspondence of the male with the female organs is strikingly shown in this preparation: the testes representing the ovaria; the epididymides the expanded fimbriæ; the vasa deferentia the Fallopian tubes; and the vesiculæ the horns of a bifid uterus.

2512. The male organs of generation and urinary bladder of a Hedge-hog, (*Erinaceus Europæus*, Linn.). The testes in this complicated apparatus may be distinguished by their well-defined and circumscribed form, by the attached epididymis, which is of large size, and by their hanging suspended from the slender vasa deferentia. Behind the bladder are seen the large glandular vesiculæ seminales; in front of the bladder are the flattened prostatic glands. Cowper's glands, like those of the mole, are situated out of the pelvis, behind the ischia; their long ducts are here stretched out on bristles. The separate orifices by which the ducts of the above complicated apparatus open upon the large verumontanum within the urethral cæcum are likewise displayed by having bristles inserted into them; the portion of quill is passed into the bladder.

See the figure of this preparation, Plate LV, fig. 1 and 2.

2512 a. The male organs of a Hedge-hog, with the ossa innominata and the lower part of the abdominal muscles showing the orifices of the inverted cremasteric pouches, which appear at the external abdominal rings when the testes have repassed into the abdomen. The sacrum and rectum being removed, portions of the vesiculæ seminales are exposed behind the bladder, and the right Cowperian gland is shown on the outside of the corresponding ischium. The prostatic glands and the process of peritoneum by which they are attached to the abdominal muscles may also be seen between the two testes. The penis is large and of great length. The erector muscle of the right crus is here shown, together

with the two long and slender retractor muscles, which arise from the tubcres ischii behind the crectores, and passing along the side of the penis, meet upon its dorsum near the reflection of thc long prcpucc, compress the venæ dorsales penis, and are ultimately inserted into the ossicle of the glans. The urethra terminates below a peculiar process which projects beyond the main body of the glans.

Prepared by Mr. Owen.

2513. The integumcnts of the lower part of the abdomen, with part of the pelvis, and the male organs of generation, urinary bladder, and cloacal outlet of the Musk Shrew (*Sorex myosurus*, Pallas.). The testes have passed from the abdomcn into temporary receptacles in the perinæum, not forming, however, an externally projecting bag. The scrotal receptacle on thc left side is laid open, and the testis detached from the cremaster and spermatic vessels, and turned down. A bristle is passed from the abdomen through the wide peritoneal canal which leads to the tunica vaginalis of the right testicle. On each side of the contracted bladder may be sccn the vesicula seminalis and prostate. The prcputium is in part laid open to show the extremity of the bent and retracted penis.

2514. The male organs of generation, with the perinæal integument, scent-glands, scrotum, rectum, and anus of the Zibet (*Viverra Zibetha*, Linn.). The testes are concealed in the scrotum, from which the spermatic chords may be seen ascending to the sides of the bladder where the vasa deferentia quit thc chords to pass to the base of the small prostate: there are no vesiculæ seminales. The muscular part of thc urethra is of great length; Cowper's glands are situated on each side of its termination; that on the left side is exposed immediately behind the left crus penis, which has been detached from its bony connection. The penis is continued from the junction of the two crura forwards in front of the pubis to the small preputium which is situated at the anterior part of the enlargcment caused by the scent-glands: the glans penis, which has a pointed form, is bent downwards. The large orifices of the two lateral scent-glands are situated just within a longitudinal fissure bounded by two labia, which

have been divaricated; a section has been removed from the right gland: the fissure is situated between the preputium and scrotum.

2515. The prostatic and muscular parts of the urethra, penis, scrotum, anus and anal glands of a Viverrine quadruped. The muscular capsule of the anal glands is dissected and a portion removed from the left gland, through the excretory orifice of which a bristle is passed. A bristle is also placed in the termination of the urethra.

2515 A. One of the testes, with the urinary bladder, penis, and Cowper's glands of a Suricate (*Ryzæna tetradactyla*, ILLIG.). The epididymis is closely attached to the testis and is of large size, especially at its commencement, where it forms the enlargement called 'globus major'; the vas deferens is convoluted at its commencement, and sends off a short cæcal process, after which it is continued straight to the beginning of the urethra. The bladder and urethra are laid open. A section is removed from Cowper's gland on the left side, showing the large size of its component follicles; the duct of this gland is traced to the urethra, and laid open to show the longitudinal plicæ of its lining membrane; a bristle is inserted into the orifice of the duct of the opposite gland: the absence of a prostate and of the accessory glands called vesiculæ seminales, seems to be compensated by the great development of Cowper's glands, which nearly equal the testes in size. They have each a proper capsule of muscular fibres, and the secretion is forced along the ducts, to near the distal end of the urethra; posterior to the orifices of Cowper's glands the urethra is dilated into a cul de sac, which is separated from the muscular or membranous part of the canal by a transverse valvular fold. The penis is extremely short. *Presented by Mr. Owen.*

2515 B. The neck of the bladder, and commencement of the urethra, with the terminations of the ureters and vasa deferentia of a Bear (*Ursus Arctos*, LINN.). The vasa deferentia are injected with mercury to show the cellular or follicular structure of their terminal dilatations, which though in contact, are quite distinct from each other, both as to their cavities and proper substance: the continuation of the vas deferens beyond the dilated

part is at first wide, but contracts as it converges towards its fellow to terminate on the verumontanum.

Presented by Thomas Blizard, Esq., F.R.S.

2515 c. The glans and os penis of a Raccoon (*Procyon Lotor*, Storr.). The distal end of the ossicle is an expanded subcircular convex imperforate disc, which is simply covered with the skin of the glans, of which it forms the most prominent part: the erectile tissue of the glans and the urethral orifice are below the terminal disc. *Mus. Langstaff.*

2516. One of the testes of a Hyæna (*Hyæna vulgaris*, Cuv.), showing the large size of the epididymis, and its close connexion with the body of the gland.

2517. The testes, penis, and surrounding integuments of a Leopard (*Felis Leopardus*, Linn.). The right compartment of the scrotum is laid open, showing the testis and tunica vaginalis *in situ*: the commencement of the urethra is also exposed, and the course of the short penis traced to the thick tegumentary preputium, which is laid open to show the small glans.

2518. The penis of a Cat (*Felis Catus*, Linn.), showing the retroverted callous papillæ of the glans.

2519. The testes, penis, anus and anal glands, of an Otter (*Lutra vulgaris*, Linn.). The left compartment of the scrotum is laid open, showing the testes *in situ*, and the commencement of the canal leading from the tunica vaginalis to the abdomen. The long glans penis is exposed within the preputial sheath; the left anal follicle is laid open, showing its glandular and receptacular part, the former being placed around the excretory orifice.

2520. The lower part of the abdomen, with the male organs *in situ*, of a Porpesse (*Phocæna communis*, Cuv.). The left testis presents an elongated form, and is of small size, being in the unexcited condition; the vas deferens is short, but is convoluted in its course to the neck of the bladder. The right testis has been removed; a bristle is placed in the termination of the vas deferens; the prostatic part of the urethra is surrounded

with a remarkably strong capsule of muscular fibres, part of which are exposed on the right side. The right rudimental ischium, and right 'erector penis' arising therefrom, are shown; the penis, after the junction of the two corpora cavernosa, describes a close sigmoid curvature, before terminating in the long, straight, and gradually tapering glans. This, in the ordinary retracted state of the penis, is entirely withdrawn, as in the Otter and Seal, within the prepuce, so that, while the glans is protected from the sea water, no impediment is offered by a projecting penis to the course of the animal through the element which it inhabits. The 'retractor penis' of the right side is dissected.

2521. The corresponding parts of a young Porpesse, with the right kidney and testis *in situ*; the testicle lies just below the lobulated kidney; the epididymis is here shown; the strip of integument which includes the preputium has been reflected backwards with the rectum; the glans penis has been drawn out of the prepuce, and a section of the corpus cavernosum penis has been made. A bristle is inserted into the artery entering the right crus.

2522. The male organs, with the urinary bladder and rectum, of a Porpesse, removed from the body. The preparation is partly suspended by the testes, which are connected with the posterior surface of the urinary bladder by two broad duplicatures of peritoneum, resembling the broad ligaments of the ovaria and uterus in the female. The epididymis is of an elongated triedral form, with the broadest facet connected by a duplicature of peritoneum to the testis; the connexion is close at the commencement, but gradually becomes looser, and, at the lower end of the testis, the connecting fold is half an inch broad. The convoluted part of the course of the vas deferens is here shown. The twisted penis, its retractor muscle, and the long and pointed glans are all well exhibited in this preparation.

2523. The bent portion of the penis of a Dolphin (*Delphinus Tursio*, Fabr.), showing the form and extent of the curvature of the penis in its retracted state, together with portions of the two retractor muscles.

2524. A section of the penis, including the elongated glans, of a Dolphin. On the cut surface may be seen the single corpus cavernosum which composes the body of the penis; it is remarkable for the thickness of its fibrous sheath, which equals that of the contained erectile tissue.

2525. A portion of the convoluted vas deferens of a Whale; the thickness of the parietes of the duct varies from one fourth to one sixth of an inch: the surface of the lining membrane is smooth.

2526. The terminations of the vasa deferentia, and a portion of the urethra, of a Whale, showing the semilunar fold within which the ducts open. The vasa deferentia are slightly dilated, and their inner surface is honeycombed.

2527. A transverse section of the penis of a Whale. This preparation shows the body of the penis to consist, as in the Porpesse, of a single corpus cavernosum, grooved above for the lodgment of the vena dorsalis, and more deeply excavated below for the passage of the urethra and the surrounding vascular structure. This structure, representing the corpus spongiosum, is principally placed on the lower and lateral parts of the canal, and exhibits in the transverse section chiefly the areas of large divided veins. The fibrous sheath of the corpus cavernosum is of great thickness; the substance which it incloses is principally composed of decussating bands of glistening ligamentous substances intercepting small meshes or interspaces which are occupied by blood vessels.

The following is Mr. Hunter's description of the male organs of generation in the Whale tribe:

"The parts of generation in both sexes of this order of animals come nearer in form to those of the ruminating than of any others; and this similarity is, perhaps, more remarkable in the female than in the male; for their situation in the male must vary on account of external form, as was before observed.

"The testicles retain the situation in which they were formed, as in those quadrupeds in which they never come down into the scrotum. They are situated near the lower part of the abdomen, one on each side,

upon the two great depressors of the tail. At this part of the abdomen, the testicles come in contact with the abdominal muscles anteriorly.

" The vasa deferentia pass directly from the epididymis behind the bladder, or between it and the rectum, into the urethra; and there are no bags similar to those called vesiculæ seminales in certain other animals.

" The structure of the penis is nearly the same in them all, and formed much upon the principle of the quadruped. It is made up of two crura, uniting into one corpus cavernosum, and the corpus spongiosum seems first to enter the corpus cavernosum; in the Porpoise, at least, the urethra is found nearly in the centre of the corpus cavernosum; but towards the glans seems to separate or emerge from it, and becoming a distinct spongy body, runs along its under surface, as in quadrupeds. The corpus cavernosum in some is broader from the upper part to the lower than from side to side; but in the Porpoise has the appearance of being round, becoming smaller forwards, so as to terminate almost in a point some distance from the end of the penis. The glans does not spread out as in many quadrupeds, but seems to be merely a plexus of veins covering the anterior end of the penis, yet it is extended a good way further on, and is in some no more than one vein deep.

" The crura penis are attached to two bones, which are nearly in the same situation and in the same part of the pelvis as those to which the penis is attached in quadrupeds; but these bones are only for the insertion of the crura, and not for the support of any other part like the pelvis in those animals which have posterior extremities, neither do they meet at the fore part, or join the vertebræ of the back.

" The erectores penis are very strong muscles, having an origin and insertion similar to those of the human subject.

" The acceleratores muscles are likewise very strong; and there is a strong and long muscle, arising from the anus, and passing forwards to the bulb of the penis that runs along the under surface of the urethra, and is at last lost or inserted in the corpus spongiosum. This muscle draws the penis into the prepuce, and throws that part of the penis that

is behind its insertion into a serpentine form. It is common to most animals that draw back the penis into what is called the sheath, and may be called the retractor penis."

Hunter on Whales, Phil. Trans., lxxvii, 1787, *p.* 441.

2527 A. The distal extremity of the penis of a young Dugong (*Halicore Indicus*, Cuv.). The animal measured eight feet in length; the penis, from the bulb to the glans, one foot fourteen inches. The preputial integument reflected over the glans contains, as in the true Cetaceans (see No. 2520.), a layer of rete mucosum; but the glans terminates in an enlargement, consisting of two lateral semilunar lobes or prominences, including a conical process with the apex turned forwards, upon which the urethra opens. All the integument covering the glans presents numerous and deep rugæ, indicative of the great capacity for expansion in this part of the organ. On the cut surface of the penis there may be observed a marked deviation from the cetaceous structure of the same organ, and an approach to that which the Pachydermata and some other mammalia exhibit, viz. a division of the corpus cavernosum into two lateral portions by a middle ligamentous septum; the vascular and erectile tissue also bears a greater proportion to the surrounding ligamentous structure than in the true Cetaceans. *Presented by Sir Stamford Raffles.*

2527 B. The distal extremity of the penis of the Sumatran Tapir (*Tapirus Indicus*, Cuv.). The upper and lateral parts of the base of the glans present three rounded processes, beyond which the extremity of the glans is continued forwards, and terminates in a large truncate, slightly convex, surface, in the middle of which is situated the orifice of the urethra.

Presented by Sir Stamford Raffles.

2528. A transverse section of the penis of a young Elephant (*Elephas Indicus*, Cuv.). The corpus cavernosum presents in this view a reniform figure, with the corpus spongiosum and urethra occupying the concavity; the external ligamentous substance increases in thickness as it approaches the urethra, and, dividing at that part, sends a portion over the upper surface of the canal between the spongy and cavernous bodies, and a thicker portion below the urethra. The corpus cavernosum is divided

into two lateral moieties by a thick vertical ligamentous partition; and similar but thinner septa subdivide the lateral parts by extending between the fibrous capsule of the corpus spongiosum and the external sheath. The vessels of the erectile tissue of the corpus cavernosum are surrounded by the soft substance which Mr. Hunter describes as muscular in the Horse.

2529. One of the accessory glandular organs of the male apparatus commonly called 'vesiculæ seminales,' and the true seminal bladder, or reservoir, of the Elephant. The glandular vesicula is of an elongated form, becoming smaller towards the anterior or closed extremity, which is divided by a constriction or septum from the general cavity, with which it communicates by means of a small canal. The parietes of the glandular vesicula are thickest at the blind end, and the internal surface is here most broken and increased by the presence of columnar processes of the internal membrane, which project into the cavity, and decussate each other: the interspaces of these columns extend in many parts, like sinuses, deep into the substance of the parietes of the vesicula: towards the urethra these parietes become thinner and smoother. The external coat of the vesicula presents a fibrous structure. A part of the muscle is shown which is expressly adapted to empty the glandular vesiculæ in the Elephant. A few inches of the termination of the tortuous vas deferens are preserved; this duct opens on a papillary eminence in the fundus of a large pyriform sac, of which a section has been removed to show the thinness and smooth internal surface of its parietes.

2530. A portion of one of the accessory glands of the male generative apparatus of an Elephant.

2531. A portion of the neck of the bladder and urethra of an Elephant, showing the orifices of the true seminal reservoirs, as well as those of the glandular vesiculæ, and of the prostatic glands. The two large orifices are those of the glandular vesiculæ; the large black bristles are inserted into the terminal dilatations of the vasa deferentia; the smaller bristles are placed in the ducts of the prostate.

2532. One of the testes of a Peccari (*Dicotyles torquatus*, Cuv.). These glands are of unequal size; the present is the largest, and shows the epididymis to be considerably developed; this part is closely attached to the whole length of the testis, and the extremity from which the vas deferens is continued is bent upon itself.

2533. The smaller testis of the same Peccari; it has been laid open, showing the small corpus Highmorianum, or cellular substance to which the tubuli testis converge, situated near the upper third of the testis, and extending deep into its substance.

2534. The bladder and muscular part of the urethra, with the prostate, Cowper's glands, and one of the vesicular glands of a Peccari. The gland commonly called vesicula seminalis is a very large and lobulated parenchymatous body, the duct of which terminates by an opening distinct from that of the vas deferens in the urethra. The vasa deferentia and ureters are included in a lateral fold of the peritoneum continued from the side of the bladder. The prostate is a small glandular body situated near the cervix of the great vesicula. The muscular part of the urethra is of great length, and Cowper's glands are proportionally developed; they are of an elongated subtriquetral figure, surrounded with a proper capsule of muscular fibres; the one on the left side has been laid open, showing the thickness of its glandular parietes, and the numerous sinuses in its substance which receive the secretion from the component follicles and convey it to the central cavity. Bristles are inserted into the ducts of these glands, which terminate beyond a transverse valvular fold of the lining membrane of the urethra.

2535. The large accessory generative gland, called vesicula seminalis, of a Peccari, with its lobes partially unravelled, and the secerning cæca injected with size and vermilion from the excretory duct.

2536. This preparation is described in the original manuscript catalogue as 'the testis of a Boar, which had the epididymis taken off.' The testis is much diminished in size. The straight portion of the vas deferens is reduced to very small dimensions, but the convoluted part next the testis retains its

usual size, having been probably distended with its own secretion; it is here injected with quicksilver.

2537. The muscular and bulbous parts of the urethra, with the prostatic and Cowperian glands, the terminations of the vasa deferentia, and the ducts of the glandular vesiculæ; the latter are indicated by the insertion of large black bristles; the vasa deferentia and prostatic ducts have yellow bristles passed into them. The whole length of the muscular part of the urethra is laid open; the glands of Cowper present the same structure and extraordinary development as in the Peccari: the one on the right side has its muscular and aponeurotic investment dissected; that on the left side has its cavity exposed, and the thickness and follicular structure of its glandular parietes displayed by the removal of a lateral section. The cul de sac in the bulb of the urethra in which the ducts of the preceding glands terminate, and the valvular fold separating this cul de sac from the muscular part of the canal are well displayed in this preparation.

2538. One of the glandular vesiculæ of a Boar, laid open to show the follicular structure of its parenchyma.

2539. A section of one of the glandular vesiculæ of a Boar, showing the principal ramifications of the duct through the substance of the gland.

2540. The bladder and penis, with the accessory glandular organs of generation of a Hog. The vesiculæ seminales present a comparatively small size; but the glands of Cowper are proportionally more developed than in the Boar, extending the whole length of the muscular part of the urethra. Their muscular capsule and cellular structure are well displayed. The bulb of the urethra is comparatively small, and the surrounding muscle or ejaculator seminis much atrophied, the erectores penis are also smaller than in the Boar. The penis makes a sigmoid flexure, as in the Porpesse, and the last bend is similarly provided with a pair of muscles for its retraction; the insertions only of these muscles are here shown.

2541. The preputial follicles and part of the penis of a Boar.

2542. A similar preparation, showing the triquetral, elongated, pointed glans

bent backwards in its retracted state towards the anus. One of the large preputial follicles is laid open.

2543. A portion of a young Pig, injected, to show the relative positions of the anal and preputial openings.

2544. The urinary bladder, and muscular part of the urethra, with the dilated extremities of the vasa deferentia, the vesiculæ seminales, prostatic glands, and Cowper's glands, of a Zebra (*Equus Zebra*, Linn.). The dilated terminations of the vesiculæ seminales are not simple reservoirs as in the Elephant, but are occupied by numerous close-set glandular lamellæ, with the passage from the duct above continued through their centre : a longitudinal section has been removed from the left dilatation showing this structure. The corresponding lobe of the prostate is cleft longitudinally to show the nature of its parenchyma, and the contracted canal by which the dilated vas deferens terminates in the urethra. The vesiculæ seminales are here of large size, and present the condition of simple bladders with thin parietes. Between the large vesiculæ and the urinary bladder there is a transverse fold of peritoneum connecting the vasa deferentia with each other; and the middle of this fold is occupied by a third narrow elongated vesicula, bifid at its upper or blind extremity. The urethra is laid open to show the excretory orifices of the glands and vesicles above described; and at the termination of the muscular part of the canal may be seen the two large Cowper's glands, each having its proper investment of muscular fibres; a section has been removed from the left gland showing its structure.

Mr. Hunter describes and comments on the various structures which the so-called vesiculæ seminales present in the previous preparations in the following words:

"These vesiculæ are not similar either in shape or contents in any two genera of animals which I have dissected; and they differ more in size, according to the bulk of the animal, than any other parts whose uses in different animals are supposed to correspond; while the semen in most of those which I have examined, may be said to be similar.

"The resemblance which obtains between these bags and the gall-

bladder, in the human subject, by no means holds equally good when applied to other animals. In the horse they are like two small urinary bladders, almost loose and pendulous, with a partial coat from the peritonæum, under which there are two layers of muscular fibres; they are thicker in their coats at the fundus than any other part, and appear there to be glandular. Their openings into the urethra are very large; and although they open close to the vasa deferentia, do not communicate with them. The septum between the two ducts is not continued on quite to the urethra, so that they cannot, in strict language, be said to enter that passage separately; but there is not length of common duct sufficient to admit of regurgitation from the vasa deferentia into these bags. They are not of the same size in the gelding and in the stone-horse, being large in the last. Their contents in both are exactly similar, and nearly equal in quantity; but in no way resembling the semen emitted by the stone-horse in the coitus, or what is found in the vas deferens after death.

" In the boar, these bags are extremely large, and divided into cells of a considerable size; or they may more properly be said to form ramifications closely connected with one another, and having a large canal or duct common to the whole. The ducts contain a whitish fluid, very unlike what is found in the vasa deferentia of the same animal, with which they have not the least communication.

" In the rat, the bags are large and flat, with serrated edges, and lie some way within the abdomen, containing a thick ash-coloured mucus, nearly of the consistence of soft cheese; very different from what is found in the vasa deferentia of the same animal, with which they do not communicate.

" In the beaver, the bags are convoluted; their ducts have no communication with the vasa deferentia; but both the one and the other open on the verumontanum.

" In the guinea-pig, they are composed of long cylindrical tubes, and lie in the cavity of the belly; are smooth on their external surface, and do not communicate with the vasa deferentia. They contain a thick bluish transparent substance, which is softest near the fundus, and be-

comes firmer towards the openings into the urethra, where it is as solid as common cheese. From this circumstance, and what is observed in the horse, the fundus appears to be the part that secretes this substance, which is very different in colour and consistence from the contents of the vasa deferentia, and is often found in broken pieces in the urethra.

" To be more certain that the substance contained in these bags was not the secretion of the testicle, I extracted one of the testicles of a guinea-pig, and six months afterwards gave it the female. As soon as the action of copulation was over, (in which all the parts containing semen should naturally have emptied themselves) I killed the animal, and upon examination found the vesicula of the perfect side, and that of the side from which the testicle had been removed, both filled with a substance in every respect similar. It will scarcely be alleged that this substance had been contained in the bag before the extirpation of the testicle; nor could it be semen, which must have been all thrown out in the previous connection with the female.

" To ascertain that the contents of the vesiculæ are not discharged into the vagina of the female, with the semen, in the act of emission, I killed a female guinea-pig as soon as the male had left her, and examined with attention what was contained in the vagina and uterus; in neither could I find any of the mucus of the vesiculæ; which, from its firmness, must have been easily detected.

" In the hedge-hog, these bags are very large, being more than twice the size of the vesiculæ in the human subject.

" Many animals have no such bags; and I believe they are wanting in the greater part of that class which lives chiefly upon animal food: they are, however, to be found in some of them; and the hedge-hog is an example. There is no apparent difference in the testicles, vasa deferentia, or semen of the animals which have vesiculæ and of those which have none; and the mode of copulation, as far as these bags can be concerned, is very similar in both.

" In birds, as far as I have yet observed, there is nothing analogous to these bags; and yet there appears to be no difference between the mode of copulation of the drake and the bull, or ram. It is very natural to

suppose, that if the vesiculæ were reservoirs of semen, they would be more necessary in birds; who have the power of repeating the act of copulation in an infinitely greater degree than quadrupeds: and indeed we find that in birds there are reservoirs, which may account for this power; the vasa deferentia being enlarged just before they open into the rectum, probably to answer that intention. As birds have no urethra, some having merely a groove, as the drake and gander; and many being even without a groove, as the common fowl, it was absolutely necessary there should be such a reservoir somewhere; and the necessity of this will appear more evidently by and by.

"What I have observed of the reservoir of birds, is equally applicable to amphibious animals, and to that order of fish called rays.

"From the above observations I think we may fairly conclude, that these vesiculæ are not for the purpose of containing semen; the single circumstance of their ducts being united to those of the testicles in the human subject not appearing sufficient to set aside the many facts which are contradictory to such an opinion." *Animal Œconomy*, p. 38.

2545. The dilated termination of the vas deferens of some large Quadruped, exhibiting a lamellated structure similar to that of the Zebra: the fundus of a cul-de-sac, traversed by the vas deferens, is also preserved.

2546. A portion of the dilated and glandular extremity of the vas deferens of a Horse (*Equus Caballus*, Linn.); a longitudinal section has been removed, showing the lamellated structure of the thickened parietes, and the pores by which the secretion passes from their interstices into the central cavity of this part of the duct.

2547. A part of the longitudinal section of the glandular parietes of the vas deferens, removed from the preceding preparation.

2548. A transverse section of the terminal glandular part of the vas deferens of a Horse.

2549. A longitudinal section of the corpus cavernosum penis of a Horse; this is not divided by a longitudinal vertical ligamentous septum, as in the Elephant, but consists of one body formed by the confluence of the two

crura of the penis. The vascular substance is traversed throughout by transverse ligamentous bands, and by longitudinal fibres of a soft substance, regarded by Hunter as muscular, and which are interwoven in an undulatory course with the ligamentous bands throughout the corpus cavernosum. Mr. Hunter alludes to this structure in the following passage of his 'Animal Œconomy': "The cells of the corpora cavernosa are muscular, although no such appearance is to be observed in men: for the penis is not at all times equally distended. In the Horse the parts composing the cells of the penis appear evidently muscular to the eye; and in a Horse just killed they contract upon being stimulated." p. 43.

2550. A section of the corpus spongiosum surrounding the urethra of an Ass (*Equus Asinus*, Linn.), showing the longitudinal course of the plexus of veins which chiefly composes that part.

2551. The penis of a Foal, showing the form of the glans, which consists of two lateral tumid semilunar lobes, and a central pyramidal process, on the apex of which the urethra terminates. The prepuce is inverted, and bristles are inserted into the ducts of the rudimental mammæ, which, from their peculiar position, remained long undiscovered in the Horse.

2552. The neck of the bladder, muscular part of the urethra, prostatic and Cowperian glands of a Camel (*Camelus Bactrianus*, Linn.). The vasa deferentia are of large size; they have been laid open near their terminations, and show that their structure is not modified at this part as in the Horse, or different from the previous part of the duct; bristles are inserted into their terminations on the wide and wrinkled verumontanum. There are no vesiculæ seminales. The prostate gland is a transversely oblong compact body, with a smooth exterior; bristles are inserted into some of its excretory ducts. The muscular part of the urethra is long, and the stratum of fibres surrounding it remarkably thick. The left gland of Cowper is divided longitudinally to show its compact texture, and the thickness of its muscular sheath.

2553. The corresponding parts of another Camel, with a portion of the intestinum rectum attached, apparently from a younger animal; the muscular part of the urethra is much smaller. Bristles are placed in the ureters.

2554. The glans penis and prepuce, injected, of a Camel. The prepuce is laid open, showing the elongated pointed form of the glans, the extremity of which is continued beyond the urethral orifice, and is bent back upon itself.

2555. Two specimens of the urinary bladder, penis, and accessory male organs of generation from the two trunks of a Double-bodied Sheep. Each specimen has been carefully dissected, and the parts themselves present the natural structure, but differ in their degree of development. In the larger specimen, one of the vasa deferentia has been laid open near its termination, to show its glandular structure: the lining membrane is produced in transverse folds. The prostate gland is here divided into two lobes, placed in the ordinary situation of the vesicular glands. The muscular part of the urethra is laid open to show the valvular verumontanum, the fossæ of which, directed forwards, contain and defend the orifices of the vasa deferentia and prostatic ducts. Cowper's glands are situated at the beginning of the bulbous part of the urethra, and are surrounded, as in the Camel, by a strong capsule of muscular fibres. The penis is slender, but of considerable length, and is bent in a sigmoid form when in a state of retraction. The pair of muscles which produce this state are here shown. They arise from the anterior commissure of the sphincter ani, pass along the under surface of the bulb of the urethra, where they are included in a sheath of muscular fibres, and then diverge to be continued along the sides of the penis to the base of the glans, where they are lost in the external ligamentous sheath of the corpus cavernosum penis.

2556. The terminations of the vasa deferentia, prostatic glands, and contiguous parts of the bladder and urethra of a Goat (*Capra Hircus*, Linn.). The structure of the dilated and glandular part of the left vas deferens is exposed by a longitudinal section, showing the external fibrous and internal glandular coats of the ducts. Fine injection of size and vermilion has been thrown into the duct of the left prostate, and has penetrated to the terminal secerning follicles. The right gland has had a longitudinal section removed from it to expose the central cavity in which the parietal

follicles terminate. The verumontanum is occupied by two oblong depressions, placed side by side, each of which receives the separate terminations of the vas deferens and duct of the prostate of its own side.

2557. The corresponding parts of the Zebu (*Bos Indicus*, var. *minor*, Linn.). The prostatic glands here present a more elongated tubular form than in the Goat, and are contorted in an irregularly undulating manner ; part of the parietes of the right prostate has been cut away to show the secerning follicles: a section has also been removed from the corresponding vas deferens, showing the thickened glandular and fibrous coats of the dilated terminal part of the gut. A black bristle is inserted into the orifice of the right vas deferens, and a white one into the orifice of the duct of the corresponding prostatic gland, showing their situation close to each other within the corresponding lateral depression of the verumontanum.

2558. The neck of the bladder, with the dilated terminations of the vasa deferentia and the prostate glands of a Bull (*Bos Taurus*, Linn.). The left vas deferens has been laid open, showing the thickening of the parietes, dilatation of the cavity, and extension of the secreting surface of this part of the duct. The windings and branches of the duct and cavity of the prostate are also shown on the corresponding side.

2559. The corresponding parts of an Ox, showing the atrophied condition of the prostatic glands, and the contracted, but still pervious state of the vasa deferentia. The verumontanum is of large size, and the lateral fossæ, receiving the vasa deferentia and ducts of the prostate, are relatively deeper than in the Goat.

2560. The testicle of an Armadillo (*Dasypus novem-cinctus*, Linn., *Tatusia Peba*, F. Cuv.). It is preserved chiefly to show the great length of the epididymis.

2561. The testicle of an Armadillo, with the tunica albuginea reflected from one side, to show the narrow and oblique folds in which the large secerning tubuli testis are disposed on the superficies of the substance of the gland.

2562. The opposite testis of the same Armadillo, with the tubular structure of the testis displaced from the capsule, and partially unravelled.

2562 A. The male organs of generation *in situ* of the Weasel-headed Armadillo (*Dasypus sex-cinctus*, Linn.). The testes are situated within the abdomen, at the side of the bladder, just above the brim of the pelvis. The vasa deferentia are very short, and without the convolutions which they present in most other Testiconda. They penetrate the substance of a single triangular prostate, which has been divided to show their passage towards the urethra. There are no vesiculæ seminales. The two glands of Cowper are situated immediately behind the enlarged bulb; one of them has been laid open, showing its muscular capsule and dense glandular structure; a bristle is passed through its duct to show the place of its termination. The erector penis and right crus are preserved, attached to the ischium: the ejaculator seminis, or accelerator urinæ, and bulb of the urethra, are cleft longitudinally. There are also two levatores penis, or compressores venæ dorsalis, which arise, as in the Rodentia, from the symphysis pubis, and run along the dorsum penis to be inserted into the glans; a bristle is inserted beneath the right levator muscle. The preputial sheath is of great extent, and the reflected membrane has a layer of dark rete mucosum. The penis is of considerable proportionate length, as in all copulative animals in which either the form of the body, the condition of the prehensile extremities, or the nature of the integuments, impose unusual mechanical obstacles to coition. The Hedgehog (No. 2512.), the Porpesse (No. 2520.), and the Tortoise (No. 2452.), in the present series of preparations illustrate this compensatory relation.

Prepared by Mr. Owen.

2563. The male organs of generation of the Great Jerboa (*Helamys capensis*, Cuv.). The right testicle is protruded from the abdomen through the external ring into the tunica vaginalis and cremasteric pouch, which passes down to a scrotum situated posterior to the anal aperture. The left testis has been retracted, and the tunica vaginalis and cremaster have been inverted. The vesiculæ seminales consist of long slightly sacculated pendulous bags, with thin parietes. The prostatic follicles are numerous, short, and thick. The penis is suddenly bent at right angles midway between the crura and the glans: the latter is shaped like a cone, with the base terminal, somewhat concave, and perforated by a subcentral urethral aperture.

2564. The bladder, penis, vesicular and prostatic glands of the Slender Lemur (*Stenops gracilis*, Illig.). The vesiculæ are simple oval subcompressed bags, with the lining membrane honey-combed: that on the left side is laid open through its whole extent, and a bristle is passed through the corresponding vas deferens, showing their separate terminations in the urcthra. The prostate is bifid at its upper part. The penis is very short; it contains a bone, of which the distal end makes a projection in the middle of the glans.

2565. The testes and penis, said to be in the manuscript catalogue, 'of a Lori,' or Slow Lemur (*Stenops tardigradus*, Ill.)

2566. Thc urinary bladder and accessory organs of generation of a 'Mocock' (*Lemur Macauco*, Linn.). The vesiculæ seminales consist each of an elongated cæcal tube, bent inwards and reflected downwards at its free extremity; their parietes are very thin, the cavity capacious, and the lining membrane puckered up into minute rugæ. The prostatic gland is bilobed as in the Ruminants; each lobe is rounded, elongated, and situated by the side of the neck of the bladder. Cowper's glands are elongated compressed bodies, invested with a capsule of muscular fibres; they are of large proportional size. The ejaculatores seminis, and erector penis of the right side, are preserved; the left erector has been dissected away to show the form of the crus which it surrounded; but the muscles of most interest in the present preparation are those which are analogous to the muscles termed 'transversalis penis' by Douglas, in the Dog; and which are mainly subservient to the erection of the penis by compressing the venæ dorsalis penis. These veins have here been injected with size and vermilion; they are two in number, and converge, as they pass backwards from the glans, towards the dorsum penis, gliding beneath the compressor muscles, so as in the contraction of those muscles to be compressed between them and the ligamentous sheath of the corpus cavernosum. Each compressor muscle takes its origin from the upper part of the crus penis; they converge towards each other as they pass forwards, and terminate in a tendon which runs along the dorsum penis to be inserted into the bone of the glans. The glans penis is of large size, and

gradually expands towards its anterior end, which is truncate; the urethra terminating near the centre of the disc. The sides of the glans are beset with small horny papillæ.

2567. The bladder, vesiculæ seminales, and prostate of the Satyr (*Papio Maimon*, Cuv.). The vesiculæ are of very large size and complicated structure; one of them is unravelled; it consists essentially of numerous cæca, which terminate the subdivisions of branches given off from one main central duct.

2568. A portion of the pubic integument with the prepuce and glans penis of the same animal. The glans is traversed by a longitudinal fissure, which gives it a subbilobate form.

2568 A. The bladder, penis, and accessory glandular organs of generation of a Baboon (*Macacus Cynomolgus*, Cuv.). The large and complicated vesicular glands and the vasa deferentia are reflected down from the bladder to show the portion of the prostate gland which intervenes between the ducts of the above parts and the neck of the bladder, and which corresponds with what has been called the third lobe of the prostate in man. The entire prostate, and both Cowper's glands, are displayed. The acceleratores muscles surrounding the bulb do not advance between the erectores penis; these arise from the commencement or crus of the corpus cavernosum, and not from the ischium; two small compressores venæ dorsalis also arise from the upper part of the crus, and converge to terminate in a tendon which is inserted into the os penis, here exposed *in situ*. *Prepared by Mr. Owen.*

2569. The bladder and part of the penis, with the accessory male glands of a Baboon (*Cynocephali species*). The lobulated vesiculæ and prostate here present a relatively large size: the latter is also partially subdivided into smaller lobes. The muscular part of the urethra is short and wide; Cowper's glands are seen applied to the posterior part of the bulb of the urethra. The ejaculator or accelerator muscles surrounding this part of the urethra are powerfully developed; at the anterior terminations of these are seen the origins of the muscles which compress the vena dorsalis, analogous to those displayed in the Lemur (No. 2566.).

The erectores penis are here evidently attached entirely to the crus penis; in the lower interspace of these muscles the spongy part of the urethra is situated, the bulb and its compressor muscles being wholly posterior to the crura penis.

2569 A. The testes and penis of the Dog-faced Baboon. The testes are not suspended in a pendulous scrotum, but are placed by the sides of the penis, making a slight projection externally: the orifices of the canals of communication between the tunica vaginalis and peritoneum are shown. The prepuce is reflected back from the elongated glans, showing the absence of the *frænum præputii*; and the glans is dissected to show the bone which it contains. *Prepared by Mr. Clift.*

2570. The vesiculæ seminales and terminations of the vasa deferentia of a Monkey; the branches of one of the vesiculæ have been unravelled.

2571. The urinary bladder, vesiculæ seminales, and prostate of a Monkey (*Macaci species*), showing the angular form of the elongated vesiculæ, and their broad flat surface which is applied to the rectum. The bladder is laid open, and the muscular fibres which surround the terminations of the ureters, and converge to be inserted into the verumontanum, are shown.

2572. The corresponding parts 'of a Monkey,' in which the vesiculæ seminales are divaricated to show the dilated terminations of the vasa deferentia; the one on the right side is laid open to show the transverse rugæ of the lining membrane. Bristles are inserted into the orifices of the ureters, vasa deferentia, and right vesicula seminalis. The muscular part of the urethra is dilated into a kind of cul-de-sac immediately behind the verumontanum, both in the present and preceding preparation.

2573. The integuments covering the os pubis and nates, with the penis, scrotum, and anus of the Chimpanzee (*Troglodytes niger*, Geoff.). The glans penis is partially protruded from the prepuce, showing that there is no *frænum præputii*.

2574. A Human testicle, with part of the spermatic chord and the tunica vaginalis laid open, showing that the serous covering of the testis, derived

originally from the peritoneum, is a shut sac; the canal of communication being wholly obliterated.

2575. A transverse section of the Human testis, and tunica vaginalis, showing the line of reflection of the serous layer of that tunic, upon the epididymis and body of the testis.

2576. A Human testicle injected, showing partial adhesion of the opposite serous surfaces of the tunica vaginalis to have taken place in consequence of inflammation.

2577. A Human testicle, with the tunica albuginea laid open and inverted, and the tubuli testis unravelled.

2578. A Human testicle, with the tubuli testis, rete testis, part of the vasa efferentia, and epididymis injected with mercury. The tunica albuginea has been laid open, and the elongated packets in which the convoluted tubuli testis are disposed are well displayed. These packets converge to a line of condensed cellular tissue attached to the inner surface of the tunica albuginea, and forming the *corpus highmorianum*: in passing through this substance the tubuli unite and form the 'rete testis:' the vasa efferentia are continued from the upper extremity of the rete testis, and diverge as they pass into the globus major of the epididymis: their course is at first straight ('vasa recta'), then gradually wavy, and convoluted; the body so formed (conus vasculosus) enlarging as it recedes from the testis: a few only of the vasa efferentia are here injected.

2578 A. A Human testicle, with the tubuli testis, epididymis and vas deferens injected with mercury, and in which all the vasa efferentia have been filled. *Presented by Sir William Blizard, F.R.S.*

2578 B. A Human testis, with the vas deferens, epididymis, vasa efferentia, and a small portion of the rete and the secerning tubular apparatus of the testis injected with mercury. "This testicle was injected by Dr. William Hunter, in the year 1752, in the presence of Mr. Galhie of Spital-square, and is mentioned in Dr. Hunter's Medical Commentaries. It was given by Mr. Galhie to Dr. Langmore." Note accompanying the preparation. *Presented by Dr. William Langmore.*

The passage in the Medical Commentaries relating to the above specimen is as follows:

"About the beginning of November, 1752, in presence of Mr. Galhie, and some others, I injected the vas deferens in the Human body with mercury, and by that method filled the whole epididymis, and the tubes that come out from the body of the testis to form it: and observed, in this operation, that the mercury continued to run, and the body of the testis to become gradually more turgid and heavy, for some time after the external parts were completely filled. I showed this preparation next night at my public lecture, said that I believed we should find the internal tubuli likewise filled, but that I would not venture to open it, till I had got another, lest I should spoil what was already a valuable preparation, and desired my brother to lose no opportunity of making the trial.

"In some such time as a week or a fortnight after this first public demonstration, my brother made the trial and succeeded. He showed me the testis opened, and the tubular internal substance very generally filled with mercury." (As, for example, in No. 2578.). "This preparation, which I still preserve, I showed at my public lecture, that very evening, with marks of being pleased with the discovery. In my next course of lectures, viz. Feb., &c., 1753, and in every course since that time, I have shown the same, and some other preparations of the same kind; and always gave the history of the discovery, to avoid taking that share of it from my brother which belonged to him.

"Mr. Galhie, of Spital Square, Surgeon, the gentleman above mentioned, in the account he gives me under his hand, says:

"'Having made no memorandum of the testis in which your brother had filled the internal tubes with mercury, I cannot be positive as to the precise time it appeared at lectures; I remember, indeed, that the preparation was made within a few weeks after you had injected the first testis; and, as it was shown to the pupils the same evening it was finished, it must, without doubt, have been publicly demonstrated sometime in the Autumn Course, 1752.

"'Spital Square, Nov. 24, 1758. R. Galhie.'"

Dr. Wm. Hunter's Medical Commentaries, Pt. I. p. 1., 1762.

From the preceding account it is probable that Dr. William Hunter having obtained a perfectly injected testicle from his brother John, no longer scrupled to open the one he had himself attempted to inject; and finding that he had failed to demonstrate the structure which his brother had succeeded in displaying, he gave away his imperfect specimen to his zealous pupil Mr. Galhie. The present specimen, and No. 2578, may therefore be regarded as types of the respective shares which the two Hunters had in demonstrating by mercurial injections the tubular structure of the Human testicle.

2578 c. A Human testicle, with the rete testis and epididymis injected with mercury: the modifications of the vasa efferentia to which the terms 'vasa recta' and 'coni vasculosi' are applied in Human Anatomy, are well displayed in this preparation.

Presented by Sir William Blizard, F.R.S.

2579. A Human testicle, with the epididymis and vasa efferentia, injected with mercury; the latter have been separated so as to display the globus major: the blood vessels of the chord have been filled with red injection.

2579 a. A Human testicle and spermatic chord, with the veins of the chord, forming the plexus pampiniformis, injected with mercury.

Presented by Sir William Blizard, F.R.S.

2580. The terminations of the vasa deferentia, and the glands called 'vesiculæ seminales', of the Human subject; a longitudinal section has been made of each vesicula, showing the cavities of the different lobes or ramifications of that gland: the dilated termination of one of the vasa deferentia is similarly exposed, and the increase of the surface of the secerning membrane is shown; the communication of the vas deferens with the duct of the vesicula seminalis is clearly displayed, and the small size of the common canal, as compared with either of its constituents, may be observed.

2581. The terminations of the vasa deferentia, prostate gland, and vesiculæ seminales of the human subject attached to the posterior part of the bladder, injected with mercury, dried and preserved in oil of turpentine.

2582. The urinary bladder, terminations of the vasa deferentia, vesiculæ seminales, and prostate of a Man, in whom the right testicle had been extirpated; there is but little difference perceptible in the size of the vas deferens, but the right vesicula is rather smaller than the left; a small portion of its parietes has been removed to show the patent state of its component cæca.

2583. The corresponding parts of a Man in whom the left testis had been extirpated. The vas deferens of that side may be seen extending from an amorphous body, to which it had adhered after the operation, and gradually increasing in size as it approaches the neck of the vesicula seminalis: a portion of its parietes has been removed to show the cavity of the duct still patent at this part, and the terminal glandular part of the duct below has been preserved, probably distended with its own secretion: it is of an equal size to the corresponding part of the vas deferens on the opposite side, but becomes much smaller immediately before it joins the duct of the vesicula. There is here scarcely any difference perceptible in the size of the vesiculæ.

2583 A. The corresponding parts of a Man in whom the part of the prostate which lies between the united ducts of the testes and vesiculæ seminales and the neck of the bladder, and which has been called the third lobe of the prostate, exhibits a slight morbid abnormal increase of size: the vesiculæ seminales, by which the specimen is in part suspended, have been reflected forward to show this enlarged lobe. (See the figure of this Preparation, Philos. Trans. 1806, Pl. III. p. 204, where it is described as the natural structure of the gland.)

Presented by Sir Everard Home, Bart.

2584. The bladder, penis, and accessory glandular organs of generation of a Man. The termination of the right vas deferens, and the corresponding vesicular gland are laid open longitudinally: a section is removed from the anterior part of the urinary bladder and prostatic part of the urethra, showing in the former the orifices of the ureters, through which bristles protrude, and in the latter the longitudinal eminence, or verumontanum, upon which the united ducts of the testes and vesiculæ terminate: a bristle

is passed from the vas deferens through the orifice on the left side. The whole of the urethral canal is laid open from below, and a bristle is inserted into the orifice of one of the follicles which open into its upper part, showing the direction of the orifice. The structure of the bulb of the urethra is displayed by a longitudinal section. Cowper's glands are not preserved. The right division of the corpus cavernosum is laid open by a longitudinal section, and a great part of the erectile tissue removed to show the vertical ligamentous partition which separates it from the opposite division; many of the ligamentous fibres which traverse vertically the vascular tissue are also shown. The prepuce and integuments of the penis have been removed, with the exception of the smooth covering of the glans.

2585. The prostate gland and prostatic part of the urethra laid open to show the verumontanum, and the terminal orifices of the ducts of the testes and vasa deferentia, in which portions of bristles are placed.

2586. A section of the penis with the urethra laid open to show the terminations of the ducts of Cowper's glands.

2587. The termination of the penis, minutely injected, of a Man in whom circumcision or the removal of the prepuce has been performed, showing the slightly vascular, thickened, rugous and papillose condition of the integument covering the denuded glans. The urethra is laid open, showing the depression at its commencement called the navicular sinus.

2587 A. The corpora cavernosa penis injected, dried, and preserved in oil of turpentine; to show the arteriæ dorsales penis.

Presented by Sir William Blizard, F.R.S.

2587 B. The corresponding parts similarly prepared, but having longitudinal sections removed to show the arteriæ corporis cavernosi, and their larger ramifications. *Presented by Sir William Blizard, F.R.S.*

2587 C. A human penis, with the glans and vena dorsalis penis, injected with mercury, dried and preserved in oil of turpentine.

Presented by Sir William Blizard, F.R.S.

2588. The penis of a Child, in which one of the arteriæ dorsales is injected with size and vermilion, and the veins with mercury. The superficies of the corpus spongiosum urethræ and glans penis seems to consist wholly of a plexus of minute and slightly tortuous veins.

2588 A. The anterior part of a human penis, in which all the vessels are injected with mercury; the plexus of veins composing the glans penis is beautifully displayed. *Presented by William Lawrence, Esq., F.R.S.*

2588 B. A human penis, injected, and dissected to show the external forms of the corpus cavernosum, corpus spongiosum, and glans.
Presented by Sir William Blizard, F.R.S.

2589. The penis of a Negro, injected, with the prepuce reflected from the glans to show the rete mucosum and cuticle covering that body.

2590. The penis injected, with the scrotum and pubic integuments of a Negro.

2591. The penis injected, and scrotum of a Negro.
The two latter preparations are from a race characterized by the large size of the intromittent organ.

Series VII. Female Organs.

Subseries I.—*In Plants.*

2592. The female flower of a Cucumber (*Cucumis sativus*, Linn.), in which a portion of the corolla has been removed to display the trifid style, and the three bilobed stigmata; the cavity of the ovarium is also exposed.

2593. The termination of a twig of a female *Cliffortia cuneata*, with several flowers; these are chiefly remarkable for their long and pilose stigma.

2594. A larger branch of *Cliffortia cuneata*, with several female flowers.

2595. A portion of a branch of the Chestnut (*Castanea vesca*, Gært.), with several male and female flowers; the former are described in No. 2279; the latter are here seen to be sessile, and placed at the base of the catkins; having a calyx with five sepals, which are echinate, or support spinous processes, and protect three germens, with penicillate stigmata.

2595 A. A portion of a branch of the female Misletoe (*Viscum album*, Linn.) with several flowers; these are placed at the angle of the divergence of the leaves; the corolla is free, and presents four divisions or petals; the stigma is sessile and obtuse; the ovarium is adnate to the calyx.

Presented by Capt. Sir Everard Home, Bart., R.N.

2595 B. The termination of a branch of the female Rock-pine (*Pinus rupestris*), with two cones or aggregates of female flowers.

Presented by Sir Everard Home, Bart.

2. *In Entozoa.*

2596. A female Round-worm (*Ascaris lumbricoides*, Linn.), with the integuments removed from the dorsal parietes of the abdominal cavity and the female organs displaced and unravelled. The ovaria consist of two simple cæcal tubes, analogous in structure to the single testis of the male (No. 2324); each of these tubes commence by blind capillary extremities which are almost too minute to be discerned with the naked eye: these very gradually acquire an increased diameter during a convoluted course which exceeds the length of the entire worm about four times, and then they again diminish in size before being continued into a more suddenly dilated part of the tube, which is regarded as the uterus; this dilated portion equals the length of the entire worm, and in it the ova of this viviparous Entozoon are hatched. The uteri, or cornua uteri, unite together about one-third of an inch from the vulva, which is situated at the junction of the anterior and middle thirds of the body. A portion of bristle is placed behind the slightly tortuous vagina. The straight intestine is preserved *in situ*.

2597. An *Ascaris lumbricoides*, with part of the parietes of the abdomen removed and the two uteri displaced and unravelled; portions of bristle are inserted into the mouth and anus.

2598. An *Ascaris lumbricoides*, with part of the parietes of the abdomen removed, and the convolutions of the ovarian and uterine tubes displayed *in situ*.

2599. The ovarian and uterine tubes of an *Ascaris lumbricoides* removed from the body, and exhibiting their natural convoluted disposition.

2600. The female organs of an *Ascaris lumbricoides*, exhibiting an interesting variety of structure in having three equally developed uterine and ovarian tubes continued from a single vagina: the third or superadded tube communicates with the vagina about half an inch before its bifurcation into the ordinary uteri.

2600 A. A species of *Filaria*, with the abdominal cavity laid open and the ovarian and uterine tubes displaced and unravelled: the ovaria, as in the Ascaris, are of extreme tenuity at their commencement, but enlarge more quickly, and are of much less extent, not exceeding an eighth part of the length of the entire worm; they are defined, as in the Ascaris, by the attenuated portion of the canal which intervenes between them and the uteri; this portion, which may be compared to the oviduct or Fallopian tube, is here short and tortuous, and the diminution of size is well marked: the uterus begins quickly to enlarge, and is continued of uniform diameter, equalling in length the entire worm to near the anterior extremity of the body, where it unites with its fellow, and a short vagina leads to the vulval aperture, about three lines behind the mouth. The minute tube which runs parallel with the body is the alimentary canal. *Prepared by Mr. Owen.*

2600 B. A large *Filaria*, taken from the abdominal cavity of the *Rhea* or American Ostrich. The vulva is here situated close to the mouth, from which the vagina is continued for about an inch before dividing into the two uteri: these are continued from one extremity of the body to the other, and are then reflected forwards, surrounding the intestine with a few convolutions in different parts of their course. The capillary commencement of one of the ovaria is shown, the other is attached near the mouth; and the amber-coloured stomach has been divided and reflected upwards to bring this attachment into view.

Prepared by Mr. Owen.

2600 C. A female Intestinal worm (*Gnathostoma spinigerum*, Owen), taken from the stomach of a Tiger. The abdominal cavity is laid open, and the female organs are displaced and unravelled. The vulva is situated at the junction of the middle and posterior thirds of the body; the vagina is wide at its commencement near the vulva, then becomes narrower,

and lastly, again enlarges where it joins the uterine tubes; the dilated portions of these tubes are about five lines in length; beyond this part they diminish, and are continued, of capillary tenuity, to a length exceeding that of the body of the worm by thirty times; these remarkably developed ovarian canals are naturally disposed in masses of elongated coils by the side of the intestine. At the commencement of the alimentary canal may be observed some of the salivary cæca, which peculiarly characterize this genus of Entozoa.

Prepared by Mr. Owen.

2600 D. A worm from the lungs of a Porpesse, (*Strongylus inflexus*, Rudolphi), with the abdominal cavity laid open and the female organs displayed *in situ*. These differ remarkably from the corresponding organs in the genera *Ascaris*, *Filaria*, and *Gnathostoma*, in their relatively small extent and unconvoluted disposition. The ovarian tubes commence about the middle of the body, and run backwards for about the extent of an inch; then they suddenly become attenuated, and the short capillary duct is twisted upon itself and opens into the commencement of a wide uterine canal. The uteri in the anterior two-thirds of their course present a beaded structure, and are afterwards continued of uniform diameter to the anal extremity of the body; the young are developed in the uterine tubes.

Prepared by Mr. Owen.

2600 E. The female organs of a Strongylus (*Strongylus Gigas*, Rud.). In this species the generative tube is single. The convolutions of the ovarian portion have been unravelled, and it may be observed to be here and there partially distended with masses of ova; the uterine portion commences by a sudden dilatation, but is not separated from the ovarian tube by a constricted canal; it pursues a straight course of nearly four inches towards the anterior part of the body, and ends, as abruptly as it began, in the vaginal canal, which performs a slight convolution as it passes forwards to the vulva.

A portion of the integument and of the intestinal canal is preserved with the termination of the female organs.

Prepared by Mr. Owen.

3. *In Insects.*

2601. An unimpregnated female Silk-Moth, (*Bombyx Mori*, Fabr.). It differs from the male in having the teeth of the pectinated antennæ shorter, and the abdomen more rounded at the anal termination. The following is Mr. Hunter's description of the parts of generation.

" *Of the Female.*

" The female is larger in the belly than the male, but I believe this is owing to the vast number of eggs in the belly.

" *Of the External Parts.*

" The external parts, which includes the anus, is projected very much beyond the body of the animal, (more especially before she has had the male), which forms a rounded termination on each side of the opening, making a slit between, which is upwards and downwards,' (or vertical) ' on which there are a great many small hairs. Under the anus is a thin horny scale of some length, from side to side, concave on the upper surface, as it were, half surrounding the lower surface of the anus.

" *Of the Internal Parts of Generation.*

" The internal parts of generation consist, first, of eight oviducts, four on each side. These tubes are very small at their beginnings; so small as to seem to be united or arise from one part. As they pass from this union or origin, they become larger and larger, four going down on each side of the belly; each four at last unite into one tube near the anus, forming two ducts.

" These two tubes, formed by the union of the four tubes on each side, unite into one, which is continued to the termination of the tail, or what may be called anus, where it can be projected a little, forming two rounded lips which can be protruded: this is the common oviduct, or in appearance what might be called vagina.

" These eight oviducts are filled with eggs from one end to the other, which gradually become smaller towards the beginnings of the tubes, as

the tubes themselves become smaller; but at the time of laying they are all pretty well formed.

" Before this common tube, or what might be called vagina, lies a bag very much in shape like the bladder of urine in the quadrupeds, viz. of a pyramidal figure, which is fixed by its apex to the horny substance at the anus (mentioned in the description of the external parts), and opens externally. Near to the apex of this bag passes a very small duct which enters the common oviduct or vagina. Just above the oviduct, or between it and the rectum, is another bag, which is smaller, and of an irregular shape, terminating in a small end; its duct enters the oviduct, but not by a lateral communication as in the former.

" When these bags are examined before copulation, they are found perfectly empty, and when copulation has taken place they are found full of a semitransparent whitish mucus. Behind this, and on the side of these parts, are two long bags or canals, which at their extremities become small at once, and from thence goes out a small duct which divides into several. These smaller ones are coiled up on the lateral part of the above-described parts and anus. They would appear to unite just behind the former, and they open into the oviduct at the union of all these parts. This is filled, before copulation, with a transparent mucus. I am apt to suspect that the use of this last-described mucus is to give the sticking coat to the egg.

" The bag, or enlargement of the rectum, and the anus, lie above these described parts, and the opening of the anus is, I believe, in common with the oviduct." *Hunterian Manuscript Catalogue.*

2602. A female Silk-Moth, with the dorsal integuments of the abdomen removed, and the intestine and rectal dilatation turned down to show the parts of generation. The quadrifid ovarium is turned out entire on the right side: that on the left side has been removed, the better to display the large, sub-globular seminal reservoir, the accessory glandular sac, and the nidamental glands.

2603. A female Silk-moth, with the ventral parietes of the abdomen removed, giving an opposite view of the parts of generation, which are turned

down. The ovarian tubes and oviducts are empty, the eggs having been excluded.

2604. A female Silk-moth, with the dorsal parietes of the abdomen removed, and the intestine and rectal sac turned down, to show the seminal reservoir*, accessory cæcal gland, and oviducts. The ovaria have been removed.

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* Mr. Hunter makes the following observations relating to this bladder or reservoir in the Silk-worm, in his paper on Bees.

" Insects, respecting the males, are of two kinds: one when the male lives through the winter as well as the female; and the other, when every male of that species dies before the winter comes on; among which may be considered as a third, those where both male and female die the same year. Of the first I shall only give the common Fly as an instance; of the second I shall just mention all of the Bee-tribe; and the third may be illustrated in the Silk-worm moth. The mode of impregnation in the first is its being continued uninterruptedly through the whole period of laying eggs; while in the second the copulation is in store; and in the third the female lays up by the copulation a store of semen, although the male is alive. Of this I shall now give an explanation in the Silk-moth, which may be applied to the Bee, and many other insects.

" In dissecting the female parts in the Silk-moth, I discovered a bag lying on what may be called the vagina, or common oviduct, whose mouth or opening was external, but it had a canal of communication between it and the common oviduct. In dissecting these parts before copulation I found this bag empty, and when I dissected them after, I found it full. Suspecting this to contain the semen of the male, I immediately conceived the following experiment: I opened the female as soon as the male had united to her, and found the penis in the opening of this bag, and by opening the duct where the penis lay, I observed the semen lying on the end of the penis. In another I observed the bag to fill in the time of copulation; and in a pair that died in the act I found the penis in this passage.

" When we consider the impregnation of the egg in the Silk-worm, we may observe the following circumstances:

" First, many of the ova are completely formed, and covered with a hard shell before copulation; secondly, the animals are a vast while in the act of copulation; and thirdly, the bags at the anus are filled during the time of copulation. From the first observation it appears that the egg can receive the male influence through the hard or horny part of the shell. To know how far the whole or only a part of the eggs were impregnated by each copulation I made the following experiments. I took a female just emerged out of her cell, and put a male to her, and allowed them to be connected their full time. They were in copulation ten hours. I then put her into a box by herself, and when she laid her eggs, I numbered the different parcels as she laid them, viz. 1, 2, 3, 4, 5; these eggs I preserved, and in the summer following I perceived that the No. 5 was as prolific as the No. 1; so that this one copulation was capable of impregnating the whole brood; and therefore the male influence must go either along the oviduct its whole length, and impregnate the incomplete eggs as well as the complete, which appears to me not likely, or those not yet formed were impregnated from th reservoir in the act of laying; for I conceived that these bags, by containing semen, had a power of

2605. A female Silk-moth, with the dorsal parietes of the abdomen removed, and the intestine turned down, together with the two nidamental secerning tubuli and oblong reservoirs.

2606. A species of *Reduvius*, Fabr., with the ventral parietes of the abdomen removed to expose the female organs.

2607. A *Pentatoma*, Oliv., with the ventral parietes of the abdomen removed to expose the female organs, and the large ova in different stages of development.

2608. A species of *Scutellera*, Latr., with the cavity of the abdomen similarly exposed, and the multifid ovaria turned down.

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impregnating the egg as it passed along to the anus, just as it traversed the mouth of the duct of communication.

" Finding that eggs completely formed could be impregnated by the semen, and also finding that the before-mentioned bag was a reservoir for the semen till wanted, I wished next to discover if they could be impregnated from the semen of this bag; but as this must be done without the act of copulation, I conceived it proper first to see whether the ova of insects might be impregnated without the natural act of copulation, by applying the male semen over the ova, just as they were laid. The following experiments were made on the Silk Moth.

" Experiment 1.—I took a female moth as soon as she escaped from her pod and kept her carefully by herself upon a clean card till she began to lay. Then I took males that were ready for copulation, opened them, exposing their seminal ducts, and after cutting into these, collected their semen with a hair pencil: with this semen I covered the ova as soon as they passed out of the vagina. The card with these eggs, having a written account of the experiment upon it, I kept in a box by itself. In the ensuing season eight of the ova hatched at the same time with others naturally impregnated. Thus then I ascertained that the eggs could be impregnated by art after they were laid.

" The ova laid by females that had not been impregnated did not stick where they were laid; so that the semen would appear not only to impregnate the ova, but also to be the means of attaching them.

" To know whether that bag in the female silk moth, which increased at the time of copulation, was filled with the semen of the male, I made the following experiment:

" Experiment II.—I took a female moth as soon as she had escaped from the pod, and kept her on a card till she began to lay. I then took females that were fully impregnated before they began to lay, and dissected out that bag which I supposed to be the receptacle for the male semen; and wetting a camel-hair pencil with this matter, covered the ova as soon as they passed out of the vagina. These ova were laid carefully on the clean card, and kept till the ensuing season, when they all hatched at the same time with those naturally impregnated.

" This proves that this bag is the receptacle for the semen and gradually decreases as the eggs are laid."—Phil. Trans. 1792, p. 175.

2609. A specimen of the unprolific female, or labourer, of the Hive-bee (*Apis mellifica*, Linn.). The energies of this modified sex of the bee, not being exhausted in the development of ova, are equal to the laborious operations on which the well-being of the hive depends, and the activity of the secretary function, especially of the parts in the neighbourhood of the abdomen, is vicariously expended in the elaboration of wax; some scales of which may be observed attached to the under surface of the body in the present specimen.

2610. Two labourers, with the ventral parietes of the abdomen removed to show the rudimental condition of the parts of generation.

Mr. Hunter's description of the external characteristics of the Queen-bee and Labourer is given at p. 35 of the present volume; his account of the female organs of the prolific or Queen-bee is as follows:

"*Of the Female Parts.*

'I may here observe that insects differ from most of the classes of animals above them in having their eggs formed in those ducts along which they pass, not in a cluster on the back, as in some fish (for instance all of the Ray kind, or what are called the Amphibianantes), in the bird, and as is supposed in the quadruped; from thence the eggs are taken up, and by the ducts are carried along to their places of destination.

"*Of the Oviducts.*

"The female of the common bee, similar to all the females of the bee tribe, has several oviducts on each side, beginning by very small and almost imperceptible threads, as high as the chest; they then form one cord coiled up, or pass very serpentine, and become larger and larger as they approach the anus, owing to the gradual increased size of the eggs in them, which are now more distinct, and give the duct a sort of interrupted appearance towards the lower end. The ducts when full of eggs make a kind of quadrangle, then all unite into one duct which enters the duct common to it and the oviducts of the other side. The ducts common to the oviducts on each side are extremely tender, so much so that it is difficult to save them. The duct common to those

on both sides may be called the vagina, and it is continued to the anus or termination of the belly."

Observations on Bees, Phil. Trans. 1792, p. 173.

2611. A Queen-bee, with the dorsal parietes of the abdomen removed to expose the parts of generation. The ovaria, which are full of eggs, form the two large whitish bodies at the anterior part of the abdominal cavity. The single oviduct from each may be observed converging to terminate in the vagina, which is here concealed by the spherical receptacle for the semen; the two small cæcal glands which open into this receptacle are distinctly shown: the poison-bladder, connected with the apparatus of the sting, is turned down.

2612. The female organs of the Queen-bee, removed from the body, dissected and displayed on a tablet of ebony; of this preparation little more than the poison-apparatus now remains.

2613. A Queen-bee, with the vagina and oviducts displayed.

2614. A similar preparation.

2615. A prolific female Humble-bee (*Bombus terrestris*, Latr.), with the ventral parietes of the abdomen removed, and the two ovaria reflected downwards with the intestine. The development of the ova is just commencing. Mr. Hunter's description of these parts is as follows:

" (*Humble Bee.*) *Female Parts.*

" The female parts consist of a vagina or common oviduct which divides into two; each of which again divides into four, in which four the eggs are formed and lie till protruded. The vagina or oviduct opens or begins externally under the last scale of the belly, immediately between it and the sting; this opening is pretty large, and has a brownish edge; from this the vagina passes up on the inside of the belly, is pretty large, and at the upper end of it divides into two ducts, each of which is smaller than the common duct. These two soon subdivide into four, which make a swell at this part; these are attached together, forming a bundle, and as this bundle passes up it becomes smaller and smaller. The two bundles get on each side of the stomach and terminate above in

a small point about the great artery, as that artery bends to the back. This which I have called termination is properly the beginning of the oviducts. It is in these last canals the eggs are formed; probably the part which answers to the yolk in the eggs of birds is formed higher up, where the oviducts appear to begin; and as they form they descend in regular succession, and as they descend they increase in size from acquiring additional matter, and when got to the lower part they are then ready for protrusion, each through its oviduct into the common one."

Hunterian Manuscript Catalogue.

2616. A similar specimen of the female Humble-bee, with the ova, further advanced: the four ovarian tubes, and the short single oviduct on each side are here distinctly observable.

2617. A similar specimen, dissected to show the capillary commencement of the ovaria at the anterior part of the abdomen.

2618. A female Humble-bee, dissected to show the parts of generation.

2619. A similar preparation.

2620. A Carpenter-bee (*Xylocopa violacea*, Latr.), with the ventral parietes of the abdomen removed to display the female organs, which exhibit their inactive or quiescent state. The oviducts are relatively longer, and the vagina wider than in the Hive-bee.

2621. A Carpenter-bee (*Xylocopa latipes*, Latr.), with the dorsal parietes of the abdomen removed to display the generative organs.

2622. A fine specimen of *Xylocopa Brazilianorum*, Latr., dissected to show the female generative organs.

2623. A female *Xylocopa*, with the sting protruded.

2624. Two specimens of Horned-Bee (*Osmia bicornis*, Latr.). The horn-like processes on the head are peculiar to the female.

2625. A Leaf-bee (*Megachile centuncularis*, Latr.), with the ventral parietes of the abdomen removed to display the female organs.

The species of *Xylocopa* and *Megachile* are solitary bees, and have no neuters or sterile females. In the genus *Megachile* the male serves for

fecundation only, the business of nidification and providing for the larvæ being performed by the female.

2626. An unprolific and a prolific female, or Worker and Queen of the common Wasp, (*Vespa vulgaris*, FABR.).

2627. A prolific female Wasp, with the ventral parietes of the abdomen and the intestinal canal removed, and the ovaria reflected downwards: they exhibit the quiescent and unimpregnated state.

2628. A similar specimen, with the ova beginning to be developed.

2629. A Wasp, dissected to show the generative organs.

2630. Two female specimens of exotic species of Wasp, undissected: in the lower one the sting is protruded.

2631. A female specimen of an exotic species of Wasp, undissected, with the sting protruded.

2632. The female of an exotic species of Hornet, (*Vespa*), with the dorsal parietes of the abdomen removed, and the ovarium of the right side reflected downwards; the oviduct of the opposite ovarium, and the vagina, are also displayed.

2633. A Hornet (*Vespa Crabro*, FABR.), with the ventral parietes of the abdomen removed, and the alimentary canal and female organs in the quiescent state displayed.

2634. A female Hornet, with the dorsal parietes of the abdomen removed, and the generative organs reflected downwards: the ovarian tubes, which are six in number, are distended with ova, in which the vitelline matter has begun to accumulate around the germinal vesicle. One of the ovaries, with the oviducts of another insect, are displayed on the same piece of card.

2635. A Hornet, with the ventral parietes of the abdomen, and intestine, removed to show the female organs.

2636. The generative organs of a large species of Hornet.

2637. A Hornet (*Vespa*) with the abdomen laid open, and the two capillary cæcal tubes which constitute the poison-glands, and their vesicula are

dissected out and reflected downwards. (See the description of the Poison apparatus of the Humble Bee, No. 2159.).

2638. A female of the *Vespa cincta*, FABR., with the sting protruded.

2639. The female of a species of *Sphex*.

2640. Two females of a species of *Sphex*.

2641. A female Cock-chaffer (*Melolontha vulgaris*, FABR.), with the dorsal parietes of the abdomen and the alimentary canal removed to expose the parts of generation.

The ovaria consist, on each side, of a packet of six simple elongated tubes, (they may here be distinguished by their brownish-yellow colour); the slender ligaments which naturally converge from their anterior extremities to attach them to the dorsal parietes of the thorax have been removed: the ovaria converge at their opposite, or posterior extremities, and send off at an acute angle from the point of union a single oviduct; this unites with its fellow of the opposite side, and the common duct proceeds, in a sigmoid course, to the vagina. At the point of junction of the two short and wide oviducts two cæcal tubes (seminal reservoirs) are continued from the vagina; the anterior one is long and narrow, the posterior one is wide, and bent upon itself; both reservoirs contain an opake white substance. On each side of the vagina, near its termination, may be seen a short blind sac, filled with a brownish secretion; those are the odoriferous or attractive follicles.

2642. A female Cock-chaffer, dissected to give an opposite view of the parts of generation.

2643. A Chaffer (*Melolontha solstitialis*, FABR.), dissected to show the generative organs: bristles are passed through the cloaca into the anus and vulva.

2644. A Dung-chaffer (*Geotrupes stercorarius*, FABR.), similarly prepared.

2645. A Dung-chaffer, with the ventral parietes of the abdomen removed, and the vagina and vulva reflected downwards.

646. A female Stag-beetle (*Lucanus Cervus*, LINN.), with the dorsal parietes of the abdomen removed, and the ovaria exposed *in situ*: these consist on

each side of twelve cæcal tubes, with dilated blind extremities. The oviduct from each racemose ovary is short and wide.

2646 A. A Buprestis (*Buprestis superba*, Hope), with the ventral parietes of the body removed to expose the parts of generation. The ovaria consist on each side of a cluster of short and wide tubes. The oviducts are reflected forwards from the point of convergence of the ovaria, and are bent backwards at their extremities to open together into the vagina. Two small accessory sacculi are situated behind the vagina.

Prepared by Mr. Owen.

2646 B. A Cetonia (*Cetonia chinensis*, Fabr.), with the ventral parietes of the abdomen removed, and the female organs displayed *in situ*. The ovaria consist each of six moderately short and wide cæca, dilated into three or four sacculi. The oviducts are short and wide; the common canal grows narrower to the cloaca; the seminal reservoir is exposed on the right side. The vulval apparatus is very large and extensible, covered with short scattered hairs, and strengthened on the upper and lateral surfaces by four thin, horny plates. *Prepared by Mr. Owen.*

2646 C. A female Beetle (*Dynastis Gideon*, Macl.), with the dorsal parietes of the abdomen removed to show the large seminal reservoir.

Prepared by Mr. Owen.

4. *In Arachnidans.*

2647. A Scorpion (*Buthus Africanus*, Leach), with the parietes of the abdomen removed, so as to show the right lateral series of ovaria and oviducts. The ovaria are tubular, as in insects; each ovarian tube commences by a blind extremity, and becomes narrower at the opposite termination, where it communicates with a suddenly dilated glandular body, from which a very short capillary canal leads into the receptacular or uterine portion of the oviduct, in which a single embryo is developed. These incubating pouches, in the present unimpregnated state, gradually contract as they approach the common efferent canal, to which they are placed at right angles, and with which they communicate at pretty regular distances.

2648. A Scorpion, dissected to show a portion of the female generative apparatus at an earlier stage of development than in the preceding preparation.

2648 A. A Bird-spider (*Mygale fasciata*, Latr.), with the ventral parietes of the abdomen removed to show the two simple saeciform ovaria filled with ova, far advanced in their development. Each ovary has a separate short and wide oviduct, and a separate vulval outlet. The terminal joint of the palpi, which in the male (No. 2364.) is dilated and made the seat of a peculiar organ of sexual excitement, in the female is armed with a small curved and sharp-pointed horny claw.

Prepared by Mr. Langstaff.

5. *In Crustaceans.*

2649. A female Isopodous Crustaccan (*Æga emarginata*, Leach), exhibiting the ovarian lamellar appendages attached to the intermediate pairs of legs.

2650. A Craw-fish (*Astacus fluviatilis*, Leach), exhibiting the two distinct vulvar apertures piereed in the coxal joints of the third pair of legs; bristles are placed in these orifices.

6. *In Mollusks.*

2651. A Whelk, (*Buccinum undatum*, Linn.), with the female organs displayed; the ovary occupies, with the liver, the apex of the visceral mass, which is lodged in the spire of the shell: the oviduct extends downwards and forwards to the right side of the branchial cavity, where it is continued between the rectum and the body to within a short distance of the margin of the branchial cavity; the parietes of the terminal moiety of the oviduct are thick and glandular. On the inner surface of the branchial chamber, between the rectum and the larger gill, may be observed a number of close-set transverse laminæ, the office of which is to secrete the external and connecting envelope of the ova.

2651 A. The female organs of generation of the Pearly Nautilus (*Nautilus Pompilius*, Linn.). The ovary in this Cephalopod is single, and is lodged in an appropriate peritoneal sac in the posterior part of the abdominal cavity. It is an oblong compressed body, convex towards the lateral aspect, and on the opposite side having two surfaces sloping away from a middle

longitudinal elevation. Its cavity is occupied by numerous ovisacs of different sizes, the largest of which appear to have recently discharged their contents: they present an elongated oval figure, and are attached by one extremity to the ovarian capsule, while the other floats freely in the ovarian cavity, and exhibits the rent by which the ovum has escaped. The ovisacs are smooth on their external surface, but present internally very numerous and minute wavy folds. They are principally attached along the line of the exterior elevated ridge, at which part the nutrient vessels penetrate the ovary. The oviduct is single, wide, and short: it is a continuation of the membranous external covering of the ovarium; the thick glandular and fibrous tunic of which presents, at the anterior extremity of the ovarium, a distinct perforation, with plicated borders, which projects into the membranous commencement of the oviduct. At a short distance from this part a laminated glandular structure begins to be developed in the tunics of the oviduct, and increases in thickness to the external outlet of the canal. The eggs doubtless receive an outer covering from this gland, and a still more exterior nidamental coat, with, probably also, a connecting thread from the large laminated gland which is here placed above the oviduct. This organ is situated, like the nidamental laminæ in the Whelk, in the branchial chamber; it is adherent to the mantle, and gives rise to the two round convexities observable, in the entire animal, in the ventral aspect of the body behind the infundibulum. It is a transversely oblong trilobed mass, composed of numerous close-set pectinated laminæ, which are about a quarter of an inch in depth, and are disposed in three groups, forming the lobes of the gland; the laminæ of the larger group extend transversely across the middle line of the body, and have their free margins unprotected by a membrane; but the two smaller symmetrical groups have these margins covered by a thin membrane, which is reflected over them from the anterior margin of the glandular body; this is analogous to the detached laminated glands observable in the succeeding preparations.

Prepared by Mr. Owen.

2652. A Cuttle-fish (*Sepia*, Cuv.), with the ventral parietes of the abdomen removed to display the female organs *in situ*. The ovarium occupies the

posterior extremity of the visceral cavity; its thin capsule has been removed, and the pedunculate ovisacs are exposed in different stages of development. A single wide membranous oviduct is continued to the left side, advances forwards, and is surrounded at its termination by a series of transverse glandular laminæ, which secrete the external coat of the ova; a bristle is passed through this portion of the oviduct: there are, in addition, two detached laminated nidamental glands, of which that on the right side is preserved in the preparation, and a bristle is inserted into its excretory outlet, which is directed forwards.

2653. The ovarium of a Cuttle-fish (*Sepia officinalis*, Linn.), exhibiting the ova in various stages of development, and many of the ovisacs empty and collapsed, having discharged their ova. The inner surface of the ovisac presents a reticulated disposition of the lining and secreting membrane; but the ova themselves are perfectly smooth.

2654. The glandular termination of the oviduct of the Cuttle-fish: it consists of two portions, the first being of a spheroidal form, with the laminæ arranged concentrically; the second and terminal part, being of a conical figure, occupied with a double series of semicircular laminæ, arranged transversely; the secerning laminæ are closely packed, and in contact with each other.

2654 a. The ovary and oviduct of a Cuttle-fish. The capsule of the ovary has been partially removed, and the numerous reticulate ovisacs are seen attached in groups to a narrow space of the inner surface of the capsule, corresponding to the place where the vessels penetrate that body. The oviduct is immediately continued from the capsule, and is membranous for two-thirds of its extent; the rest is occupied by the double series of glandular laminæ, as described in the preceding preparation. This part is laid open longitudinally. *Prepared by Mr. Owen.*

2655. A Cuttle-fish, (*Sepia officinalis*, Linn.), with the ventral parietes of the abdomen removed, showing a portion of the ovarium at the right side of the fundus of the visceral sac and the left nidamental gland, in the excretory orifice of which a white bristle is placed; a black bristle is passed through the anus into the duct of the ink-bag, which is lodged between the ovary

and nidamental gland; a white bristle is bent across the termination of the rectum.

2656. The nidamental glands of a Cuttle-fish. A bristle is placed in the orifice of the right gland: some of the component glandular laminæ have been removed from the left gland. The secretion of these laminæ exudes from their interstices into the space between the two series, and escapes from the anterior orifice, where it is applied to the ova, as they pass out of the oviduct, and serves to give them an additional coat of albuminous substance, and to connect them together, and also to foreign bodies. A portion of the corpus succenturiatum is seen above and between the anterior extremities of the nidamental glands.

2657. A small Calamary (*Loligo*), with the visceral cavity laid open to expose the ovary and nidamental glands.

2657 A. A Cuttle-fish (*Sepioteuthis Australis*, Bl.), with the ventral parietes of the body removed to display the female organs of generation. These consist, as in the *Sepia officinalis*, of an ovary, an oviduct, and two detached nidamental glands. The ovarium is very large, and of an oblong form; the anterior part of its capsule has been removed, to show the reticulate ovisacs, some of which are empty, and others contain ova at different stages of development. The oviduct is continued from the middle of the left side of the ovary, and descends obliquely to the bottom of the ovary, where it may be observed to be dilated by a cluster of smooth and polished ova: at this part it is bent abruptly upon itself, and near the anterior extremity of the ovary enters the terminal laminated gland: this part is enlarged at its commencement, and, after suddenly contracting, gradually diminishes to its free extremity. The nidamental glands are longer and narrower than those of the *Sepia*; they are composed of a similar double series of close-set transverse semi-elliptical laminæ, the interstices of which communicate with a longitudinal fissure, in which the glutinous secretion is moulded into the thread-like form adapted to connect the ova together as they escape from the true oviduct.

Prepared by Mr. Owen.

2657 B. An Argonaut, (*Argonauta rufa*, Owen) with the ventral parietes of the

abdomen and the gills removed, to show the female organs of generation. The ovary is lodged at the fundus of the visceral sac. Two oviducts are continued from its posterior part, which are at first convoluted, and then advance straight forwards to the base of the funnel. A white bristle is placed in the excretory aperture of each. *Prepared by Mr. Owen.*

2657 c. A Poulp (*Octopus nidulans*, Owen,) with the ventral and lateral parietes of the abdomen and the branchiæ removed, to show the female organs. The bilobed hemispherical ovarium occupies the posterior half of the visceral cavity; its capsule is left entire. Two oviducts are immediately continued from the ovary, one from the antero-dorsal, flattened surface of each lateral lobe; after a short and tortuous course each duct is surrounded by a series of short semicircular glandular laminæ, which here present a dark colour; the ducts are then continued, of somewhat increased size, in a tortuous course, to the base of the infundibulum, where they open on each side of the rectum: black bristles are inserted into these openings, and a white one into the anus.

Prepared by Mr. Owen.

2657 d. The female organs of generation of the Sagittated Calamary (*Loligo sagittata*, Cuv.). The ovary, which here exhibits the quiescent state, is narrow and long; the ovisacs are developed from and attached by the blood-vessels to the external capsule. The ovarian artery enters the anterior extremity, and extends straight down to the bottom of the ovarian sac; it is surrounded by condensed cellular tissue at its entry into the ovarian sac, to which it is connected, for the extent of an inch, by a duplicature of the lining membrane of the capsule; beyond this part it is continued loosely in the sac, to within an inch of the bottom, when it again becomes attached. Throughout the whole of the course of this vessel and surrounding tissue, it may be observed to send off from its entire circumference delicate arborescent filamentary branches, the extremities of which terminate in minute ovisacs. Two oviducts are continued from the ovarian sac; they commence, about one third of the length of the ovary from its anterior extremity, by smooth oval apertures half a line in breadth; each duct is continued forwards, of the same diameter, and

is disposed in sixteen short transverse folds, after which it passes straight to the terminal ovarian gland. External to the oviducts may be observed the two perfectly detached nidamental glands, which are elongated and flattened, broadest in the middle, composed of two lateral series of transverse glandular lamellæ, as in the *Sepia*, but having a relatively wider central canal for receiving and moulding the nidamental secretion.

Prepared by Mr. Owen.

It will be seen that the Hunterian specimens, Nos. 2652—2655, do not afford a clear and satisfactory view of the female organs in the genus of Cephalopod there dissected; the male organs of the Cuttle-fish (Nos. 2371 and 2372) originally also formed part of the present series; and, from the description of No. 2655, in the Hunterian Manuscripts, it appears that Hunter regarded the nidamental glands as the testes, and supposed, though with some doubt, that the sexes were united in the Sepia. He writes, "The Cuttle-fish would seem to be a complete animal in itself, both male and female; but how far it is so I have not yet been able to discover: I should suppose that it impregnates its own eggs. It has a gland" (ovarium) "on the left side of the belly, which forms or secretes its yolks, or the substance of the yolk; it has a passage" (oviduct) "on the right for the exit of these yolks when completely formed; so that these yolks, as it were, pass round the other viscera. It has two bodies," (nidamental glands) "whose outlines are oval, and very much flattened: these are made up of thin bodies whose sides are in contact, and lie between the gland" (ovary) "above described, and the opening for the exit of the ova; having their apices directed forwards, and their mouths opening near the passage of the yolks, as if intended to impregnate them as they pass out; just as the male toad impregnates the eggs of the female. It has no parts for receiving or being received" (*i. e.* no organs of copulation).

It is now scarcely necessary to add that the diœcious condition of the sexual apparatus in the Cephalopods, which was known to Aristotle, is an established and certain fact in natural history. The organs themselves have, however, been described in only a few species. So far as is now

known the female parts of the Cephalopoda present five principal modifications of the structure of the efferent and nidamental apparatus.

1. In the *Nautilus* there is one oviduct, which traverses an elongated gland at its extremity; there is also a distinct nidamental laminated gland attached to the parietes of the branchial chamber.

2. In the genera *Sepia, Sepiola, Rossia, Sepioteuthis*, and in some species of *Loligo*, there is one oviduct, with a dilated glandular termination, and two separate nidamental glands, detached from the mantle.

3. In *Loligo sagittata* and the genus *Onychoteuthis*, there are two oviducts, each terminated by a laminated gland, and also two separate nidamental glands, detached from the mantle.

4. In the genera *Octopus* and *Eledona* there are two oviducts, each of which traverses a laminated gland; but no separate nidamental glands.

5. In the *Argonaut* there are two long convoluted oviducts, with glandular coats throughout, but without partial enlargements; no separate nidamental glands.

7. *In Fishes.*

2658. A section of a Lampern (*Petromyzon fluviatilis*, Linn.), with the ventral parietes of the abdomen and the intestine removed, to show the single ovarium *in situ*; it is composed of a double membrane, serous and mucous, disposed in oblique and irregular folds, within which the ovisacs and ova are developed. The ovigerous folds are not inclosed in a capsule, and there is no oviduct. The ova, upon their dehiscence, fall into the abdominal cavity, and are expelled by the peritoneal outlets: bristles are passed through these outlets, and others into the rectum and right ureter. The kidneys are the elongated compressed bodies situated external to the ovarium.

2659. The corresponding section of a Lamprey (*Petromyzon marinus*, Linn.), displaying the elongated ovarium, with the ova in a more advanced state of development. These ova, as in the Lampern, are not conveyed externally by an oviduct, but break through the thin covering of the ovary into the cavity of the abdomen, and finally escape by the wide peritoneal aper-

tures: a bristle is passed through one of these outlets, which are situated in the cloacal fissure between the anal and urinary openings.

2660. A section of a Conger Eel (*Conger vulgaris*, Cuv.), showing the termination of the ovarium on the left side: it presents a puckered laminated structure, as in the Lamprey, but is disposed in finer and more numerous folds: it extends some way beyond the anus, and is without an oviduct.

2660 a. A section of the Common Eel (*Anguilla acutirostris*, Yarrell), showing a portion of both ovaria; they are attached by a duplicature of the peritoneum to the sides of the dorsal aspect of the abdomen, and are disposed in numerous transverse narrow plaits.

Presented by Wm. Yarrell, Esq., F.L.S.

2661. One of the ovaria of a Salmon, (*Salmo Salar*, Linn.). This presents a more compact figure than in the preceding fishes: the ova are developed in the folds of an irregularly transversely plaited membrane; these folds and ova are inclosed posteriorly and laterally by a thin capsule, but are exposed on their anterior surface, from which the ova are discharged into the cavity of the abdomen, and are finally expelled by the peritoneal apertures, as in the Lamprey.

2662. The cloaca, with the allantoid bladder and rectum of a Salmon, showing one of the peritoneal apertures situated between the outlets of the preceding parts, within the verge of the cloaca. The allantoid bladder is laid open through its whole extent, showing the fine longitudinal rugæ of its lining membrane.

2663. The trunk of a Barbel (*Cyprinus Barbus*, Linn.), with the anterior parietes of the abdomen and intestine removed to show the female organs. The laminated ovarium in this, as in most other osseous fishes, is completely surrounded by a membranous capsule, which becomes contracted towards the lower part of the ovarium, and is continued from thence in the form of a duct to the cloaca, where it joins its fellow, and opens externally behind the anus. A black bristle is inserted into the left oviduct; a white one into the rectum. The ovaria are beginning to take on the state of activity.

2664. A Crucian Carp (*Cyprinus carassius*, Bloch), with the parietes of the left side of the abdomen removed, to expose the left ovarium; it may be distinguished by the moderately developed ovisacs and ova, lodged between the kidney and the coils of intestine.

2665. A portion of the two ovaries, with the oviducts, rectum, cloaca, and surrounding soft parts of a Cod-fish, (*Gadus Morrhua*, Linn.) The capsule of each ovary has been laid open, showing the membranous laminæ in which the ovisacs and ova are developed. A short and wide oviduct is continued from the lower third of each ovary, and terminates in a common single excretory canal, the orifice of which may be observed posterior to the anus.

2666. One of the ovaria of a Whiting Pollack (*Merlangus Pollachius*, Cuv.), with the posterior part of the capsule removed to display the ovigerous laminæ.

2667. One of the ovaria 'of a Goby (*Gobius*, Linn.)'. (?) The ovigerous surface of the ovarian sac presents merely a thickened glandular or coarsely villous character, and the laminar processes are very slightly developed in the present condition.

2668. The left ovarium and both oviducts of a Mackarel (*Scomber Scombrus*, Cuv.). The ova are in an early stage of their development; the ovigerous laminæ are attached to nearly the whole of the internal surface of the ovarian sac, which is laid open; the oviducts are very short and wide and terminate just within the verge of the common excretory outlet: a portion of bristle is inserted into each duct.

2669. Both ovaria of a Mackarel; one is entire and shows the elongated subcompressed oval figure of the sac; the other is laid open and exposes the numerous and close-set short wavy oblique ovigerous laminæ, with the ovisacs and ova in a more advanced state of development. A bristle is inserted into the oviduct.

2670. A similar preparation of the more enlarged ovaria of a Mackarel: it may be observed that the ovarian laminæ are not developed on the dorsal surface of the terminal portion of the common sac.

2671. A similar preparation, showing the relative position of the oviducts and rectum, which latter is laid open and stretched transversely with a portion of white bristle.

2671 A. The ovaria of two specimens of the Smooth Serranus (*Serranus Cabrilla*, Cuv.). Each of these ovaria possesses throughout the same ovigerous laminated structure, exhibiting at both extremities the ova in a cod, similar (early) stage of development.

Both Cavolini and Cuvier have observed specimens of this fish in which one portion of each generative gland contained true ova, while the other presented all the appearance of a perfect testis; it is however evident from the present specimens that this is not a constant or normal structure, as Cavolini supposed, but that it is to be attributed to accidental malformation, which occurs, but probably less frequently, in the cod, the carp, the perch, the mackarel, and other osseous fishes.

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2672. The posterior portion of the ovaria, with the allantoid bladder and cloaca of the Pike (*Esox Lucius*, Linn.). Both ovaria are laid open, showing the ova in that on the right side in a very different state of development as compared with those in the left ovary: the ovigerous laminæ occupy a longitudinal strip on the inner side of the ovarian capsule; they are short, indistinctly formed, and arranged irregularly. The ova are perceptible to the naked eye at the posterior extremity only of the right ovarium. In the left ovary the ova are fully developed, excepting at the lower boundary of the ovigerous laminæ. A compact oblong body, resembling the testis, is also attached to a part of the ovigerous surface; but this is an abnormal formation. The ovigerous laminæ terminate about two inches from the union of the oviducts; the common excretory canal is about half an inch in length, a bristle is passed through it; the urethral canal terminates behind, and the rectum in front of the generative orifice.

2673. The short-spined Cottus (*Cottus Scorpius*, Bloch.), with the ventral parietes of the abdomen removed and the chylopoietic and generative viscera displayed *in situ*. The ovarian sacs present a more compact pyri-

form figure than in the preceding specimens; their apices converge towards the cloaca, and a bristle is inserted into the common outlet. The capsule of the ovary is very thin and transparent, and the ovisacs and ova of different sizes are plainly discernible through it.

2674. The ovaria, allantoid bladder, rectum, cloaca, and surrounding parts of a Wolf-fish (*Anarrhichas Lupus*, Linn.). The ovaria consist of two pyriform bags adhering together by their mesial surfaces, and connected by duplicatures of peritoneum continued from the line of adhesion, one to the rectum in front, the other to the spine behind. The tunics of the ovarian capsule present a very different condition to that of the Cottus, being strengthened by a much more highly developed fibrous or muscular layer, consisting of strong fasciculi somewhat reticulated, but chiefly disposed in the longitudinal direction. The left ovary is laid open, showing the processes of the ovigerous membrane extending irregularly from the whole of the internal surface of the dilated part of the bag; they terminate abruptly at the commencement of the short and wide oviduct, which unites with its fellow before opening on the external surface. The common outlet is situated, as in other bony fishes, between the anus and urethra: the rectum and anus are laid open; a bristle is passed from the urethra to the allantoid bladder.

2675. A Pipe-fish (*Syngnathus Acus*, Linn.), with the ventral parietes of the abdomen removed to show the ovaria; these present the form of two straight cylindrical tubes, with their anterior extremities obtuse, and attached each by a slender thread-like ligament to the abdominal parietes: they terminate posteriorly in a short common oviduct, which opens behind the anus, within a projecting bilabiate vulva. In the portion of the tail which is preserved it will be seen that there is no trace of those two lateral longitudinal folds of integument, observable in the male, and within which the ova are received and protected until the completion of embryonic development. (See No. 2376.)

2675 a. A Sand-launce (*Ammodytes Lancea*, Cuv.), with part of the parietes of the abdomen removed to show the ovaria; these are continued into each other at their anterior extremities, and thus present the form of a single

cylindrical tube bent upon itself. They are again blended together posteriorly, and may thus be regarded as a single ovarium, partially separated into two lateral lobes. *Prepared by Mr. Owen.*

2676. A young specimen of the Antarctic Chimæra (*Callorhynchus antarcticus*, Cuv.), with the dextral parietes of the abdomen and the chylopoietic viscera removed to expose the female organs of generation. These manifest a higher type of organization than in the osseous fishes. The ovarium presents a relatively smaller and more compact form, and its capsule is not continued into the oviduct, but forms a shut sac. The oviducts are continued from the vulva forwards along the external margin of the kidneys, near the anterior extremity of which they perforate the nidamental gland, which secretes the horny external covering of the ovum; they then pass outwards and wind round to the anterior part of the liver, but their mode of termination at their anterior extremities is not shown in the preparation.*

2677. The posterior part of the abdomen with the female organs of generation preserved *in situ*, of a young Monk-fish (*Squatina Angelus*, Dum.). The ovaria, in their present quiescent state, present the form of compressed elongated bodies, with a smooth and even surface; the minute ova appearing like dark specks through the semitransparent capsule: a moderately broad duplicature of peritoneum connects each ovarium with the sides of the œsophagus and spine. The oviducts commence by a single aperture attached to the middle of the anterior surface of the liver, and, winding round the sides of that gland, converge and are continued along the mesial edges of the kidneys to the cloaca. They present a slight dilatation opposite the posterior extremities of the ovaria, and a more marked expansion at their terminations, which latter have been called the uteri, and in these the young are developed in the mature fish. The outlets of the oviducts are situated posterior to the rectum, and in

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* Cuvier describes the anterior extremity of the oviduct in the *Chimæra monstrosa* as terminating in an expanded opening, which is attached to the ovarium.—*Leçons d'Anat. Comparée*, (1805) tom. v. p. 140.

the space between them is the common outlet of the ureters, through which a bristle is passed. The right oviduct is filled with red injection; a black bristle is passed along the left oviduct. The termination of the rectum with the rectal glandular cæcum is preserved; a bristle is placed in the orifice of the cæcum. At the sides of the external opening of the cloaca may be seen the peritoneal canals, through which white bristles are passed into the abdominal cavity.

2678. The left uterine dilatation of the oviduct of a Monk-fish, laid open to show the oblique folds of its lining membrane: a quill is passed through the short canal of communication between this receptacle and the cloaca: a portion of the rectum is preserved, and the peritoneal canals are indicated by large black bristles.

2679. The body of a young Tope (*Galeus communis*, Cuv.), with the anterior parietes of the abdomen, chylopoietic viscera, and ovaries, removed to display the oviducts. These commence by a common aperture, situated between the pericardium and liver, and have the same course as in the Monk-fish. A bristle is passed some way down the left oviduct, and portions of bristle are inserted into the terminal or posterior orifices of both canals. The rectum is laid open, and a bristle inserted into the cæcal gland. White bristles are passed through the peritoneal canals, above each of which there is a semilunar valvular fold, with the concavity directed forwards.

2680. The ovaria and anterior moieties of the oviducts of a Picked Dog-fish (*Spinax Acanthias*, Cuv.). The ovisacs, which may be observed in different stages of development, are imbedded in a very loose cellular tissue; they present an elliptic figure: the whole is surrounded by a thin semi-transparent capsule, attached by a duplicature of peritoneum to the back of the abdomen, immediately below the liver and œsophagus. The anterior orifices of the oviducts are situated close together above the liver; their coats, which are at first thin and membranous, gradually increase in thickness, and about four inches from the orifice become suddenly enlarged by the addition of a laminated glandular structure; this is, however, much less developed in the present viviparous species than in the oviparous

cartilaginous fishes ; and the size of the oviduct continued from the glandular part more nearly corresponds with that of the preceding part, indicating that the ovum does not derive any considerable increase in size as it traverses the gland. The left oviducal or nidamental gland is laid open, showing it to be composed of two elliptic flattened lobes, attached by these lateral margins.

2681. The left oviduct, rectum, and cloaca of a Picked Dog-fish, injected, and laid open through its whole extent. The part anterior to the nidamental gland presents on its inner surface very fine oblique folds: the glandular part is more vascular, and is characterized by minute transverse striæ; after this the folds assume a longitudinal disposition, and in the dilated uterine portion they are more produced, and their free margins, which are beautifully wavy, contain each a single vessel, following the sinuosities of the fold, and sending off branches to the parietes of the oviduct; the sinuous folds gradually subside into a few simple plications at the outlet of the oviduct. The ureters here terminate in a common excretory canal, supported by a conical process, which projects from the interspace of the orifices of the oviducts; the rectum and elongated glandular cæcum connected therewith are also shown.

2682. The anterior portions of the two oviducts, including the nidamental glands of a Cartilaginous Fish, showing the wide common aperture by which the oviducts commence: the whole of the inner surface of the aperture is beset with small compressed villi, which gradually run together into minute crenate longitudinal folds as the oviducts separate from each other. The small size of the nidamental glands indicates the species to which the present preparation belonged to have been ovo-viviparous, as in the Dog-fish.

2683. The left oviduct and cloaca of a Cartilaginous Fish, injected and laid open, showing the close-set transverse laminæ of its glandular part, and the oblique parallel folds of the lining membrane of the dilated or uterine portion: both veins and arteries have been injected, and they present a different arrangement to those of the preceding preparation, being distributed in minute and tortuous ramifications continued from the parietes

of the oviduct upon the membranous lamellæ, and presenting no appearance of being derived from trunks running along the free margins of the several folds.

2684. A portion of one of the oviducts of a Shark (*Scoliodon*, Müller), including the glandular and uterine segments of the tube: the gland is small and bilobed; but the chief peculiarity of the generative apparatus in this genus obtains in the presence of several uterine cotyledons, developed from the internal surface of the terminal dilated cavity; the surface of these processes presents, at the impregnated season, the structure which is partially exhibited in the large cotyledon on the right side of the specimen, viz. countless folds and fissures, in which are interlocked the corresponding folds and fissures of similar fœtal cotyledons developed from the vitelline sac of the embryo, which is thus firmly attached to the parent, in a manner presenting the closest analogy to the placental union of the mammiferous fœtus.

2685. A portion of the oviduct of a Shark, laid open to show the small bilobed nidamental gland, and the dilated terminal portion, which has been termed the uterus: the anterior part of this dilatation has its lining membrane disposed in somewhat irregular longitudinal folds; that of the posterior part presents much finer oblique folds, which are so minute and close-set as to give to the surface a villous appearance.

2686. The cloaca, with the terminations of the rectum, ureters, and oviducts of a Shark. Along with the rectum is preserved the appended glandular cæcum, into the outlet of which a bristle is placed. Bristles are also passed through the ureters, which open by a common orifice between and behind the outlets of the oviducts. Of these the left is laid open, showing its irregular rugous internal surface. A soft, obtuse, rugous prominence is situated at the anterior part of the cloaca.

2687. A small-spotted Dog-fish (*Scyllium Canicula*, Cuv.), injected, and with the ventral parietes of the abdomen removed to display the female organs of the right side, *in situ*. The ovarium is of an elongated oval figure, and extends from the liver to near the cloaca, and is attached by a duplicature of peritoneum to the side of the spine; the ovisacs may be seen

through the loose and thin external capsule in various stages of development: the oviducts commence by a common longitudinal aperture situated in the middle line between the pericardium and liver; they diverge from this aperture and pass to the external side of the liver, where each is inclosed by a bilobed glandular body; beyond this body the oviduct is continued of increased diameter to near the rectum, where it is enlarged, and behind which it communicates with its fellow, and terminates in a transverse semilunar plicated vulva: the urethra projects like a clitoris from the lower part of this aperture.

2688. The left oviduct of the same specimen, laid open. The narrow membranous portion anterior to the nidamental gland is disposed in small wavy longitudinal folds; these terminate abruptly at the commencement of the glandular portion, which is characterized by the appearance of the free edges of part of the close-set transverse layers of capillary cæcal tubes, which constitute the gland; it is from the interstices of these lamellæ that the secretion exudes to form the outer coat of the ovum. In the remaining extent of the gland the internal margins of the secerning laminæ are covered by a smooth and thin membrane. The lining membrane is disposed in longitudinal plaits at the commencement of the second portion of the oviduct, the enlarged diameter of which is in relation to the increased size of the ovum after it has received the nidamental covering. The longitudinal folds soon fall into irregular wavy plicæ, and these are continued over the larger transverse folds into which the lining membrane of the terminal dilated portion of the oviduct is thrown.

2689. The anterior extremities of the oviducts of a Cartilaginous Fish, with their connecting ligaments and a portion of the liver, showing the common longitudinal narrow aperture by which the oviducts take up from the abdomen the ova which have been discharged from the ovaria; bristles are passed from this aperture into each oviduct. The margins of the narrow aperture are not fimbriated.

2690. The female organs of generation of an unnamed Plagiostomous Cartilaginous Fish. Portions of the two lobes of the liver, the kidneys, the rectum, and its glandular sac are also preserved in connexion with the

genital organs. The ovaries are the highest parts in the preparation, being situated above the lobes of the liver, to the superior convex surface of which they are connected by broad reduplications of the peritoneum (forming the suspensory ligaments of the two lobes); they are here of small size, and in the passive or unexcited condition: their exterior surface is wrinkled, and exhibits numerous small granular ovisacs through the smooth semitransparent capsule. The right ovary is laid open, to show its serous and fibrous capsules and the lobulated stroma in which the ovisacs and ova are developed.

The oviducts commence by small apertures above the ovaries; they proceed downwards behind the liver, converging towards the mesial plane as they descend, and immediately below the liver expand into the glandular segments of the oviducts. A bristle is inserted into the inferent superior orifice of the right oviduct; the left is laid open through its entire course, showing the longitudinal wavy rugæ of its lining membrane, and the oblique folds of the lining membrane of the dilated terminal segment.

The rectum is laid open, showing the terminations of the oviducts at its posterior part, in which black bristles are placed. A black and a white bristle are inserted into the duct of the glandular sac, which communicates with the rectum two inches above the orifices of the oviducts.

The kidneys are situated posterior to the oviducts and rectum; they are narrow at their commencement, increase gradually in bulk as they descend, and finally become blended together.

2691. Portions of the oviduct of a Cartilaginous fish said to be a Skate (*Raia*, Linn.), in the Hunterian manuscript catalogue; showing the partial glandular enlargements of the canal.

2692. The termination of the oviduct of a "Skate."

2693. The glandular portion of the oviduct of a large Homelyn, (*Raia maculata*, Montagu). One of the lobes of the gland is entire, and on the flattened inner surface may be seen the free margins of the close-set transverse layers of secerning tubes at the part where the secretion passes into the cavity of the oviduct: a section has been removed from the opposite

lobe, showing the convergence of the component tubes towards the part where the course of the lining membrane of the oviducal canal is interrupted, and free passage left for the escape of the nidamental secretion.

2694. The section of the nidamental gland removed from the preceding preparation; in which the minute secerning tubuli, of which the laminæ are composed, are shown.

8. *In Reptiles.*

2695. The posterior part of a Siren (*Siren lacertina*, Linn.), with the ventral parietes of the abdominal cavity removed to display the female organs of generation. The ovaria are the two irregular elongated bodies situated on each side of the root of the mesentery, and bearing impressions of the convolutions of the intestine. They contain innumerable minute ovisacs of a greyish colour, with a few others of a larger size, and of a very dark colour. The oviducts are external to the ovaria, and are attached to the sides of the spine, each by a broad duplicature of peritoneum: they commence anteriorly by a simple elongated slit-like aperture without fimbriated margins, and are immediately disposed in about twenty parallel transverse folds, which gradually diminish, and finally cease about three inches from the cloaca, where the oviducts open behind the rectum upon small prominences: bristles are placed in these outlets. The contracted allantoid bladder is seen anterior to the rectum: the posterior extremity of the kidney extends behind the oviducts a short way beyond the cloaca.

2696. The anterior extremity of the oviducts and liver of a Siren. The oviducts are much attenuated at their commencement, but soon increase in size, and become thicker in their parietes.

2697. A Newt (*Triton marmoratus*, Lam.), with the ventral parietes of the abdomen and chylopoietic viscera removed to display the female organs of generation. The ovaria are elongated compressed irregular bodies lying in front of the kidneys and between the oviducts: they are studded with minute white granules, which are the ovisacs, and exhibit a very early stage of development. The oviducts commence at the anterior

extremity of the abdominal cavity, and pass in an irregularly convoluted course to the cloaca.

2698. A Newt (*Triton cristatus*, LAM.), with the ventral parietes of the abdomen, the intestines, and oviducts removed to show the ovaria: these bodies present an elongated form and an irregularly lobulated exterior, but are relatively broader than in the Siren, especially at their posterior extremities.

2699. A Newt (*Triton cristatus*, LAM.), with the ventral parietes of the abdomen, intestine, and ovaria removed to show the course of the oviducts. These tubes commence by simple slit-like apertures situated between the pericardium and liver, and pass backwards in a wavy course, which becomes irregular as they approach the anterior extremities of the kidneys: here they diverge from each other, then approach together at the mesial line, and a second time diverge, and, after describing a regular curve outwards, again converge to terminate separately, but close together, at the posterior part of the cloaca.

2700. A Newt (*Triton cristatus*, LAM.), with the female organs, in an advanced state of development, displayed *in situ*. The ovaria, besides the minute light-coloured granular ovisacs, contain, as in the Siren, ova of a larger size, and which, from the superadded vitelline matter, present a darker colour. The anterior convolutions of the oviducts are distended with a slimy secretion; the posterior ones present more opake parietes from the increased muscularity of their coats. The papillous labia, and their crenate external margins, exhibit the tumid state preparatory to coition.

2701. A Salamander (*Salamandra maculosa*, LAM.), with the ventral parietes of the abdomen and the chylopoietic viscera removed, and the ovaria and right oviduct exposed *in situ*. The ovaria are elongated and irregularly lobulated bodies attached by duplicatures of peritoneum to the sides of the spine. The ovisacs and ova in them are seen in various stages of development, but none have arrived at maturity. A bristle is inserted into the anterior orifice of the oviduct; and that tube is continued backwards, of small size, and in a very convoluted course to within a short distance of the cloaca, where it suddenly expands, and then bends

outwards before its termination. The young are developed in this expanded portion of the oviduct, and it undergoes a great increase of size during the impregnated state. It is in this respect that the female organs of the Salamander chiefly differ from those of the oviparous Newt, in which the oviducts maintain a more uniform diameter.

2702. A Bull-frog (*Rana pipiens*, Linn.), with the ovaria and right oviduct exposed *in situ*. Many of the ovisacs contain, in addition to the germinal vesicle, a quantity of yolk, with the dark-coloured oil characteristic of the ovum of the frog. A bristle is inserted into the anterior aperture of the oviduct, which is situated close to the base of the heart: the cloaca is laid open posteriorly, to show the outlet of the oviduct between the rectum and ureter.

2703. A Frog (*Rana temporaria*, Linn.), dissected to show the relative position of the terminations of the oviducts to the other parts which open into the cloaca. The outlet of the allantoid bladder is the most anterior; behind it is the rectum; then the dilated extremities of the oviducts, through which white bristles are passed; and, lastly, the ureters, in the right of which a black bristle is placed.

2704. A Frog (*Rana temporaria*, Linn.), injected, and with the ventral parietes of the abdomen removed to show the female organs soon after the expulsion of the ova. The ovaria appear as empty membranous sacs, supporting a net-work of vessels. The white opake convolutions of the oviducts are seen external to the ovaria.

2705. A Toad (*Bufo vulgaris*, Lam.), with the ventral parietes of the abdomen and chylopoietic viscera removed to expose the female parts of generation *in situ*. The ovarium exhibits, in its present quiescent condition, the form of an irregularly-plicated membranous sac, with thin and semitransparent parietes, in the substance of which the ovisacs and ova are developed; some of the latter contain a black vitellus. The oviduct is enlarged and disposed chiefly in transverse convolutions as it proceeds towards the cloaca.

2706. The abdominal viscera, with the exception of the intestinal canal, of the Surinam Toad (*Pipa monstrosa*, Lam.). The ovaria are small and the

ova few, and more irregular as to their state of development than in the preceding specimens; those, also, which are most advanced, present a greater relative size. The oviducts commence between the liver and pericardium, and perform many convolutions before they reach the posterior part of the cloaca. Bristles are placed in the terminations of the oviducts, as also into the rectum, and the allantoid bladder.

2707. Part of the body of a Viper (*Vipera Berus*, var. *nigra*, Daud.), with the ventral parietes of the abdomen removed, and the female organs of generation, the gall-bladder, intestine, and kidneys exposed *in situ*. The right ovarium commences immediately behind the gall-bladder; it consists of an elongated thin membranous sac, containing about twenty visible elliptical ovisacs in different stages of development, and arranged in a single longitudinal series. The left ovarium commences opposite the termination of the right; the anterior extremity of each oviduct is opposite the middle of its corresponding ovary; the commencement of the tube is disposed in a few wavy folds; the rest is continued straight to the cloaca, in the anterior part of the interspace between the intestine and kidneys; the latter bodies may be recognised by their regularly lobulated structure; like the ovaries, they are situated unequally, the right being placed more forwards than the left.

2708. A similar preparation of a species of *Coluber*, in which the ova in the ovaria are in an advanced state of development; the ovisac nearest the expanded anterior orifice of the left oviduct is near the period of discharging its contained ovum, and the longitudinal line is discernible which indicates the place of the future rent by which it would have escaped. The cloaca is laid open; a bristle is placed in the termination of the rectum, behind which may be observed the semilunar fissure in which the oviducts terminate, and the bilobed prominence on which the ureters open.

2709. The urinary and female generative organs of a Rattle-snake (*Crotalus horridus*, Linn.). The ovaria, like most of the other viscera of the serpent tribe, are characterized by their great length; and the ovisacs are for the most part developed in a simple longitudinal series. The

ovaria are connected with the beginning of the oviducts by a broad duplicature of peritoneum. Each oviduct commences by a wide fissure with entire margins; its tunics, at first delicate and semitransparent, increase in thickness as the tube contracts: the course of the oviduct is at first slightly wavy for a short extent, and is then straight, and its terminal portion is suddenly dilated. The internal membrane of the oviduct, prior to this dilatation, is disposed in minute parallel longitudinal rugæ. The termination of the rectum is seen anterior to that of the oviducts: the ureters communicate with the cloaca behind them; a bristle is passed through one of these tubes.

2710. The cloaca and terminations of the rectum, oviducts, and ureters, with the two anal pouches of a large species of Coluber. The rectum is laid open, showing the transverse valvular fold which separates its termination from that of the oviducts; bristles are inserted into each of these, and also into the ureters, which terminate on the prominence behind the vulval fossa.

2711. The cloaca of a Water-snake (*Pelamis bicolor*, Cuv.), with the terminations of the rectum, ureters, and oviducts.

"The Water-snake has two oviducts, two ovaria, two kidneys, which are placed near the lower part of the abdomen with ureters about two inches long. The form of the anus is different from either that of the Lizard or the Newt, but it seems to be a mixture of both. It terminates in two lips, like the Newts, but which are in a deep sulcus having a semicircular edge opposing them. If this had the broad thin scale covering the whole, it would be somewhat similar to the Lizard or Snake." *Hunterian MSS.*

2712. A Lizard (*Lacerta bilineata*, Daud.), dissected to display the female organs of generation. The ovaria are situated in the middle of the abdomen, the right being a little more advanced than the left: they contain each about a dozen visible ovisacs, nearly a line in diameter: the oviducts commence more anteriorly than the ovaries, and are plicated through their whole course to the cloaca.

2713. A Lizard (*Ameiva*, Cuv.), with the ventral parietes of the abdomen and

intestine removed to show the two oviducts, the right of which contains a single large ovum.

2714. A Lizard (*Anolius*, Cuv.), similarly prepared to show the oviducts, each of which contains a single large ovum.

2715. A Lizard (*Tiliqua*, Gray,), with the ventral parietes of the abdomen removed to show the intestine and generative apparatus *in situ*.

2716. A Lizard (*Agama atra*, Daud.), with the female organs exposed *in situ*. Seven or eight equally developed ovisacs are obvious in each ovarium: these organs are situated more posteriorly than in the *Lacerta viridis*, but have the same relative position to one another; the oviducts are external to the ovaria; their coats are very thin and membranous at the commencement, and become more muscular as they approach the cloaca.

2717. An Iguana (*Iguana delicatissima*, Linn.), similarly prepared, to expose the female organs *in situ*. The left ovarium exceeds the right in size, and the ovisacs, in their present immature state, appear as flattened disks, overlapping each other obliquely. The duplicature of peritoneum which connects the oviduct to the side of the spine is continued forwards beyond the oviduct, where it terminates in a free edge.

2718. One of the ovaria and one of the oviducts of a Turtle, (*Chelonia Mydas*, Brongn.). The ovary is an elongated flattened substance, variously folded, and thickly studded with innumerable ovisacs, which appear like minute white specks. The oviduct commences by a simple elongated slit, opening upon the free margin of the ovarian duplicature of peritoneum: two bristles are placed in this aperture: the duct soon diminishes to almost capillary tenuity, and so continues throughout that portion which is here preserved.

2719. The cloaca and tail of a Turtle, with the clitoris exposed *in situ*.

2720. The posterior part of the carapace, with the cloaca and female organs of generation, *in situ*, of a fresh-water Tortoise (*Emys*, Brongn.). The ovaria are attached by duplicatures of peritoneum to the sides of the spine between the rectum and the oviducts. The cloaca is laid open through its whole extent; the bifid allantoid bladder communicates by a

wide aperture with the anterior part of the common excretory canal; next behind this are the orifices of the oviducts, in one of which a black bristle is inserted; then comes the aperture of the rectum, through which a white bristle is passed; and most posteriorly are the outlets of two large anal sacculi, into one of which a portion of quill is inserted. The clitoris may be seen projecting from the divided anterior edge of the cloacal canal.

2721. Portions of the kidneys, with the female organs, cloaca, and tail of a Chelonian Reptile. The cloaca is laid open, and the grooved clitoris exposed *in situ*. The ovaria are attached to the peritoneum covering the anterior surface of the kidneys, and exhibit their feeblest state of development, being simple flattened elongated bodies, pointed at both extremities, with a smooth surface, and without any visible trace of ovisacs: the oviducts correspond in their small dimensions and unconvoluted course with the quiescent condition of the essential organs of generation. The rectum and neck of the allantoid bladder are preserved in connexion with the cloaca; a quill is passed through the latter. The black bristles indicate the bifurcation of the aorta.

2722. The right ovary and oviduct, with the cloaca and attached parts of a Tortoise. In the ovary there are numerous ovisacs in different stages of development, but none far advanced. The oviduct has obeyed the stimulus of the commencing activity of the ovary, and become widened and lengthened; it is disposed in short transverse folds, with the anterior extremity bent back upon itself, and the simple slit-like recipient aperture directed toward the ovary. The interior of the opposite extremity of the oviduct is exposed to show the wavy wrinkles of its lining membrane; and the adjoining part of the cloaca is laid open to bring into view the prominent margins of the outlet of the oviduct. On the opposite side of the cloaca the clitoris is displayed; and the allantoid bladder, rectum, and anal sacculi may be seen to communicate with the cloaca in the same relative positions as in No. 2720.

2722 A. One of the ovaria and kidneys of a Fresh-water Tortoise (*Chelydra Serpentina*, Fitz.). The ovary presents a similar structure to that of the

Turtle, but the ovigerous folds are more extensive; the ovisacs are here seen to be less equally developed, many of them being further advanced.

Prepared by Mr. Owen.

2722 B. The left oviduct, with the cloaca and attached parts of the same Tortoise (*Chelydra serpentina*, Fitz.). The oviduct is of considerable length, and is disposed in short transverse folds between the layers of a broad duplicature of the peritoneum: it commences, as usual, by a simple elongated aperture, and gradually diminishes in width, and increases in the thickness of its parietes, as it approaches the cloaca. The inner surface of the anterior part of the duct presents a series of slightly developed oblique folds; these gradually become more produced and more longitudinal in their course. Portions of black quills show the termination of the oviducts between two diverging folds of the lining membrane of the cloaca, which folds gradually subside as they converge to meet, and terminate in the sinus of the glans clitoridis. Immediately anterior to the orifices of the oviducts is the termination of the rectum; and, in front of this, the outlet of the allantoid bladder, by which the preparation is in part suspended. Behind the oviducts are the terminations of the ureters, in which black bristles are placed, and behind these are the wide orifices of the anal saeculi, which in this species exceed in size the allantoid bladder. The one on the right side is preserved, and a part of the parietes removed to show its smooth internal surface.

Prepared by Mr. Owen.

2723. The left ovarium, kidney, and part of the left oviduct of a Crocodile. The ovary presents a very irregular surface, studded or granulated with minute ovisacs. The anterior orifice of the oviduct has its margins smooth and simple; it maintains a more uniform diameter, and sooner gets upon the edge of the connecting duplicature of peritoneum than in the Chelonia: the lining membrane of the posterior part of the oviduct is puckered up into close-set undulating transverse rugæ.

2724. The cloaca, with the right and part of the left oviduct, and the rectum, of a Crocodile. The right oviduct is suspended by its anterior extremity, where the aperture by which the ova are received may be observed.

The terminal portion of the left oviduct is laid open, showing the gradual subsidence of the transverse rugæ, the dilated part where the shell is formed, and the minute longitudinal puckerings of the membrane lining this part. The margin of the excretory outlet projects into the cloaca: a quill is inserted into that of the right oviduct. The rectum and urinary pouch are slit open: a brown bristle is placed behind the clitoris, and black ones into the orifices of the anal follicles; that on the left side is laid open, and its contents removed; a portion of the tunics of the right follicle are turned down, and the brown odorous secretion exposed.

2725. The cloaca and surrounding parts of a young female Crocodile, prepared to show the clitoris with its two crura and longitudinal groove. One of the anal follicles is also dissected, and a bristle inserted into its orifice.

9. *In Birds.*

2726. The left ovarium and adjoining portion of the abdominal vena cava of a Cyrus Crane (*Grus Antigone*, Cuv.). The ovisacs and ova, as in all birds, manifest very different states of development, and none are far advanced: but even the smallest project more or less from the superficies of the ovary, giving it a grape-like or botryoidal form.

2727. The ovaria, corpora succenturiata, and kidneys of the Crown Pigeon (*Columba coronata*, Gmel.). The ovaria are situated on the sternal aspect of the corpora succenturiata, and anterior lobes of the kidneys: that on the right side appears as a mere dark streak; the left ovary, as usual, is more developed, and the numerous and various-sized ovisacs give it an irregular granulated surface.

2728. A Sparrow (*Pyrgita domestica*, Cuv.), with the ventral parietes of the abdomen and chylopoietic viscera removed to expose the female organs of generation *in situ*. The single or left ovarium presents the same relative position as in the Crown Pigeon: the left oviduct may be seen passing along the front of the corresponding kidney to the cloaca; the right oviduct undergoes a very early arrest of development.

2729. The trunk and mutilated extremities of a young Fowl (*Phasianus Gallus*, Linn.), with the female organs similarly displayed *in situ*. A portion of

bristle is inserted into the ovary, in which the ovisacs appear as minute granules, and contain only the germinal vesicle: the left oviduct, which is attached at its anterior extremity by a ligament to the left penultimate rib, increases gradually in diameter as it descends in a simple unconvoluted course to the cloaca. The rectum and portions of the two cæca are here preserved.

2730. A similar preparation, showing, in the Common Fowl, the parts of generation *in situ*, and in a more advanced state of development. The enlarged ovisacs and ova give to the ovary the appearance of a bunch of grapes. The wide longitudinal anterior aperture of the oviduct has its margins entire and simple, as in the cold-blooded Ovipara; a bristle is placed in this aperture. The increasing length of the oviduct obliges it to fall into convolutions.

2731. The cloaca, with the oviducts and part of the rectum injected, of a young Goose (*Anser palustris*, Briss.). This preparation is intended chiefly to show the right rudimental oviduct, in the orifice of which a black bristle is placed: the wider orifice of the left oviduct is similarly indicated. White bristles are passed through the ureters.

2732. The rectum and cloaca of a Fowl, prepared to show the absence of a clitoris, corresponding with the absence of a penis in the male.

2733. The corresponding parts of a Duck (*Anas Boschas*, Linn.), showing a single, spirally twisted, and grooved clitoris, or miniature representation of the penis in the male.

2734. The cloaca and termination of the oviduct, ureters, and rectum, with the urinary bladder and clitoris, of an Ostrich (*Struthio Camelus*, Linn.).

10. *In Mammals.*

α. Ovoviviparous Sub-class.

2734 a. The female organs and cloaca of an Ornithorhynchus (*Ornithorhynchus paradoxus*, Blum.), in the unexcited state. The left ovarium is an irregular, semi-elliptical, flattened body, with a wrinkled and slightly granulated surface: it is seen attached to one angle of the wide aperture of the

oviduct: the margins of this aperture are extremely thin, and, as in the preceding Ovipara, are without fimbriations. The wavy convolutions of the oviducts, and the comparatively straight course of the uteri as they pass along the connecting duplicature of peritoneum, may be observed on both sides. The whole extent of the cloaca is laid open, showing the projecting thickened margins of the uterine orifices, between which is the outlet of the urinary bladder; a bristle is here inserted: just below the junction of the rectum with the urethro-sexual canal may be observed the orifices of the anal follicles, aggregated in two lateral groups.

Presented by Sir Everard Home, Bart.

2734 B. The female organs and cloaca of an Ornithorhynchus in a state ready for impregnation. The left ovarium is crowded with numerous ovisacs in various stages of development, two of which are conspicuously larger than the rest, and project in a greater part of their circumference from the surface of the ovary. One of these ovisacs, or *Graafian vesicles*, as they are termed in the class Mammalia, has been laid open, and the ovulum, with the surrounding granular layer and fluid, removed; the other remains entire. The peritoneal capsule of the ovary has been divided and reflected from the ovary. The ovarian ligament and the junction of one of its extremities with that of the oviduct may be seen at the highest point in the preparation. The dilated beginning of the oviduct or Fallopian tube with its wide and simple slit-shaped aperture are left entire; they are adapted to receive the entire ovarium. The contracted part of the oviduct is laid open, showing the irregularly wrinkled or flocculent character of its lining membrane. The right ovarium and ovarian ligament are extended, in the preparation, transversely below the left: the ovary presents itself as a slight granular enlargement of the ligament: it nevertheless contains many perfect ovisacs and germinal vesicles, which it is possible might be developed so as to be susceptible of impregnation. The right oviduct is much shorter than the left, but presents a similar structure. Both uteri are laid open; they are equally developed, and lined by a thick membrane disposed in very minute oblique rugæ; the different colour of this membrane, due to its

greater vascularity as compared with that of the oviduct, is still perceptible in the preparation. The muscular tunic grows stronger at the cervix, and continues to increase in thickness to the os uteri; this projects, like the os tincæ in ordinary Mammalia, and also like the oviduct in the turtle, into the commencement of the urethro-sexual canal, and is traversed in the virgin state by a transverse band or hymen. Above and between the ora tincæ is seen the orifice of the urinary bladder; below them the outlets of the ureters, in which bristles are inserted. This arrangement of the preceding orifices exactly corresponds with that in the Chelonia. The lining membrane of the urethro-sexual canal is disposed in irregular longitudinal rugæ, which slightly converge to the place of its junction with the rectum, which is seen at the back of the preparation. The common external passage of the cloaca is laid open, and the clitoris and its elongated preputium turned to one side: the bilobed clitoris is exposed at the back part of the preparation, and a bristle is passed through the preputial orifice, which is situated just within the anterior verge of the common external outlet of the cloaca*. *Prepared by Mr. Owen.*

2734 c. The female organs of the Dorsigerous Opossum (*Didelphys dorsigera*, Linn.). The ovaries present a compressed oval form; the oviducts are wide at their commencement, but soon diminish to almost capillary minuteness, and descend in a tortuous course to the uteri: these suddenly expand, and then gradually diminish to their junction with the vaginæ. Each vaginal canal is, like the uterus, distinct from its fellow in this and all other multiparous marsupiata. The vaginæ are connected together by cellular tissue at their commencement, but immediately recede from each other directly outwards, then bend downwards, and, after being slightly twisted upon themselves, converge to terminate by distinct orifices in the urethro-sexual canal. *Prepared by Mr. Owen.*

2734 d. The female organs of two specimens of the Pygmy Flying Opossum (*Petaurus pigmæus*, Less.). The lower one exhibits the unimpregnated

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* See the description and figure of this preparation in the Philosophical Transactions for 1832, p. 536, pl. xvii.

and unexcited state; the upper specimen was taken from an individual which had two small embryos in her pouch. In both examples the uteri are relatively shorter and thicker than in the *Didelphys dorsigera*, but especially so in the recently impregnated specimen. The vaginæ, where they are connected together and receive the ora tincæ, send down respectively a small cul-de-sac before bending outwards. The rectum, canalis communis, clitoris, and external cloacal outlet is preserved in the lower preparation. *Prepared by Mr. Owen.*

2734 E. The female organs of a Petaurist (*Petaurus taguanoides*, Desm.), in the unexcited and unimpregnated state. The vaginal canals are relatively longer than in the *Pigmæus*; the rectum and cloaca are laid open posteriorly to show the separate communications of the two vaginæ with the urethro-sexual canal: a bristle is inserted into that of the left side.

Prepared by Mr. Owen.

2734 F. The female organs, urinary bladder, and cloaca of a Viverrine Dasyure (*Dasyurus viverrinus*, Temm.). The ovary and oviduct are preserved with the uterus on the right side. The ovary is a smooth, elliptical body: the aperture of the oviduct is wide, and its margin is produced into many delicate fimbriations: the contracted part of the oviduct is much convoluted in its course. Each uterus has a pyriform shape, and sends down a long and narrow cervix to the vagina: the parietes of the dilated body of the uterus are much thicker and more vascular than those of the cervix: the left uterus is laid open, showing the disposition of the thickened rugæ in two opposite groups; a bristle is inserted into the right. Both vaginæ are laid open at their commencement, showing the separate cul-de-sacs which receive the ora tincæ; they present in their interior distinct and large longitudinal rugæ. The urinary bladder and long urethro-sexual canal are laid open anteriorly; black bristles are placed in the separate communications between the two vaginæ and this canal. The vaginæ are relatively shorter as compared with the uteri in this than in the preceding marsupial species.

Prepared by Mr. Owen.

2735. The female organs, urinary bladder, and cloaca, with the integuments of

the lower part of the abdomen and marsupial pouch of an 'American Opossum.' The ovaria are small, and their surface is studded with minute ovisacs; the fimbriated apertures, and the convolutions of the Fallopian tubes, are seen in their natural positions. The cul-de-sac, and commencement of the right vagina, is laid open, exposing the os tincæ of the corresponding uterus, into which a bristle is inserted. The urethro-sexual canal is also laid open, and from it a thick bristle is passed into the urethra, and a slender one into the orifice of the left vagina. The termination of the rectum, and the right anal gland are preserved, and a bristle is passed through the duct of the left anal gland.

2736. The female organs, with the termination of the rectum and cloaca, of a Virginian Opossum (*Didelphys Virginiana*, Linn.). A section has been removed from the left ovarium, showing its strong capsule, loose cellular stroma, and the small ovisacs imbedded therein; in the right ovarium, which is left entire, these give rise to many granular projections from its superficies. The large fimbriated apertures of the oviducts, the tortuous contracted parts of those tubes, the simple uteri, and the complicated vaginæ, are all preserved in their natural state; but the urethro-sexual canal is laid open to show the orifices of the two vaginæ, and the urethra, through which a bristle is passed. The lining membrane of the common passage is disposed in large longitudinal rugæ, with finer intermediate reticulations. The portion of the rectum is laid open, and one of the anal glands is preserved, surrounded with its capsule.

2737. The corresponding parts of a younger Virginian Opossum, in which the ovaria present a smaller size and smoother superficies. Here the left uterus is laid open posteriorly, and the unbroken villous character of its inner surface is exhibited. The cavity of the left vagina and its plicated membrane are similarly exposed: the os tincæ is divided into numerous irregular radiated folds or processes; below the os tincæ is the vaginal cul-de-sac; external to it the vagina bends upwards and outwards, and then returns upon itself to communicate with the urethro-sexual canal: the outlets of both vaginæ are laid open; that of the urinary bladder, which is between and before them, is left entire; a bristle is passed

through it. Near the outlet of the urethro-sexual canal may be seen the bifid clitoris, each division of which is grooved, corresponding to the structure of the bifid glans penis in the male.

2738. The female organs and urinary bladder of a Virginian Opossum. In this preparation both uteri and both vaginæ, with the urethro-sexual canal, are laid open from behind. Some of the vessels of the left genital tubes have been filled with injection. The inner surface of the body of the uteri presents very numerous and delicate wavy folds, which become coarser and more longitudinal in the cervix. The lining membrane of the vaginæ is puckered up into well-marked folds, following the curved course of these tubes; both the vaginal and urethral outlets are laid open; two longitudinal ridges are continued from the termination of the urethra some way along the urethro-sexual canal; the form and position of the clitoris is well displayed in this preparation.

2738 A. The female organs of a Virginian Opossum, in which the oviducts or Fallopian tubes have been partially unravelled and dissected from their connexions, and the vaginæ separated from their attachments to each other and the surrounding parts. This dissection not only demonstrates the existence of a complete septum dividing the right from the left cul-de-sac, but also shows that that septum is double, being constituted by the mutual apposition and close adherence of the proper tunics of the vaginal pouches. The outwardly curved part of the vagina is the widest portion of the canal; the terminal part is the most contracted, and has the thickest parietes. *Prepared by Mr. Owen.*

2738 B. The female organs of a Wombat (*Phascolomys Wombatus*, Bl.). The ovaria exhibit in this species the botryoidal form in the most marked degree, and closely resemble that of the bird. The prominent ovisacs and ova are in various stages of development, the largest having a diameter of eight lines. One of the ovaria is seen in its natural position inclosed in a semitransparent peritoneal capsule; this has been removed from the opposite ovarium. The expanded orifice of the margins of the Fallopian tube are remarkable for the number, variety, and size of the membranous fimbriations. The ovarian ligaments are continued along the free edge

of the duplicature of peritoneum which connects together the oviducts and uteri. The uteri are laid open to show the great development and loose texture of the vascular lining membrane. Each uterus communicates, as in the Opossum, with a separate vaginal cul-de-sac, which, in the present species, presents a relatively larger size : the lining membrane of these cul-de-sacs is greatly increased by innumerable irregular rugæ and papillæ ; the terminal portion of each vagina is remarkable for the thickness of its muscular coats. The urethro-sexual canal is lined by a thick epithelium, and its surface is broken up into countless oblique rugæ and coarse papillæ, betraying a certain regularity in their arrangement ; the surface immediately around the urethral orifice is comparatively smooth. *Prepared by Mr. Owen.*

2739. The female organs, urinary bladder, rectum and cloaca, with the integuments of the lower part of the abdomen and marsupial pouch of a young Kangaroo (*Macropus major*, Shaw). Some of these parts have been partially injected. The ovaria present an oval form, and perfectly even and smooth exterior, and are not inclosed in a peritoneal capsule, as in the Wombat. The right uterus is laid open, and a bristle is continued from it, along the corresponding vaginal or lateral canal, into the urethro-sexual passage. Bristles, from the left vagina and urethra, also project into this passage, which then runs parallel with the rectum and opens in the cloaca anterior to the anus ; the simple bifid clitoris may be observed at the anterior part of the termination of the urethro-sexual canal. The thickened margin of the cloaca forms a well-marked prominence. The formation of the marsupial pouch by an inward reduplication of the abdominal integuments is well displayed ; the orifices leading to the fossæ containing, at this early period, the inverted nipples, may be observed at the lower part of the pouch.

2740. The female organs of a Kangaroo (*Macropus major*, Shaw). These consist of two distinct ovaries, oviducts, and uteri, a complicated vaginal apparatus, and an urethro-sexual passage. The latter is here laid open, showing its whole extent: a porcupine's quill is passed through the urethra, and a large bristle through the termination of the right vagina ; the remainder of this canal and the mesial cul-de-sac have been laid open :

the left vagina has been partially exposed, and both the tubes are seen communicating with an elongated cul-de-sac, which extends from below the uterine orifices downwards towards the urethro-vaginal passage, but without opening into it at that part. The cul-de-sac is formed as it were by the blending together of the two separate corresponding sacs in the Opossum and other multiparous Marsupials, and it is seen to be traversed longitudinally by a mesial ridge, or rudimental septum.

The left uterus is laid open; a bristle is placed in the orifice of the right uterus, which is entire; and the oviduct, with its fimbriated extremity, and the ovary, are preserved on this side; the latter body has been bisected, and the two portions divaricated, to show the cavities of the ovisacs in various stages of development: the largest and most conspicuous are situated near the surface, but do not project beyond it, as in the Wombat and most other marsupials. The round, or ovarian ligament, may be seen extending from the ovary to the side of the uterus, upon which it is lost. A portion of the rectum is preserved in this preparation, to show its termination, close to the urethro-sexual orifice, and within the verge of the common cloacal outlet.

2740 A. The uteri, oviducts, and ovaries of a Kangaroo, (*Macropus major*, SHAW), taken out of the body shortly after copulation. Each ovary contains an ovisac, or Graafian follicle; in the right ovary it is of large size, and has been laid open; it was occupied with much fluid, with some coagulated and granular albuminous matter, its development having advanced probably to near the time of the escape of the contained ovum and surrounding granular substance; in the left ovary it is seen distended with the organized substance which occupies the Graafian follicle after the escape of the ovulum and surrounding granules, and forming what is termed the *corpus luteum*.

The ovaries are seen to be situated, not by the side of the expanded orifice of the oviduct, but within the two folds of that orifice; these folds are also of remarkable extent, and are beset on their internal surfaces with rugæ and papillæ, which increase in number and size as they are situated nearer the ovarium. The oviducts or Fallopian tubes are laid open to show the delicate reticulation and minute foldings of the lining

membrane, by which the vascular surface, along which the ovulum must pass, is increased; the lower moiety of the tube becomes thicker and more glandular, and the folds then assume the form of papillæ.

The uteri are laid open to show the great extent of the vascular lining membrane produced by its folds and wrinkles. At the *cervix uteri* these folds become as usual longitudinal. In the left uterus the os tincæ is preserved entire; it is situated, as is shown in the preceding preparation, at the upper part of the vaginal cul-de-sac. *Prepared by Mr. Owen.*

2740 B. The urethro-sexual passage and vaginal apparatus of the same Kangaroo.

The urethro-sexual canal is laid open posteriorly through the rectum, so as to exhibit the bifid clitoris on the opposite side near the outlet; the urethral aperture, protected by a superincumbent papillose process; and the lateral ridges, which separate it from the orifices of the two vaginæ. These tubes are laid open to show the thickness of their parietes, and the valvular constriction situated about three-fourths of an inch from their commencement. On the opposite or anterior side the vaginæ are traced to their termination in the common mesial cul-de-sac, which is laid open through its whole extent, and thus demonstrates the absence of any communication between it and the urethro-vaginal passage; a portion has been removed from its upper part, along with the uteri, shown in the preceding preparation. A cuticular lining is extended over the interior of the whole vaginal apparatus, some of which is preserved at the lower end of the cul-de-sac, and at different parts of the vaginal canals. These were distended with a firm fibrous substance, portions of which are still preserved *in situ.* *Prepared by Mr. Owen.*

2740 C. The female organs of the Kangaroo injected. The right vagina, the commencement and termination of the left vagina, and the elongated cul-de-sac formed by the union of the two canals, are laid open. The cuticular lining is removed in order to show the vascular surface beneath.

The valvular constriction near the commencement of each vagina may be observed, as in the preceding preparation. The imperfect septum of the cul-de-sac does not reach to the bottom of that cavity, but terminates at the right side. The lower end of the cul-de-sac has been detached

from its cellular connexion with the urethro-vaginal passage; its inner surface at this part is delicately reticulate.

White bristles are inserted into the orifices of the uteri, which project, like the *os tincæ* of the single uterus, into the vagina.

The uteri are seen to derive their blood chiefly from the spermatic arteries, while the vaginæ obtain their supply from the hypogastric branches. The ovaries are lodged within the beautifully vascular and delicate expansions of the fimbriated extremities of the oviducts. At the posterior part of the cervix uteri, one of the depressions in the peritoneal coat, which have been mistaken for peritoneal outlets, analogous to those in the crocodile, &c., has been slit open, showing its true nature and extent. *Prepared by Mr. Owen.*

2741. The female organs, with the urinary bladder and cloaca of a Potoroo or Kangaroo-Rat (*Hypsiprymnus murinus*, Illig.). The ovaria are relatively larger than in the Kangaroo, but resemble those of that animal in their even surface and position within the expanded fimbriated extremity of the oviduct. The oviducts are much convoluted in their course to the uteri; these present an elongated elliptical form. The left uterus is laid open, showing the processes of the lining membrane. A portion of bristle is passed through the os tincæ of each. They communicate, as in the Kangaroo, with a common vaginal cul-de-sac, but this is prodigiously developed, especially at the upper part, which extends above the uteri. The ordinary lateral vaginal canals are continued from its sides, diminishing as they descend, and terminating separately in the urethro-sexual canal. A white bristle is passed along the urethra into the bladder. Both the urethro-sexual canal and the rectum are seen to terminate in a very short common cloacal passage. The two anal follicles at the sides of the rectum are preserved *in situ*; a slice has been removed from the one on the left side, showing its muscular and glandular coats, and the contained caseous secretion.

b. Placental Sub-Class.

2742. The female organs of generation, and urinary bladder, of a Beaver (*Castor Fiber*, Linn.). The ovaria present a flattened and very regular, long,

oval form, with a smooth exterior: the pavilions are small, simple, and of a crescentic form; the oviducts are obliquely folded; the uteri long, straight, and of an uniform diameter; they open separately upon a projecting os tincæ into the commencement of the vagina. The os tincæ is, as it were, cut obliquely, and is continued into a series of irregular flattened processes, situated on the anterior part of the vagina, which gradually subside as they recede from the os tincæ. The urethra communicates with the vagina near its distal extremity: the clitoris projects from a notch anterior to the urethra, and in front of the clitoris is the wide aperture common to the two large preputial follicles or "castor-bags:" of these one is laid open to show its internal wrinkled epithelium, and thin muscular and glandular tunics: the preputial glands are smaller oval lobulated masses anterior to the follicles; a bristle is inserted into the excretory duct of one of these scent-glands.

2743. The female organs of generation, and urinary bladder, of a Rabbit (*Lepus cuniculus*, Linn.). The right ovary, oviduct, and a great part of the right uterus have been removed: the left ovary is flattened and oblong, with the surface irregularly tuberculated by the subjacent prominent ovisacs, or Graafian vesicles. The fimbriated aperture of the oviduct is more elongated and plicated than in the Beaver. The left uterus has been finely injected; it is thickly beset throughout its entire surface with coarse compressed processes of the lining membrane. Each uterus communicates with the vagina by a separate, well-marked, round protuberance, or os tincæ. Near the end of the true vagina there are two small semilunar folds, with their concavity directed towards the vulva: the inner surface of the vagina is characterized by minute irregular rugæ. The urethra communicates with the vagina by an oblique aperture at some distance from the external outlet, which is situated close to the anus on the same transverse naked patch of the integument. On each side of this patch, between the urethro-vaginal canal and rectum, there is a glandular depression.

2744. The external parts of generation and clitoris, injected, of a Rabbit. On one side of the preparation may be seen the crura clitoridis, on the other

side the flattened bifid glans and preputium, which is lodged within the verge of the urethro-sexual canal: the transverse naked patch of integument and the lateral glandular depressions are also preserved.

2745. The female organs of the Cape-mole (*Bathyergus maritimus*, Cuv.). The ovaria appear in their present condition as small, elongated, subcompressed bodies, their free surface coming to an edge; they are of a dark leaden colour. The process of peritoneum to which the fimbriated aperture of the oviduct is attached, does not form a capsule to inclose the ovarium. The uteri are elongated, narrow, uniform canals attached to broad peritoneal folds or ligaments, at the base of which there is accumulated a considerable mass of fat, but between which and the uteri the two laminæ of the ligament are left free to allow of the expansion of the uterine tubes during impregnation. The uteri are in contact during the last half-inch of their course, and open separately upon a single *os tincæ*, having a vertical septum intervening: a bristle is inserted into each uterus. The vagina is continued to the surface of the body without communicating with the urethra: its inner surface is at first smooth, and is afterwards disposed on its anterior part in a double series of fine oblique rugæ, which diverge in a penniform manner from a middle longitudinal line. The termination of the rectum is bisected, and the vaginal canal laid open from behind. The clitoris projects from a preputial canal immediately anterior to the vaginal opening; it is short, but thick, and is perforated like a penis by the urethra: a bristle is passed through this canal into the neck of the bladder.

2746. The female organs of generation, with the urinary bladder and rectum, of a Squirrel (*Sciurus*, Linn.). The smooth, elliptical, subcompressed ovaria are lodged in loose peritoneal capsules, along the margins of which the Fallopian tubes or oviducts commence. The anus is separated by a narrow peritoneal strip of hairy integument from the vulva, anterior to which is seen the large glans clitoridis. The crura of the clitoris are connected with considerable venous plexuses, which in section present a cellular or cavernous texture, and are subservient to the erection of the clitoris. Behind these are situated the anal follicles.

2747. The female organs, urinary bladder, cloaeal orifice, and surrounding integument of a "Ground Squirrel" (an *Sciurus striatus*, var. *Americanus*, Linn.?). The ovaries are here also surrounded by wide peritoneal capsules: the simple, long, and narrow uterine tubes open separately into the vagina, which is partially everted to show these apertures, into which bristles are placed: the vulval outlet is a longitudinal slit placed upon a conical prominence.

2748. The female organs of a Marmot (*Arctomys Marmota*, Schreb.). The vagina and urethro-sexual canal are laid open, showing the thick, soft, longitudinal rugæ of the lining membrane; the urethra opens upon the largest of these rugæ, which quickly subsides beyond the aperture: the anterior part or commencement of the vagina is beset with much finer longitudinal plicæ: the uteri communicate with the vagina by two separate and irregular apertures. The uteri are connected together for about an inch before they diverge towards the ovaria.

2749. The female organs of a Sand-mole (*Orycterus*, Cuv.). The vagina is laid open, showing the clitoris projecting into it, within the verge of the vulva; and the two orifices of the uteri, (into which bristles are inserted) at the opposite extremity of the canal.

2750. The female organs, urinary bladder, and anus of a Hudson's Bay Porcupine (*Hystrix* (*Eretizon*) *dorsata*, Linn.). The ovaria are elongated, elliptical bodies, almost pointed at the two extremities; they are not surrounded by a peritoneal capsule. The oviducts pass very gradually into the uteri, which are long, simple, compressed tubes, slightly enlarging as they approach the vagina, into which they separately open by oblique, and not prominent orifices. The vagina becomes gradually dilated as it approaches the external outlet, close to which it receives the urethra; the inner surface is characterized by slight longitudinal impressions. The vulva is a thick, semilunar prominence immediately beneath the anus, towards which its concavity is turned; it is puckered up internally into coarse longitudinal folds.

2751. The corpus uteri, with the termination of the cornua uteri, and the commencement of the vagina, of an Aguti (*Dasyprocta Aguti*, Ill.). This

preparation exhibits an early stage of the blending together of the two lateral divisions or horns of the uterus, which confluence forms the characteristic of the highest type of the structure of these parts: the common uterine canal is however much shorter than would appear on an external view: it is laid open to show its early division; and bristles are inserted into the cornua. The inner surface of the part of the wide vagina here preserved is characterised by large, irregular, oblique folds, and small and close-set transverse plicæ.

2752. The urinary and female generative organs, with the rectum, of the Two-toed Sloth (*Bradypus didactylus*, Linn.). The uterus and vagina would seem here to be blended together in one common simple oblong cavity, which communicates with the short and wide urethro-sexual passage (in the virgin state) by two distinct and small apertures. A black bristle is passed through each of these apertures into the uterus: the anterior part or fundus of this cavity is provided with thick and seemingly villous parietes. The Fallopian tubes are short; they commence by fimbriated apertures upon the anterior edge of the ovarian capsule, and run in a serpentine course upon the capsule to the angles of the simple uterus. The ovarian ligaments are continued, each along the margin of a duplicature of peritoneum forwards to the outer edge of an oval glandular body, which is probably a remnant of the primitive genital gland, or "Wolffian body." On the opposite side of the sheet of peritoneum to which the preceding parts are attached, are the kidneys; of these the right is entire, with the suprarenal body attached to its upper part: the left kidney has had a section removed from it to show its single mamilla. The termination of the ureters is shown by the insertion of white bristles into those tubes. The termination of the capacious rectum is laid open posteriorly, and the wide orifices of the two anal follicles are displayed.

2753. The female organs, with the urinary bladder much contracted, and part of the rectum, of a fœtal Sloth: a bristle is passed into the vagina.

2753 A. The female organs, urinary bladder and rectum of the Three-toed Sloth (*Bradypus tridactylus*, Linn.), with the common cloacal outlet in which

they terminate. The small smooth elliptic ovaria are here discernible: the simple uterus is laid open, showing a longitudinal ridge projecting into its anterior part. Bristles are passed through the vaginal openings and anal glands. *Prepared by Mr. Langstaff.*

2753 B. The female organs of generation of an Armadillo, (*Tatusia Peba*, F. Cuv.). The ovaria are attached to the sides of large peritoneal sacs, the apertures of which are directed towards the uterus. The fimbriated extremities of the oviducts are placed on the upper part of the above apertures; the ducts proceed in a slightly wavy course along the front of the capsules to the fundus uteri, where they terminate: bristles are inserted into them. The uterus and vagina are only distinguishable by the difference in their parietes, which is very gradual, those of the vagina being thinner, and longitudinally furrowed: the vagina opens into the wide urethra about an inch from the extremity of the clitoris, the groove of which is a continuation of the urethra. A small quill is passed through the neck of the urinary bladder. *Prepared by Mr. Owen.*

2754. The female organs of a small Quadruped, called in the Manuscript Catalogue a Deer (*Moschus*, Cuv.?). The vagina is laid open, showing the puckered and contracted orifice bywhich it communicates with the urethra. The common external aperture is close to the anus, as in most of the *Rodentia*. A bristle is passed through the urethra into the urinary bladder. The inner surface of the vagina is disposed in many parallel longitudinal folds, the abrupt termination of which at a straight transverse line indicates the beginning of the uterus; for, as in the previous examples of the *Edentata*, there is not in this specimen any valvular prominence or os tincæ indicating the division between the uterus and vagina. The uterus here presents a body and two cornua: the latter are unequal in size; the right, which is the largest, is laid open, showing its inner surface to be smooth, without any appearance of cotyledonal processes. The oviducts pursue a scalloped course along the edge of the broad ligament, and terminate in an expanded elongated opening, or pavilion, at the outer part of the circumference of the capsula ovarii. The ovaria are smooth oblong bodies with a somewhat angular contour.

2755. The female organs of a Rein-deer (*Cervus Tarandus*, Linn.). The ovaria are small, simple, smooth, ovate bodies, with the larger end attached to the fimbriated aperture of the oviduct; this is situated external to the ovary, between which and the rest of the oviduct the peritoneum is developed into a wide but shallow sac, hardly deserving the name of a *capsula ovarii*. The oviduct, after a few slight folds at its commencement, is continued straight to the uterus. The cornua are unconnected with each other for the first half of their extent: the left cornu is laid open to show the form and disposition of the cotyledonal processes; four of these are seen attached to its anterior part; the first commences near the orifice of the oviduct, is in the form of a compressed elongated fold of the lining membrane, and extends in the direction of the cornu, with its lower extremity projecting free for the extent of half an inch; the succeeding cotyledon, which begins where the other ends, is also elongated and flattened, but is shorter and broader; the third is much shorter, but thicker and broader; the fourth, which is at the commencement of the common uterus, is the smallest. In the cervix uteri the lining membrane is produced into numerous close-set longitudinal laminæ, supported on six successively larger transverse processes, the two last of which project into the vagina, and form the os tincæ. The vagina exhibits at its commencement some longitudinal rugæ; but the rest of its inner surface is almost smooth. A portion of the urinary bladder is preserved with the genital organs.

2755 a. The female organs of a Nubian Giraffe (*Camelopardalis Giraffa*, Gmel.). The ovaria are oval compressed bodies, one inch and a half in length, by one inch in breadth, and a third of an inch in thickness; they are attached by one edge to the broad ligament, and are almost wholly inclosed in a peritoneal sac. They present a smooth exterior, broken only by a few linear impressions: a section has been taken from the left ovary, showing several ovisacs in different stages of development, imbedded in and closely adherent to a very dense stroma. The fimbriated extremity of each oviduct is expanded upon the outer margin of the ovarian capsule; the inner surface of the pavilion is beset with very numerous and fine oblique striæ,

and with secondary laminæ near the contracted opening of the duct. The oviduct forms three or four wavy folds, and is then continued along the walls of the wide ovarian capsule, to the extremity of the uterine horn, which makes an abrupt curve downwards to meet it. The interior of the cornu presents four longitudinal series of short, flattened, but very prominent cotyledonal processes. Similar processes also occur, but more irregularly, in the short corpus uteri. The cervix uteri is occupied by the two circular series of close-set short longitudinal laminæ, about twelve in each series. The broad transversely oval and well-marked os tincæ is composed of similar but thicker longitudinal folds, which, when viewed from the vagina, appear to radiate from the uterine orifice. The wide vagina is lined by a smooth and polished membrane, impressed by fine and irregular longitudinal lines.

Prepared by Mr. Owen.

2756. The female organs of a Bison (*Bos Americanus*, Linn.). The ovaria are smaller than in the Giraffe, and the peritoneal sacculi, or capsules, are deeper, and have a more contracted aperture; they are situated wholly external to the ovary, with their apertures turned towards those bodies. The fimbriated pavilion or commencement of the oviduct is extended along the external border of the opening of the ovarian sac. The cotyledonal processes of the uterus are softer, thicker, and more obtuse than in the Giraffe, and are less regularly disposed; the right cornu is laid open to exhibit them. The first series of longitudinal laminæ in the cervix uteri are narrower and longer, and two series of shorter, broader and thicker folds intervene between the first series and the plicated os tincæ. The longitudinal folds of the vagina are also more developed.

2757. The female organs of a Cow (*Bos Taurus*, Linn.) similarly prepared. The ovaria are bisected. The external os tincæ is laid open, showing the next series of laminæ projecting through it like a second os tincæ. The structure of the different parts is nearly the same as in the preceding preparation.

2758. The urethro-sexual canal and external parts of generation probably of

the same Cow, showing the wide aperture of the urethra, the conical process or 'peak' into which the anterior margin of the vulva is produced, and the clitoris projecting from the inner surface of the peak.

2759. The uterus and vagina of a Heifer, showing the irregular surface of the latter canal, the constriction which separates it from the urethro-sexual passage, the urethral projection in the middle of the anterior part of the constriction, the comparatively smooth internal surface of the urethro-sexual canal, and the outlet of the preputium clitoridis near its anterior margin. The crura clitoridis are shown on the exterior of the urethro-sexual passage.

2760. The female organs of a fœtal Cow, similarly prepared; showing the smooth and even exterior of the oblong ovaria, and the small relative size of the uterus, the whole internal surface of which is occupied with the cotyledonal processes, which are relatively larger and more closely aggregated than in the mature animal. The longitudinal folds of the lining membrane of the cervix uteri are relatively thicker. The proper vagina is separated by a well-marked constriction from the urethro-sexual canal. Portions of bristle are inserted into the left cornu uteri, the ureters, and the urethra.

2761. The female organs of a Goat (*Capra Hircus*, Linn.). The cornua uteri are longer and more tortuous than in the Cow, and pass more gradually into the oviducts: these, as in other Ruminants, are continued to their fimbriated extremities, along the anterior part at some distance from the edge of the broad ligament where it forms the ovarian sac. The uterine cotyledons, which are exposed in the left cornu, are rounder and more depressed than in the Cow. The structure of the cervix uteri closely corresponds with that in the Bison. The relative extent of the vagina before and after it receives the urethra, is exhibited in the preparation, which corresponds in this respect with the Ruminants generally. The preputium clitoridis opens into the urethro-sexual passage near its anterior margin.

2762. The female organs of a Goat, with the ovaria more developed, both of which are bisected to display the ovisacs and stroma. The ovarian cap-

sules, the pavilions, and the course of the oviducts are more clearly exhibited in this preparation; both cornua uteri are laid open, showing the enlargement of the cotyledonal processes corresponding with that of the ovaria.

2763. The female organs and urinary bladder of a virgin Ewe (*Ovis Aries*, Linn.). The ovaria are more rounded than in the goat; the ovarian sacculi smaller, and the uterine cotyledons more produced. The longitudinal lamellæ of the cervix uteri are also arranged in more numerous and better defined circular groups. The proper vagina is relatively longer, it is divided from the urethro-sexual canal by a constriction, across which a filamentary band is stretched, representing the hymen. The mucous sinuses, or canals of Malpighi, open into this part of the vagina; a bristle is inserted into the outlet of the one on the left side. A portion of quill is placed in the urethra, and a white bristle in the groove of the clitoris, which has the same relative position as in the Goat.

2764. The female organs and urinary bladder, injected, of a Lamb, showing the small size of the ovaria and uterus as compared with the vagina and external parts of generation. The right cornu is laid open, showing a single longitudinal and continuous series of cotyledonal processes, which terminate each in a point, instead of presenting the flattened or concave surface as in the impregnated state. The groups of laminæ in the cervix uteri present the appearance of a number of successive ora tincæ.

2765. One of the ovaria and oviducts of a Camel (*Camelus Bactrianus*, Linn.). The ovary is a comparatively small subcompressed oval body with a smooth and even exterior: it is bisected to show its dense stroma or cellular texture, in which only a few small superficial ovisacs are perceptible. The greater part of the capsula ovarii is, as it were, formed by the expanded fimbriated aperture of the oviduct, which is of very large size and is supported by a broad fold of peritoneum; the sacculus as it approaches the contracted part of the duct has its inner surface provided with many broad parallel folds: the oviduct is disposed in a series of four oblique festoons, and is then continued in an unconvoluted course towards the uterus.

2766. The female organs of a Dromedary (*Camelus Dromedarius*, Linn.). The ovaria present a much more irregular furrowed and tuberculate surface than in the previous specimen, and their attachment is by a contracted peduncle to the broad ligaments: one of the enlarged ovisacs projects considerably from the left ovary. The cornua uteri describe each a regular semicircular curve: the right cornu is laid open, showing its smooth and even internal surface, which exhibits no trace of cotyledonal processes. The corpus uteri is short; the cervix is occupied with a series of oblique but nearly transverse folds, which do not quite complete a circle. Three of these folds are seen from the vagina concentrically disposed around the os uteri. The commencement of the wide vagina presents a smooth and even internal surface.

2767. The remainder of the vagina, with the urethro-sexual passage and clitoris of the same Dromedary. A bougie is placed in the urethra. The clitoris commences by two crura, and is continued in a tortuous and somewhat spiral course to the preputium clitoridis, to one side of which it is adherent: the extremity of the preputium forms a conical prominence external to the anterior margin of the urethro-sexual canal.

2768. The corresponding parts of a Camel (*Camelus Bactrianus*, Linn.), similarly prepared. In both specimens the structure of the venous retiform plexuses connected with the clitoris is shown by the removal of a section from each.

2769. The right ovary, oviduct, and a part of the corresponding horn of the uterus, injected, of an Ass (*Equus Asinus*, Linn.). The ovary presents an elongated reniform figure, the extremities being bent towards each other: it is lodged in a peritoneal sac. The inner surface of the expanded orifice of the oviduct is richly beset with vascular and minutely plicated laminæ, radiating in curved lines from the aperture of the oviduct: a bristle is placed in this aperture. The oviduct is continued in short wavy folds within the duplicature of the broad ligament, and some lines distant from its edge, to the uterus. The portion of the cornu here preserved is laid open, showing the oblique wavy folds of the lining membrane.

2770. The female organs of a Mare (*Equus Caballus*, Linn.). The ovaria are

inclosed and concealed in large peritoneal sacculi, to the mouths of which the fimbriated extremities of the Fallopian tubes or oviducts are attached: a bristle is inserted into one of these. The inner surface of the pavilions are characterized by numerous narrow, close-set folds. The horns of the uterus in the present unimpregnated state are a little longer than the body or common cavity of the uterus. The right cornu is laid open, and exhibits a few short oblique folds of the lining membrane projecting into the interior. A few similar folds are observable in the body of the uterus, together with others which are more developed and disposed more longitudinally at the cervix. The os uteri is denoted by the sphinctoric thickening of the muscular coat and the contraction of the canal; but there is no valvular projection into the vagina.

2771. A portion of an oviduct and uterine horn of a Mare, showing, in the latter, the increased development of the oblique folds of the lining membrane preparatory to impregnation.

2772. The termination of the vagina, with the urethro-sexual canal and clitoris, of a Mare, probably a part of the female organs shown in No. 2770. The vagina, which is characterized internally by numerous small, irregular, longitudinal folds, is separated from the urethro-sexual passage by a transverse, narrow, smooth constriction, the remains of the hymen. The urethral canal terminates just beyond this constriction, and immediately behind a soft rugous prominence. The orifices of mucous glands may be observed scattered here and there over the comparatively smooth internal surface of the urethro-sexual canal; the trilobate extremity of the clitoris projects from the orifice of its preputium close to the anterior margin of the vulva. The cut-edges of the preparation exhibit the thickness of the sphincter vaginæ, which is disposed around the urethro-sexual division of the efferent genital canal. The neck of the bladder is laid open, exposing the orifices of the ureters, into which bristles are placed. Two grooves are continued from these orifices, and converge and unite in the urethra, which is encompassed with a thick muscular coat.

2773. The female organs of a Foal. The body of the uterus and the vagina are

laid open, showing how slightly the separation of these two portions of the efferent canal is indicated. The vagina communicates with the urethro-sexual canal by two small apertures. The vulval aperture is preserved entire, showing the two labia and clitoris. The ovaria are altered in structure, and preternaturally enlarged.

2774. The female organs and urinary bladder of a fœtal Mare. The right cornu and body of the uterus, the vagina, and urethro-sexual canal, are laid open. The longitudinal folds of the vagina clearly distinguish it, in this preparation, from the smooth corpus uteri.

2775. The internal female organs of generation of a young Elephant (*Elephas indicus*, Cuv.). The ovaria are small oblong bodies, with an irregular tuberculated exterior: the fimbriated extremities of the Fallopian tubes are provided with numerous long and slender branched processes, like a loose tassel. Each tube makes a long bend upon itself around a deep and narrow ovarian sacculus, and maintains a slightly tortuous course to the uterus. The body of the uterus is very short; the cornua are long and wide; one of these is laid open, showing its inner surface, which is broken only by a few slight transverse puckerings on the concave side. The body of the uterus presents two large semilunar folds; and the os tincæ is represented by three similar successive and alternate folds, which alone distinguish the uterus from the vagina.

2776. The continuous portions of the vagina and urethro-sexual canal of the same Elephant, showing the constriction separating them in the virgin state. In this constriction, when viewed from the urethro-sexual canal, there appear three small apertures; the middle one is the communication with the vagina; the two lateral ones lead to mucous sinuses, or the canals of Malpighi; they have been distended with mercury. The internal surface of the vagina presents a few slight and irregular rugæ; those of the urethro-sexual canal affect a more regular, and in some places a penniform arrangement: the urethra terminates immediately beyond the constriction.

2777. The clitoris of an Elephant. Though probably from a young specimen, it measures fifteen inches in length. The two crura are naturally attached

to the rami of the os pubis: they are of a dense cavernous texture, and are joined together to form the body of the clitoris; this is inclosed in a strong ligamentous capsule, a portion of which is reflected from one side. After the junction of the crura the clitoris descends along the perineum, with its under or posterior surface applied to the urethro-sexual canal; two muscles, analogous to the levatores penis in the male, converge and unite upon the upper or anterior part of the clitoris, and send their common tendon through a sheath to terminate near the glans; this is composed of a vascular corpus spongiosum, which has been injected. The large nerve of the clitoris is also shown.

2777 A. The female generative organs of a young Rhinoceros (*Rhinoceros Indicus*, Cuv.). The ovaria are included within a large peritoneal sac, communicating with the general abdominal cavity by an opening which is three inches wide. They are compact oblong flattened bodies, with a smooth surface, as might be expected, from the immature age of the animal. The external capsule of the ovarium is stout and unyielding, and the serous covering has the appearance of being strengthened by tendinous lines, one of which runs in a curved direction across the anterior part of the ovary, having other shorter lines diverging from it. The stroma ovarii is dense and compact. Three ovisacs or Graafian vesicles were dissected out of each ovarium: of these, one was an inch in diameter, with very dense, thick, dark-coloured parietes; the rest had a diameter of two-thirds of an inch, with thinner coats. Their contents were examined with great care under the microscope, but the granular layer was evidently broken up by decomposition, and the ovulum was invisible. The animal had been dead a fortnight.

The Fallopian tubes or oviducts commence by wide orifices, having a richly fimbriated margin: their diameter at the expanded end equals two-thirds of an inch, but they gradually diminish in size as they pass in a slightly tortuous course along the parietes of the ovarian capsule towards the uterus. Just before they enter the cornu their diameter does not exceed one-third of a line. They terminate in the extremity of the cornu upon a valvular protuberance about the size of a pea, which is divided into four or five processes.

The inner surface of the oviduct is augmented by short, irregular, longitudinal folds or processes of the lining membrane. Each oviduct is fourteen inches in length. The cornua uteri are each seventeen inches in length, and uniformly about an inch in diameter. Their area is occupied by close-set longitudinal folds of the lining membrane about a quarter of an inch in breadth, and having a wavy, irregular, free margin. There is no appearance of processes for the attachment of cotyledons. Where the cornua join the body of the uterus, the crenation or scolloping of the longitudinal folds becomes shorter and deeper. The length of the common uterus is about one and a half inches. The surface of its lining membrane is perfectly smooth, and presents, when first exposed, a leaden hue. A large transverse crescentic fold projects from the upper and lateral part of the vagina; the upper and broadest part of the fold is one inch: it gradually diminishes as it descends on each side, and the cresses are lost about four inches from the vaginal orifice, and about an inch and a half from the middle line of the lower surface. About an inch above this fold, or nearer the uterus, a second and smaller fold is formed, which also descends from the upper and lateral parietes of the vagina, but passes across in an oblique direction: then follow in quick succession a series of shorter but equally broad semilunar folds, which become alternate in their relative position as they approach the uterus, so as to cause the cavity of the vagina to assume a spiral course not very unlike the disposition of the intestine in the Shark. As these valvular folds also assume a thicker, softer, and more vascular texture as they approach the uterus, it is by no means easy to determine where the vagina ends or the uterus begins; in which respect the Rhinoceros resembles the Elephant. The parts are minutely injected. *Prepared by Mr. Owen.*

2777 B. The remainder of the vagina, with the urethro-sexual canal, vulva, and clitoris of the same Rhinoceros. The orifice of the preputium clitoridis is distinct from that of the urethro-sexual canal, being situated immediately below or anterior to it. The length of the urethro-sexual canal is four inches; on each side, and about an inch and a half from the external outlet, there is a small aperture, through which a bristle is passed: it is the outlet of a mucous sinus, which extends forwards in

the parietes of the urethro-sexual passage, and gradually dilates to the diameter of two or three lines, and after a course of three inches it divides into two or three smaller canals with blind extremities. These sinuses are the so-called 'Malpighian canals.' The orifice by which the vagina communicates with the urethro-sexual canal is contracted, and its area is also diminished by several short, oblique, longitudinal folds, whose free edges project into it; the largest of these folds occupies the middle of the lower part of the orifice, beyond which the vagina rapidly dilates into a canal of six inches' diameter. *Prepared by Mr. Owen.*

2778. The corresponding parts of a Tapir (*Tapirus Americanus*, Linn.). The clitoris here projects within the anterior margin of the vulva: it is a short, pyramidal body with two small lateral lobes. The urethro-sexual canal is separated from the vagina by a broad transverse semilunar fold, beneath which is the wide aperture of the urethra.

2779. One of the ovaria and oviducts of a Sow (*Sus Scrofa*, Linn.). The ovary is a large, flattened, oblong body, with an irregular and somewhat convoluted surface; it is almost wholly concealed within the peritoneal sac. The whole of the posterior parietes of this sac is formed by the wide and deep pavilion, or beginning of the oviduct; the margins of the elongated aperture of the pavilion are almost entire.

2780. The opposite ovarium and oviduct of the same Sow, in which the pavilion is inverted, showing the numerous long, but narrow folds, which radiate from the contracted opening of the oviduct to the free margins of the pavilion along its inner surface.

2781. The corresponding parts, injected, of another Sow; the surface of the ovarium is tuberculated by the largely developed ovisacs. The pavilion and the whole of the oviduct are laid open, showing the vascularity of its internal plicated surface.

2782. The left ovary, oviduct, and a part of the left uterine horn of a Sow. The ovary is displaced from its peritoneal pouch, showing its pedunculate attachment close within the margin of the wide aperture of the pouch: the course of the oviduct, and its relation to the ovarian pouch, are very

clearly shown; the cornu uteri is laid open, and a bristle passed from it to the oviduct: the inner surface of the cornu is puckered up into irregular folds and plaits, the coarser ones running longitudinally, the finer ones transversely.

2783. A portion of one of the long cornua uteri of a Sow, injected and laid open, showing its very irregular rugous surface; the larger rugæ here presenting for the most part a transverse disposition.

2784. The corpus uteri, vagina, and external parts of generation of a Sow. The numerous and irregular processes and wrinkles which characterize the inner surface of the horns of the uterus gradually subside in the body as this approaches the vagina, and pass into two or three series of thick and soft ridges of the lining membrane. The os uteri is denoted by a series of close-set, narrow, longitudinal folds, but there is no valvular projection or os tincæ: in the true vagina the longitudinal folds become fewer, and gradually subside towards the line of separation between the vagina and urethro-sexual passage. The urethra opens between two longitudinal ridges, but the surface both of these and other similar projections in the urethro-sexual canal, is broken by numerous fine, wavy, and oblique furrows. The clitoris projects from the anterior angle of the vulval labia.

2785. The female organs *in situ* of a young Porpesse (*Phocæna communis*, Cuv.). The ovaries present the form of smooth elongated subcompressed bodies, completely exposed to view on the posterior surface of the broad ligaments, and situated at equal distances from the horn of the uterus and the pavilion. The expanded aperture of the oviduct is provided with almost entire margins: the contracted part of the tube pursues a wavy course to the extremity of the cornu uteri; of these the left is laid open, showing its internal surface, which, at the present immature period, is smooth, and interrupted only by a few large oblique lines. The body of the uterus is very short; the os tincæ is well developed, and is grooved longitudinally; a bristle is passed through it. Below the os tincæ the vagina presents a series of broad transverse and longitudinally grooved

folds, which diminish in size as they approach the urethro-sexual canal: this external division of the vagina is very short. The urethra opens upon a longitudinal eminence about an inch from the external outlet, and it is surrounded by other longitudinal rugæ. Anterior to the urethra are two folds which resemble the labia minora, and between which is the clitoris.

2786. A section of a Porpesse, giving a side view of the female organs and their relations to the urinary bladder and rectum; the parts are viewed from the left, and the left cornu uteri, oviduct, and ovary, with the corresponding parietes of the vagina, bladder, and rectum, are removed. A bristle is inserted into the right cornu, which is entire; it describes a semi-elliptic curve, and is abruptly bent at both extremities. The anterior and larger folds of the vagina appear like a succession of ora tincæ. A bristle is passed into the ureter, and another larger one through the urethra. The peritoneum is reflected from the bladder upon the commencement of the vagina, and from the rectum upon its termination. The urethro-sexual canal becomes suddenly dilated in the antero-posterior direction to its termination. The rectum becomes much contracted towards the anus, which is close behind the vulva. The depression exterior to the vulva lodges the nipple.

2787. The female organs of a Dolphin (*Delphinus Tursio*, Fabr.). The ovaria, as in other Cetacea, are characterized by their elongated form, and they are also impressed with lines which give to the surface a convoluted appearance as in some of the more simple brains of the Mammalia. The thin membranous pavilion presents a very simple structure without any fimbriation of its margins. The left cornu uteri, which is laid open, exhibits a few simple parallel longitudinal plaits. The corpus uteri is occupied with shorter and more irregular longitudinal processes. The os tincæ, or first of the vaginal circular folds, is coarsely plicated longitudinally, like the succeeding ones: these gradually form smaller portions of a circle, and subside about half-way down the vagina, where the longitudinal furrows are also lost. The form of the vulva may be seen on the opposite side of the preparation; a bristle is passed through the urethra; the termination of the rectum and anus are likewise preserved.

2788. One of the ovaria, oviducts, with a portion of the corresponding horn of the uterus and broad ligament of the Great Bottle-nose Whale (*Hyperoodon Dalei,* Cuv.). The half of the oviduct next the uterus is very narrow, but it rapidly expands into a very large pavilion, the inner surface of which is beset with very minute striæ, chiefly longitudinal; the chief peculiarity, however, in the uterus of the Hyperoodon is the presence of eight or ten oblong compressed processes which surround the entry of the oviduct into the cornu and project into the latter canal.

2789. The corresponding portions of the oviduct and uterus of the opposite side, with the uterus laid open to show the longitudinal folds of the lining membrane, and the fringe of processes around the entry of the Fallopian tube; through which a bristle is placed.

2790. The body of the uterus and beginning of the vagina of the same Hyperoodon. The inner surface of the uterus presents a few large smooth ridges and obtuse processes: the os tincæ is divided into five rounded tubercles; about six inches intervene between the os tincæ and the first transverse fold of the vagina; the lining membrane of which, in the interspace, is puckered up into very fine and numerous wavy wrinkles: below the fold these become larger and more regularly longitudinal.

2791. A portion of the beginning of the vagina of the same Hyperoodon, showing three of the large transverse folds, and the more numerous and smaller longitudinal plicæ of this part of the canal.

2792. The ovary, oviduct, and beginning of the corresponding horn of the uterus of the Piked Whale (*Balænoptera rostrata,* Cuv.). The ovary resembles that of the Delphinus in its elongated form and superficial markings, but it is more compressed. Beneath the ovarium the broad ligament forms a wide and shallow sac. The fimbriated aperture of the oviduct is attached at one end to the outer extremity of the ovary; the margins of this wide aperture are almost entire, but the inner surface of the pavilion is increased by many wrinkles, folds, and processes; the latter are largest and most numerous near the ovary, and around the entry to the oviduct. The oviduct is dilated into a small membranous pouch, but soon con-

tracts; it is slightly wavy for a very short distance and then is continued straight to the horn of the uterus.

2793. The body of the uterus, with the connected portions of the cornua and vagina, and the urinary bladder of the same *Balænoptera*. One of the cornua is laid open to show the longitudinal plicæ of its lining membrane; these are partially effaced at the beginning of the corpus uteri, but soon reappear. The first transverse circular fold is formed at the distance of five inches from the division of the uterus; this is followed at the interval of an inch by a second fold which is more produced; and this by a third at a similar distance which is still larger and more extended into the vagina, and would seem to represent the os tincæ: the longitudinal plicæ are numerous and strongly developed on each of these folds. Immediately beyond the third fold there is a transverse semicircular process of the lining membrane similarly folded; beyond this are four other transverse convex folds, progressively increasing in width, and connected each with a similar process, completing the circumference of the vagina; below these folds the longitudinal plicæ gradually subside.

2794. The termination of the vagina and vulva of the same Balænoptera; a bougie is passed through the urethra, in front of which is the clitoris and its sheath.

Hunter gives the following general description of the female organs in the Cetacea in his paper 'On Whales'.

"In all the females which I have examined, the parts of generation are very uniformly the same, consisting of the external opening, the vagina, uterus, Fallopian tubes, fimbriæ, and ovaria.

"The external opening is a longitudinal slit, or oblong opening, whose edges meet in two opposite points, and the sides are rounded off, so as to form a kind of sulcus. The skin and parts on each side of this sulcus are of a looser texture than on the common surface of the animal, not being loaded with oil, and allowing of such motion of one part on another as admits of dilatation and contraction. The vagina passes upwards and backwards towards the loins, so that its direction is diagonal re-

specting the cavity of the abdomen, and then divides into the two horns, one on each side of the loins; these afterwards terminating in the Fallopian tubes, to which the ovaria are attached. From each ovarium there is a small fold of the peritonæum, which passes up towards the kidney of the same side, as in most quadrupeds.

" The inside of the vagina is smooth for about one half of its length, and then begins to form something similar to valves, projecting towards the mouth of the vagina, each like an os tincæ; these are about six, seven, eight, or nine in number. Where they begin to form, they hardly go quite round, but the last are complete circles. At this part too the vagina becomes smaller, and gradually decreases in width to its termination.

" From the last projecting part the passage is continued up to the opening of the two horns, and the inner surface of this last part is thrown into longitudinal rugæ, which are continued into the horns. Whether this last part is to be considered as os tincæ, I do not know; but, from its having the longitudinal rugæ, I am inclined to think it is uterus, this structure appearing to be intended for distinction.

" The horns are an equal division of this part; they make a gentle turn outwards, and are of considerable length. Their inner surface is thrown into longitudinal rugæ without any small protuberances for the cotyledons to form upon, as in those of ruminating animals; and where they terminate the Fallopian tubes begin.

" In the Bottle-nose Whale (*Hyperoodon*), where the Fallopian tubes opened into the horns of the uterus, they were surrounded by pendulous bodies hanging loose in the horns.

" The Fallopian tubes, at their termination in the uterus, are remarkably small for some inches, and then begin to dilate rather suddenly; and the nearer to the mouth the more this dilatation increases, like the mouth of a French horn, the termination of which is five or six inches in diameter. They are full of longitudinal rugæ through their whole length.

" The ovaria are oblong bodies about five inches in length, one end attached to the mouth of the Fallopian tube and the other near to the horn of the uterus. They are irregular on their external surface, resem-

bling a capsula renalis or pancreas. They have no capsula but what is formed by the long Fallopian tube."

2794 A. The female organs, with the rectum, urinary bladder and umbilicus of a young Seal (*Phoca vitulina*, LINN.). The ovaria are inclosed in the peritoneal capsules; the one on the right side is opened, and the ovary bisected. The capsules are situated close to the ends of the cornua uteri. The inner surface of these tubes is beset with thick soft eminences, chiefly in the longitudinal direction, and which fall into longitudinal ridges as they approach the corpus uteri. This part is very short, but the cornua are externally united some way before they open into the common cavity. The uterus opens into the vagina on a well-developed round os tincæ. The vagina is separated, at the present immature period, by a well-marked constriction from the urethro-sexual canal. The urethra opens into the beginning of this canal upon a mamillary prominence. The clitoris projects from a small semilunar depression, just within the verge of the anterior part of the urethro-sexual canal. The rectum terminates close to the opposite side of the vulva, and a common cloacal sphincter muscle embraces both apertures.

Prepared by Mr. Langstaff.

2795. The female organs of a Leopard (*Felis Leopardus*, LINN.). The ovaria present an elongated, elliptical, flattened form, and are attached by one edge to the ovarian ligament: the peritoneal pouch is large and wide, with an opening extending its whole length. The fimbriated aperture of the oviduct is extended along one side of the margin of the pouch; the ovary itself forms the opposite boundary. The oviduct runs a short and tortuous course along the anterior part of the ovarian capsule to the horn of the uterus: both cornua present, in the present unimpregnated state, the form of simple, straight, narrow, flattened tubes, with a smooth and even internal surface, and they open into the common uterine cavity half-way between their external union and the vagina. The os tincæ is very prominent, and is beset with numerous short, papillose processes. The vagina is a narrow canal, with a few smooth, longitudinal rugæ internally, which terminate abruptly at the beginning of the urethro-

sexual passage. The internal surface of this compartment presents a very different character; it is beset with coarse papillæ, the larger ones being aggregated in longitudinal groups: the urethra opens into the commencement of the canal, and the clitoris projects into its termination, both being on the same line of the anterior or under surface: half-way between these parts, and at the sides of the urethro-sexual passage, are the orifices of two large glands, analogous to those of Cowper, into the ducts of which bristles are inserted. The crura clitoridis and their compressor muscles are shown at the opposite side of the preparation, with the urinary bladder and long urethra.

2796. The corresponding parts, with the anus and anal glands, of a Hyæna (*Hyæna vulgaris*, Cuv.). The ovaria present a more compact, oval form, and are more inclosed in the peritoneal capsules of the broad ligament than in the Leopard. The pavilions are less elongated and more fimbriated, and constitute a smaller proportion of the margin of the aperture of the capsule. The uterus and its cornua resemble those of the Leopard: the vagina is wider, and the longitudinal folds are more produced and irregular. The os tincæ is not fimbriated, as in the Leopard; but immediately beyond it a process is continued from the beginning of one of the longitudinal folds, which terminates in a filamentary portion of membranous substance half an inch in length; whether this is to be regarded as a natural structure is doubtful. The rugæ of the vagina gradually subside before the commencement of the urethro-sexual canal, which is much contracted. The form and relative position of the vulva and anus are shown with the surrounding integument. The right anal gland is preserved entire, the left is laid open to display the thickness of its glandular parietes, and the smooth epithelium lining its anterior cavity; a bristle is passed through the excretory canal.

2797. The female organs of generation of a Zibet (*Viverra Zibetha*, Linn.). The preparation is suspended by the peritoneal capsules of the ovaria, which loosely surround those parts, but have been here reflected from them. The ovarian ligaments are seen passing upon the posterior parts of the cornua uteri; the Fallopian tubes run in a tortuous direction

along the anterior part of the ovarian capsules; they terminate, not at the apex, but by the side of the extremity of the uterine cornu, which forms a small cæcum. The broad peritoneal, and the round fibrous ligaments, are attached to the outer side of the cornua uteri. The body of the uterus, as well as the cornua, are preserved entire; the vagina is laid open, showing its longitudinally wrinkled inner surface, and its inflected course. The urinary bladder and rectum, the vulva and anus, the large intervening peritoneal glandular pouch, and the anal glands are also severally shown in this preparation.

2798. The female organs, with the large intestine and urinary bladder, of a Civet (*Viverra Civetta*, Schreb.). The ovaria approach nearer to the globular form than usual. They are situated in shallow capsules, on one side of which the oviduct commences by a large elongated aperture. The cornua uteri are long, slender, compressed, straight canals. The corpus uteri is equally simple, but very short; the vagina is long. The urethro-sexual canal opens externally on a prominent vulva, above which there is a semilunar cutaneous depression, which receives the ducts of two large scent-glands: a section is removed from the right gland to show its follicular structure. A similar section has been removed from the anal gland; and bristles are inserted into the orifices of both these secreting organs.

2799. The generative organs and urinary bladder of a young Wolf (*Canis Lupus*, Linn.). The ovaria are wholly inclosed in capacious capsules formed by a reflection of the peritoneum; a small aperture leads into the capsule from the part nearest the horn of the uterus. The fimbriated beginning of the oviduct is attached to the exterior boundary of this aperture opposite the ovarium; the tube itself passes in a wavy course round the anterior part of the capsule to the uterus. The cornua are long, slender, compressed tubes, and are joined together externally for nearly two inches before they communicate with the body of the uterus. The interior of this part presents a few smooth, longitudinal elevations of the lining membrane. The os tincæ is a smooth, thick, simple prominence. The true vagina is of considerable length: the

urethra opens between a small transverse fold, and the triangular flattened clitoris, beyond which is a second transverse crescentic fold with its concavity opposite that of the preceding.

2800. The ovary and ovarian capsule, with the oviduct and part of the uterine horn, of a Bitch (*Canis domesticus*, Linn.). Both the ovary and pavilion are entirely inclosed in a large serous or peritoneal capsule, which opens externally by a small aperture near the end of the horn of the uterus: a portion of the capsule is reflected downwards to expose its cavity and contents. The ovary exhibits an irregular, tuberculate surface, occasioned by the large size of the superficial ovisacs. A bristle is inserted into the orifice of the oviduct, which is surrounded by numerous short and thickly-set folds or fimbriations. The parietes of the ovarian capsule contain much adipose matter.

2801. The corresponding parts of a large Quadruped, similarly prepared, but with the ovarium bisected, the pavilion reflected, and its numerous broad, plicated folds displayed on the outside of the capsule: a portion of quill is passed through the opening leading into the capsule.

2802. The pelvic viscera, and their external outlets, of a female Fox (*Canis Vulpis*, Linn.). The body of the uterus, and a small portion of each cornu, are preserved; the right wall of the vagina is removed, showing the small, round os tincæ, which is impressed with a spiral indentation. A thin, circular, membranous fold separates the vagina from the urethro-sexual canal. A large bristle is passed through the urethra, which opens between two thick longitudinal ridges, which unite below the opening, and are covered with minute wavy wrinkles. The preputial cavity of the clitoris is situated close to the anterior verge of the vulva. The rectum, anus, and left anal gland, and the glandular depression above the anus, are also preserved.

2803. The female organs of generation, with the urinary bladder, rectum, and anal glands, of a Skunk (*Mephites*, Cuv.). The ovaria are inclosed in a capsule: the cornua uteri are long and tortuous, and suspended on the edges of broad adipose processes of peritoneum. The vulva is situated

about an inch anterior to the anus, which is laid open to show the terminations of the ducts of the scent-glands: these are placed upon papillæ lodged in small depressions on each side of the verge of the anus: one gland is entire, a section is removed from the opposite one to show its muscular and glandular tunics, and its smooth internal cavity.

2804. The corresponding parts of the Ratel (*Ratelus mellivorus*, Storr.). The ovaria are completely inclosed in peritoneal capsules, as in the preceding preparation; a portion of the right capsule has been removed to expose the ovary, which presents a smooth and even exterior; a bristle is placed in the opening of the opposite capsule. The cavity of the left horn of the uterus is partly exposed, to show the thick, longitudinal, and oblique folds of the soft lining membrane. The os tincæ is formed by a double circular prominence; the internal surface at the commencement of the vagina is beset with numerous and minute oblique rugæ, which become larger and more longitudinal as they approach the urethro-sexual canal: the vagina opens into this canal by a bilobed fold or projection resembling a second os tincæ: the urethra opens upon the anterior lobe or prominence of this fold. The inner surface of the urethro-sexual canal is very smooth. The left anal gland is laid open to show the smooth and glistening epithelium which lines its cavity; a bristle is passed through the excretory outlet.

2805. The female organs of a White Bear (*Ursus maritimus*, Linn.). The ovaria are completely inclosed in a reflected capsule of the peritoneal membrane, like the testes in their tunica vaginalis: a small opening, however, leads into the ovarian capsule at the part next the horn of the uterus. The fimbriated orifices of the Fallopian tubes are situated close to this aperture: the tubes pass round the capsule in a tortuous course to the uterus. The two cornua uteri communicate with a short and wide corpus uteri, between which and the vagina there appears, in the preparation, to be no very distinct boundary; a broad transverse rugous projection of the lining membrane holds the place of the os tincæ. The vagina is separated from the urethro-sexual canal by two transverse semilunar folds, continued, one from each side of the longitudinal eminence upon

which the urethra opens. The lining membrane of the urethro-sexual canal is chiefly remarkable for its dark colour and sharply defined rugæ, which are mostly longitudinal, but in some places have an oblique or penniform arrangement. The clitoris lies concealed in a deep preputial cavity, attached through its whole length to the anterior or under part of the urethro-sexual canal. Bristles are inserted into the right horn of the uterus and into the urethra.

2805 A. The female organs of the Labiated Bear (*Ursus labiatus*, Bl.). The ovarian capsules are artificially distended, and that on the left side is laid open to show its large size as compared with the ovarium. This organ is bisected, showing the different colours of its central and superficial stroma, and the small ovisacs imbedded in the latter. The left horn of the uterus has the whole of its cavity exposed, showing the obtuse, depressed, irregular processes of its lining membrane. The body of the uterus offers a very contracted area; it terminates by a small circular papillose ridge, in a short but wider canal, which traverses a similar but much larger prominence, or os tincæ; these valvular projections are longitudinally bisected in the preparation: their surface is minutely plicated. The lining membrane of the vagina presents many small, irregular, transverse rugæ at its commencement, but these gradually pass into the longitudinal direction at its termination in the urethro-sexual canal, which is by a large corrugated valvular fold. Immediately beyond this fold is the opening of the urethra, situated between two thick longitudinal rugous ridges. The greater part of the urethro-sexual canal has a smooth internal surface. *Prepared by Mr. Owen.*

2806. The body of the uterus, with the two cornua as far as they are connected together, and a small portion of the vagina of some large Quadruped.

2807. The posterior part of a Mole (*Talpa Europæa*, Linn.), with the female generative and the urinary organs exposed. The uterus is turned to the right side, principally to display the course and attachments of the ovarian and uterine ligaments. The ovarian ligament commences anterior and external to the kidney, and carries forward with it a fold of the peritoneum as it advances to the ovarium. The uterine ligament, or ligamentum

rotundum, is continued from the extremity of the cornu uteri, and runs along the posterior edge of the preceding fold, to the part corresponding to the abdominal ring in the male, where it expands upon the fascia. The left ovary and oviduct, the cornua and corpus uteri, are also exhibited. The ovary is tuberculate, and inclosed in an almost complete peritoneal capsule. The oviduct is attached to this capsule, and pursues a wavy course to the horn of the uterus.

2808. A Mole, with the ventral parietes of the abdomen and chylopoietic viscera removed to display the female organs *in situ*. The cornua uteri are cylindrical tubes, and describe three abrupt curves before joining the corpus uteri, with which they form almost a right angle. The body of the uterus is continued, without any constriction or interruption, into the vagina: the whole canal is somewhat flattened, and is disposed in two or three vertical curves or folds before it leaves the abdomen.

2809. The posterior half of a Mole, with the female organs similarly displayed, but minutely injected. The cornua uteri are divaricated, to display the extent of the broad ligaments.

2810. A section of a Mole, in which the left ovary, oviduct, and uterine horn, and the left side of the uterus and vagina, have been removed, but exposing the remainder of the generative apparatus *in situ*, and exhibiting its relative position to the urinary bladder, the rectum and the pelvis. The contracted area of the uterine cavity, the absence of any os tincæ dividing it from the vagina, and the distinct muscular and internal membranous tunics of the flattened tortuous utero-vaginal canal are clearly displayed. A bristle is inserted into the right horn of the uterus; and another is passed through the clitoris, which is perforated by the urethra. Thus, the urethra, vagina, and rectum open by distinct orifices on the exterior of the body, and all three canals lie anterior to the pubic bones, and consequently outside the pelvis.

2811. The female organs of the Slender Lemur (*Stenops gracilis*, Illig.). The ovaria are small oval bodies, with a somewhat granulated exterior; they lie in a depression, which is a rudiment of the capsule of the broad peri-

toneal ligament. The oviducts commence by a fimbriated extremity exterior to the ovaries, and pass in front of those bodies in a tortuous course to the horns of the uterus. These are short and wide, and begin by large obtuse extremities; they are lined by a smooth, thick, and seemingly villous membrane. After the junction of the cornua the common uterine canal presents internally a smoother surface, but begins to fall into a number of fine longitudinal rugæ: it is continued into the vagina without any line or mark of distinction. The rugæ are more strongly developed in this canal, which terminates by a large round opening, half an inch anterior to the rectum. Immediately in front of the vagina is the clitoris; it is a large and prominent body, perforated, like the penis in the male, by the urethral canal, which opens upon a glans cleft by a vertical fissure, and inclosed above and at the sides by a crescentic prepuce. The urethra is of considerable length.

2812. The female organs, urinary bladder, and integument surrounding the excretory orifices of the urethra and vagina of the Slow Lemur (*Stenops tardigradus*, Illig.). The internal organs present the same peculiarities as in the Slender Lemur: the utero-vaginal canal opens externally by a transverse fissure behind the clitoris, which is also perforated by the urethra.

2813. The corresponding parts, injected, of a Lemur or Mongoose (*Lemur Mongoz*, Linn.). The principal differences here observable are, first, that the uterus communicates with the vagina upon a distinct valvular prominence or os tincæ; secondly, that the clitoris is situated more within the verge of the vulva.

2814. The female organs of a larger species of Lemur (*Lemur*, Cuv.). The vagina, corpus uteri, and left cornu are laid open. The rugæ of the vagina are well developed, and are of two kinds; the stronger ones are longitudinal, in the interspaces of which are smaller transverse or oblique folds; these assume a penniform arrangement near the outlet. The clitoris is inclosed in a large and thick prepuce, and is perforated, as in the preceding specimens, by the urethra.

2815. The external parts of generation of a Lemur. The external labia are con-

tinued from the dorsum of the clitoris; within these there are two smaller folds continued from the sides of the clitoris to the opposite part of the vulva; and on the internal surface of each of these folds or labia minora, there is a thick longitudinal fold or process of membrane projecting like the carunculæ myrtiformes, into the cavity of the vagina. The large præputium clitoridis and its internal plications are exhibited; and a bristle is passed through the clitoris into the urethra.

2816. The female organs of generation and urinary bladder, injected, of a 'Long-tailed Monkey,' (*Cercopithecus*, Cuv.). The ovaria are much compressed, and approach the triangular form: the oviducts enter the angles of the fundus of a simple undivided uterus: the cervix uteri is occupied by several irregular longitudinal rugæ; the internal surface of the vagina presents a few oblique rugæ. The urethra here terminates two thirds of an inch within the vulva, upon a longitudinal prominence, on each side of which there is a transverse ridge, dividing the vagina from the common or urethro-sexual passage; immediately beyond the constriction there are several small oblique plications of the lining membrane. The clitoris is smaller than in the Lemurs, and is imperforate; on each side of it there is a tumid process of integument, making a kind of prepuce. From these processes two ridges pass backwards to the sides of the vulva, of which they constitute the labia, and between these there is a groove running from the clitoris to the urethro-sexual canal.

2817. The female organs of a Monkey. The uterus and vagina are laid open: the tunics of the uterus are thinnest at the fundus, the angles of which are slightly produced, like a last indication of cornua. At the cervix there are seen, besides the longitudinal folds, two bulbous processes of the lining membrane; below these a large os tincæ, with a remarkably irregular surface, projects into the vagina. This canal is lined by a dense epithelium, and presents a few large longitudinal, and numerous small, compressed, transverse and oblique rugæ, the margins of which are crenated. A transverse line divides the vagina from the urethro-sexual canal, at the commencement of which the orifices of the urethra and of the glandular sinuses analogous to the canals of Malpighi, are indicated by the insertion of bristles.

2818. The female organs of generation of a Human Subject, minutely injected, and the posterior parietes of the uterus and vagina removed to show the form of their cavities and the disposition of the internal surface. Both ovaria are bisected, showing several ovisacs imbedded in the vascular stroma: these bodies are simply suspended by one margin to the posterior part of the broad ligaments, which are not developed into pouches or capsules as in many of the preceding examples. Bristles are inserted into the fimbriated extremities of the Fallopian tubes or oviducts. The rugæ of the vagina are principally transverse: they terminate abruptly at the commencement of the urethro-sexual canal, the internal surface of which is smooth and exhibits little vascularity. From the proximity of the urethral orifice to the outlet of the vulva the urethro-sexual passage is comparatively shorter than in the Ape.

2819. A section of the os tincæ and vagina removed from the preceding specimen; showing the papillose surface of the vaginal rugæ.

2820. The organs of generation of a young Woman, with the uterus and vagina laid open posteriorly. Bristles are inserted into both extremities of the oviducts, and a small quill is passed through the os tincæ. The ovaria are elongated, subcylindrical bodies, attenuated towards the extremities, and with a perfectly smooth outer surface. The oviducts are almost straight.

2821. The female organs of an Infant, similarly prepared; showing the still more elongated form of the ovaria.

2822. The right ovary and oviduct, with the right half of the uterus and urinary bladder. A bristle is passed through the whole course of the oviduct. The cut surfaces of the uterus exhibit the natural proximity of its parietes and consequent diminution of its cavity in the unimpregnated state. The oblique position and direction of the os tincæ, and the relative position of the bladder to the cervix uteri and vagina, are well seen in this preparation: the cavity of the contracted bladder is dilated with a portion of quill.

2823. The left ovary and oviduct, with the left half of the uterus and vagina and the urinary bladder. The wrinkles, cicatrices, and other irregulari-

ties on the exterior of the ovary indicate that the parts are from an aged female. A bristle is inserted into the fimbriated aperture of the oviduct, and the fundus uteri is dilated to show the gradual expansion of the angle beyond the termination of the oviduct. The contrast presented between the smooth surface of the fundus uteri and the irregular surface of the cervix uteri is well displayed in this preparation, in which the protuberance from the anterior part of the cervix, analogous to those shown in No. 2817, is also shown.

2823 A. The uterus and oviducts prepared to show the form of their cavities and the character of their internal surface. The fimbriated orifice of the right oviduct is left entire; a portion of quill is passed through it: the tube dilates beyond this orifice and then gradually contracts to almost capillary minuteness: the surface of the lining membrane of the tube is augmented by various folds, chiefly longitudinal in direction; these subside about an inch from the uterus, where the oviduct again begins slightly to dilate; where it enters the uterus the longitudinal impressions terminate abruptly. The natural hour-glass form of the cavity of the unimpregnated uterus is exhibited in this section.

Prepared by Mr. Owen.

2824. The cervix uteri and part of the vagina, showing the form of the os tincæ or mouth of the uterus.

2825. A section of the Female pelvis, with its contents injected and displayed *in situ*, from the right side; the corresponding parietes of the urinary bladder, rectum, uterus and vagina have been removed. The place of the reflection of the peritoneum from the bladder upon the cervix uteri, and from the rectum upon the beginning of the vagina, is shown. A bristle is passed into the bladder, through the termination of the right ureter. The transverse semilunar fold of membrane or 'hymen' separating the vagina from the urethro-sexual canal is here well developed. The valvular folds of the lining membrane of the rectum and the external parts of generation are also shown.

2826. The corresponding parts of a Fœtus displayed from the left side. Here may be noticed the great proportion of the urinary bladder, which rises

above the symphysis pubis, as compared with the adult; and the large size of the urethral outlet as compared with that of the vagina, which projects into the termination of the urethra in a valvular manner: the hymen resembling in its form and development an os tincæ. The vagina is greatly dilated as it proceeds towards the uterus, and its cavity is much more capacious as compared with the adult. The elongated smooth ovarium and the course of the round ligament are shown on the right side. There are no valvular productions of the lining membrane of the rectum.

2827. The ovaria, oviducts, and uterus of an Adult, in which, besides the large ordinary pavilions, there are two smaller processes projecting from the broad ligaments slightly fimbriated at their free extremity, which is perforated by an aperture leading to a narrow blind canal, the whole representing an abortive attempt at a formation of a second oviduct on each side. Bristles are inserted into both these apertures and those of the true oviducts or Fallopian tubes.

2828. The female organs of a Mulatto, exhibiting an abnormal elongation of the angles of the uterus, which gives it the appearance of the uterus bicornis of the inferior Mammalia; the rugæ characteristic of the cervix uteri and the os tincæ are also nearly obliterated.

2829. The external organs of generation. A bristle is inserted into the groove of the clitoris and a quill is passed through the urethra.

2830. A similar preparation, with bristles inserted into the ducts of some of the muciparous glands which open into the urethro-sexual passages.

2831. A similar preparation, showing a large development of the labia minora.

2832. A similar preparation from a Negress, showing the large size of the labia majora.

2833. A similar preparation, showing a remarkable elongation of the nymphæ.

2834. A section of the external parts of generation, showing a large clitoris and preputium: the crura clitoridis are dissected in this specimen.

2835. The external parts of generation, with the symphysis pubis, showing the attachment of the left crus clitoridis to the ischium.

The Hymen.

2836. The vagina and urethro-sexual canal of a Calf (*Bos Taurus*, Linn.), showing the constriction between the two passages, and the frænum or hymen passing across the constriction.

2837. The uterus, vagina, and urethro-sexual canal of a young Pig (*Sus Scrofa*, Linn.), showing the orifice of the vagina divided by a similar frænum.

2838. A transverse section, including the constriction separating the vagina from the urethro-sexual canal of a Sow, showing the vertical frænum which traverses the vaginal orifice.

2839. The termination of the vagina and the urethro-sexual canal of a young Ass (*Equus Asinus*, Linn.), exhibiting a similar condition and position of the frænal hymen.

2840. The vulva and urethro-sexual canal of a Mare (*Equus Caballus*, Linn.), showing the hymeneal constriction at the point of communication with the vagina. There is no frænum exhibited in this preparation.

2841. The organs of generation of a Girl, showing the constricted aperture between the vagina and the urethro-sexual canal traversed by a strong oblique frænum.

2842. The corresponding parts of a Woman, showing a similar structure of the hymen.

2843. A similar preparation, injected, showing the transverse duplicature of membrane between the vaginal and urethro-sexual canal so developed laterally as to reduce the aperture to the form of a mere vertical fissure.

2844. The external parts of generation, showing a similar development of the hymen, the margins of which are fimbriated.

2845. A similar preparation, showing the constriction between the urethro-sexual canal and vagina formed by the production of a crescentic fold of membrane developed from its inferior and lateral parts, and representing what is regarded as the natural form of the hymen. A bristle is passed through the urethra.

2845 a. A similar preparation from a Child, showing the crescentic form of the hymen. *Presented by Sir William Blizard, F.R.S.*

Series VIII. The Coitus.

2846. Two Snails (*Helix aspersa*, Linn.), which have been killed in the act of coition, showing the reciprocal intromission of the penis in these hermaphrodite mollusks.

2847. A similar preparation, with the intromittent organ in one of the specimens withdrawn.

2848. A similar preparation, with the common vaginal canal in each specimen laid open to show the extent to which the intromittent organ has penetrated; a bristle is inserted into its extremity.

2849. Two specimens of *Helix aspersa*, which have been killed while in the act of copulation, their shells removed, and the parts of generation dissected. The vagina of the upper specimen has been laid open, and the bulbous extremity of the intromittent organ is seen to be tightly embraced by the sphincter of the vagina; bristles are introduced into the prostatic duct, and oviduct; the multifid vesicles are small; the flagelliform appendage is bent backwards, and its free extremity is spirally twisted upon itself. In the lower specimen the same part has been unfolded.

2850. A male and female Silk-moth (*Bombyx Mori*, Fabr.), killed *in coitu*. The male is characterized by its smaller size and simpler antennæ.

2851. A male and female Privet-moth (*Sphinx Ligustri*, Linn.), killed *in coitu*, and with the ventral parietes of the abdomen removed to show the condition of the parts of generation.

2852. A male or Drone and Queen Humble-Bee (*Bombus terrestris*, Latr.), killed *in coitu*.

2853. A male and female Cockchaffer (*Melolontha vulgaris*, Fabr.), killed *in coitu*, and with the abdomen laid open in each specimen, to show the condition of the parts of generation.

2854. Two specimens of *Melolontha solstitialis*, Linn., *in coitu*: the abdomen of the female is laid open to show the size of the unimpregnated ova.

2855. The anal fins and appendages. or copulative holders, of a male Dog-fish (*Spinax Acanthias*, LINN.).

2856. A male and female Frog (*Rana temporaria*, LINN.), *in coitu*: in the male may be observed the sexual development of the radial digit of each anterior extremity, by which he is mainly enabled to retain his grasp during the long-protracted act of impregnating the ova; that act taking place as the ova pass from the female, and without intromission.

2857. A male and female Toad (*Bufo vulgaris*, LAUR.), *in coitu*, with the parts of generation exposed *in situ* in each specimen. Those of the male have been minutely injected: in the female the contents of the dilated terminal sac of the left oviduct have been expelled in the form of a long string of ova enveloped and attached together by a tough mucus: the corresponding ova of the right side are seen *in situ* through the thin and transparent parietes of the dilated oviduct.

Fig. 2.

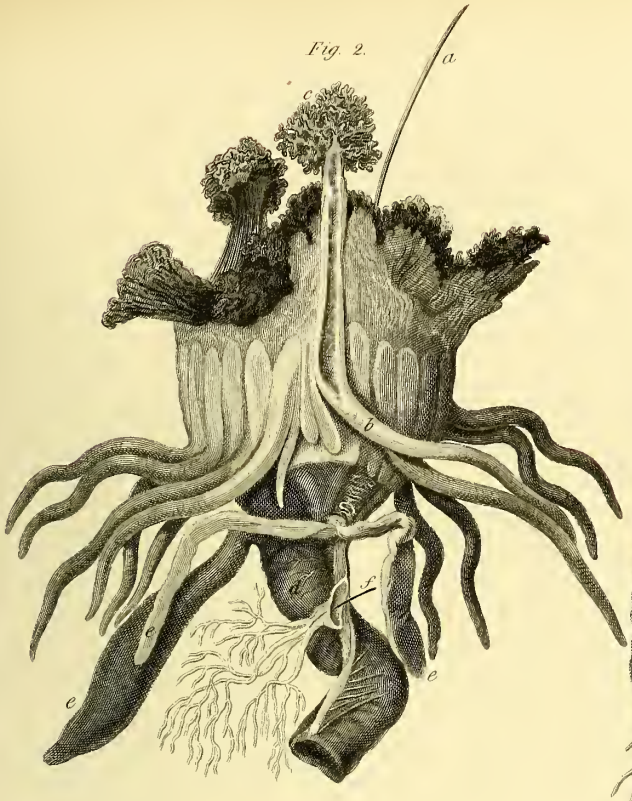


Fig. 1.

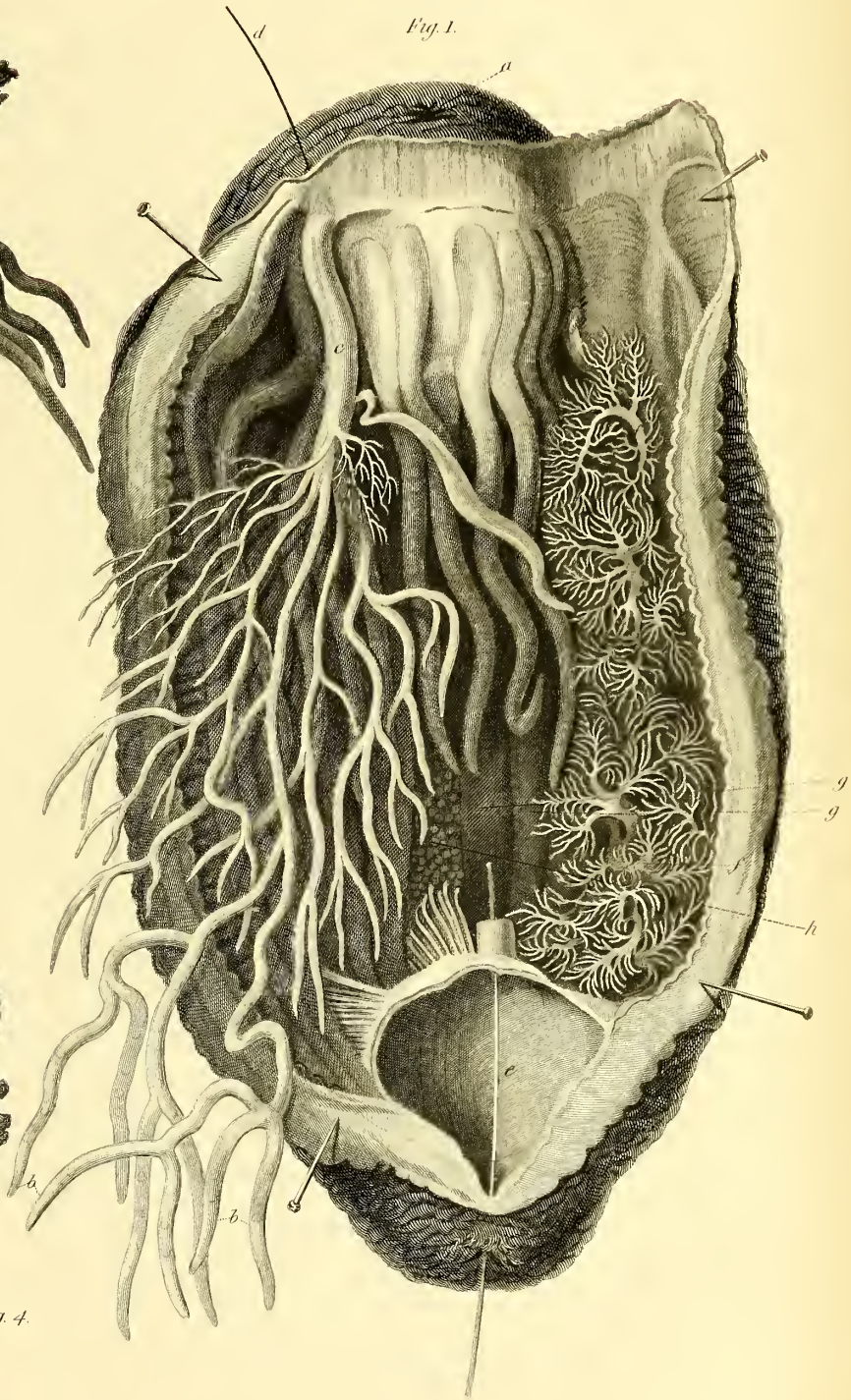


Fig. 3.

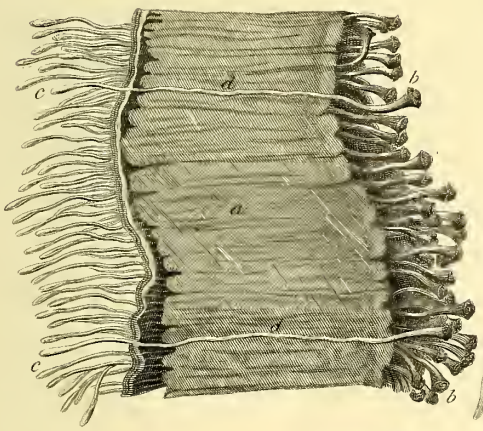


Fig. 5.

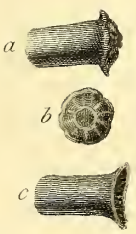


Fig. 4.

DESCRIPTION OF THE PLATES.

PLATE XLIX*.

A Holothure (*Holothuria tremula*, Linn.), dissected principally to show the unisexual generative organs.

The following is the original description, by Hunter, of the figures in this plate:

Fig. 1. "A drawing of the same animal" (as Pl. III., vol. i., p. 251.), "where some parts have been removed to expose others. This figure differs in having the intestinal canal removed so as to expose the other parts, but principally to show those ramifying ducts marked *h h* in (Pl. III.). These ramifying vessels collect into one large duct or trunk, which passes forwards and opens externally within an inch of the mouth. The only conjecture I can form of the use of this viscus is, that it is the parts of generation; there being nothing else in the body that can give us the idea of such parts, and I know of no other parts opening externally.

" *a*, The mouth.

" *b*, *b*, Different ramifications of this viscus," *i. e.* the parts of generation.

" *c*, The common duct.

" *d*, A bristle in its opening.

" *e*, The common opening of the rectum and ureters.

" *f*, *f*, What I suppose to be the kidney;" (this is the respiratory organ.)

" *g*, *g*, One pair of the straight muscles which pass from end to end of the animal, immediately under the skin, and which are at some little distance from one another.

" *h*, One of the intermediate spaces between the muscles, which is studded over with a number of little risings or eminences projecting some way into the cavity of the abdomen, which will be better understood in fig. 3.

* *No.* 34, *Manuscript Catalogue of Drawings.*

Fig. 2. " The mouth and œsophagus taken out, the better to show their construction. One of the appendiculæ cæcæ is opened, to show its continuation into an elongated body that is capable of being made to project out of the mouth of the animal: the beginning of the œsophagus is surrounded with these, answering to so many tongues or tentacula, intended most probably for the catching of the food; and probably these ducts secrete a viscid mucus which entangles the food.

" *a*, A bristle introduced into the œsophagus.

" *b*, The opened duct which is continued along to one of the tentacula, *c*, which is elongated, having an increased spongy termination, somewhat like a cauliflower.

" *d*, The beginning of the intestine.

" *e*, *e*, *e*, Glandular ducts which enter the gut near its beginning.

" *f*, A ramifying glandular part belonging to another viscus, described in fig. 1. (A portion of the branched ovarium.)

Fig. 3. " Is a section of the skin, or rather what should be considered the body or trunk of the animal, considerably magnified, and which gives a side view of those projecting bodies, *h*, *fig.* 1. They pass quite through the parietes of the trunk, like a bolt or nail, and can be made to project as far on the outside as they do within; but are of a different shape at their termination, one being like the head of a bolt, the other like the point.

" *a*, The parietes of the trunk.

" *b*, The external projecting ends or heads of the bolts.

" *c*, The internal projecting ends or points passing considerably beyond the internal surface.

" *d*, *d*, Two of the bolts dissected, or exposed through their whole length, showing that they are continued into each other.

Fig. 4. " Three views of the outer ends or heads of the bolts, magnified.

" *a*, A side view of one where the head is rounded or convex.

" *b*, An end view of the same.

" *c*, A side view where the termination is concave, as if drawn in like a sucker.

Fig. 5. " Is a side view of the internal end or point, which is a little enlarged before its termination.

Fig. 1.

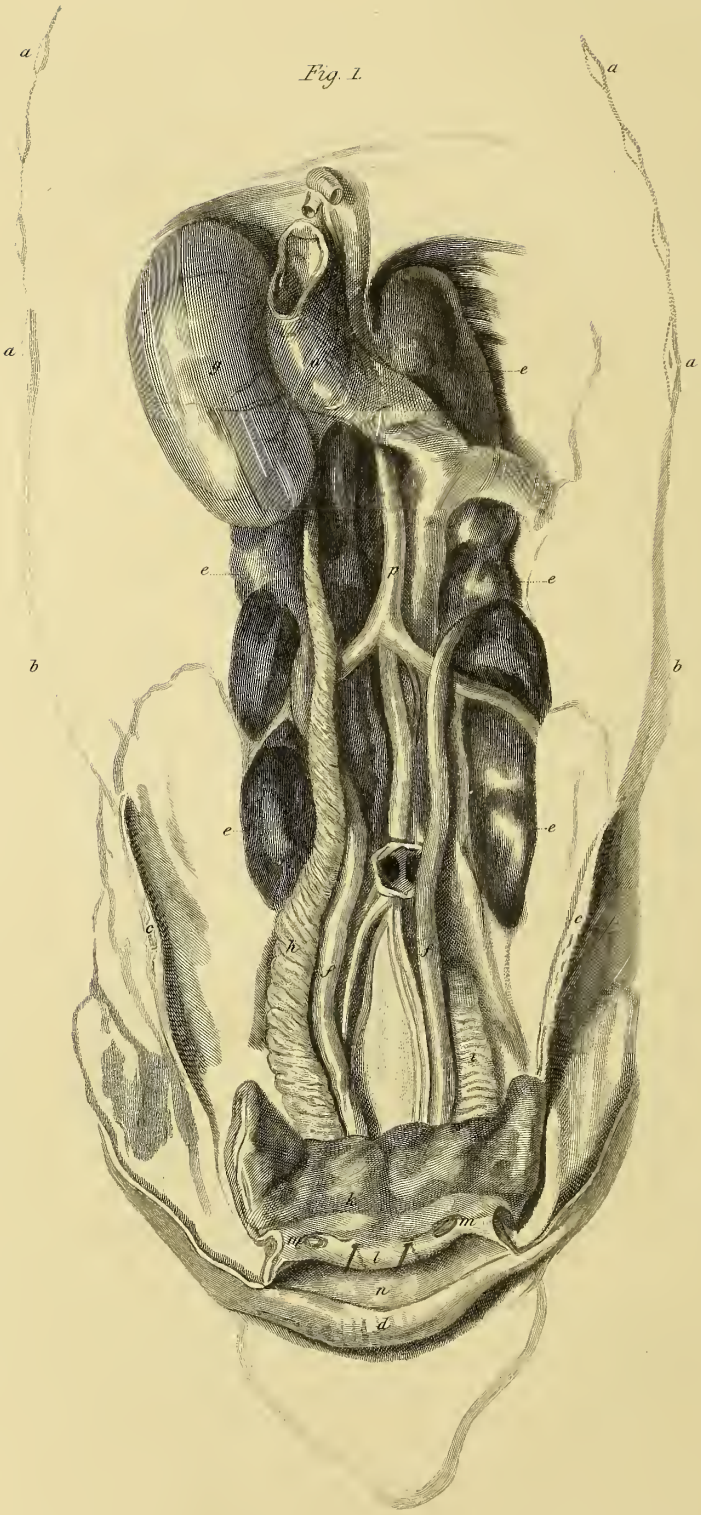


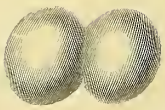
Fig. 2.

Fig. 3.

Fig. 4.

Fig. 5.

Fig. 6.



Rymsdyk & Bell. del.

Wedgwood. sc

" What may be the use of these, I can hardly conjecture. One could conceive the external ends were feelers; but why they should go through I cannot form an opinion."—*Hunter, Manuscript Catalogue of Drawings**.

PLATE L†.

MALE PARTS OF GENERATION OF THE OVIPAROUS WITH ONE OVIDUCT.

Fig. 1. " Exhibits principally the male parts of generation of the common Fowl. The parts themselves are highly finished; but all the other surrounding parts are only in outline."

" *a, a,* Ends of the ribs cut off, the sternum being removed.

" *b, b,* The cut edges of the abdominal muscles.

" *c, c,* The two lateral bones of the pelvis answering to the ilium in other birds.

" *d,* The upper lip of the cloaca.

" *e, e,* The kidneys.

" *f, f,* The ureters.

" *g,* The right testicle, the left being removed.

" *h,* The vas deferens of the right side.

" *i,* The termination of the left vas deferens.

" *k,* The rectum cut open on its under surface; the letter stands upon a kind of thickness at the termination of the rectum, the upper edge making a kind of fold.

" *l,* Stands between the terminations of the two ureters, with a bristle in each.

" *m, m,* The termination or opening of the vasa deferentia into the rectum.

* The structure and arrangement of the parts which Hunter here describes and represents with so much clearness and fidelity, relate principally to their movements of protrusion and retraction. They are membranous vesicular tubes, which constitute the principal organs of locomotion, and are usually called the feet of the Holothuria: they contain a clear fluid, which is conveyed to them by a complicated system of vessels, well described and delineated in the great work of Tiedemann (*Anat. der Rohrenholothurie*, &c., fol. 1820.); the parietes of the tube are muscular, and upon the contraction of the internal receptacle *c*, the fluid is propelled along the communicating canal *d*, into the external vesicle *b*, which becomes thereby distended and elongated: when this part retracts itself, the fluid is driven back into the internal vesicle.

† No. 128. *Manuscript Catalogue of Drawings.*

" *n*, A kind of blind cavity made on the upper lip of the anus.

" *o*, The vena cava and its branches.

" *p*, The aorta and its branches."

Fig. 2—6*. Testes of the Sparrow (*Pyrgita domestica*, Cuv.). " These figures show the gradual increase in size of the testes of the sparrow, from the middle of winter to the beginning of the breeding season; I examined those glands in January, February, March, and April; and the appearances they put on at these different periods are faithfully represented in the plate; with the date of their examination annexed to each."

" If we compare their size in January with what it is in April, it hardly appears possible that such a wonderful change could have taken place during so short a period."

Fig. 2. Shows the size of the testes in January.

Fig. 3. Do. in the middle of February.

Fig. 4. Do. in the beginning of March.

Fig. 5. Do. in the latter end of March.

Fig. 6. Do. in the middle of April.

PLATE LI†.

EXTERNAL ORGANS OF GENERATION OF ONE OF THE OPOSSUM TRIBE.

(*Didelphis Virginiana*, Shaw.)

" The figure is to show the scrotum, with the orifice of the prepuce, which in this animal is behind the testicles, instead of being before them, as in most other quadrupeds.

" *a*, The orifice of the prepuce close by the anus, so that the penis passes backwards when not erect.

" *b*, The posterior or upper margin of the anus.

" *c*, The pedicle or neck of the scrotum.

" *d*, *d*, The two compartments of the scrotum, including the testes."

* No. 129. *Manuscript Catalogue of Drawings;* see also Hunter's Observations on the Animal Œconomy, Plate VII. page 51.

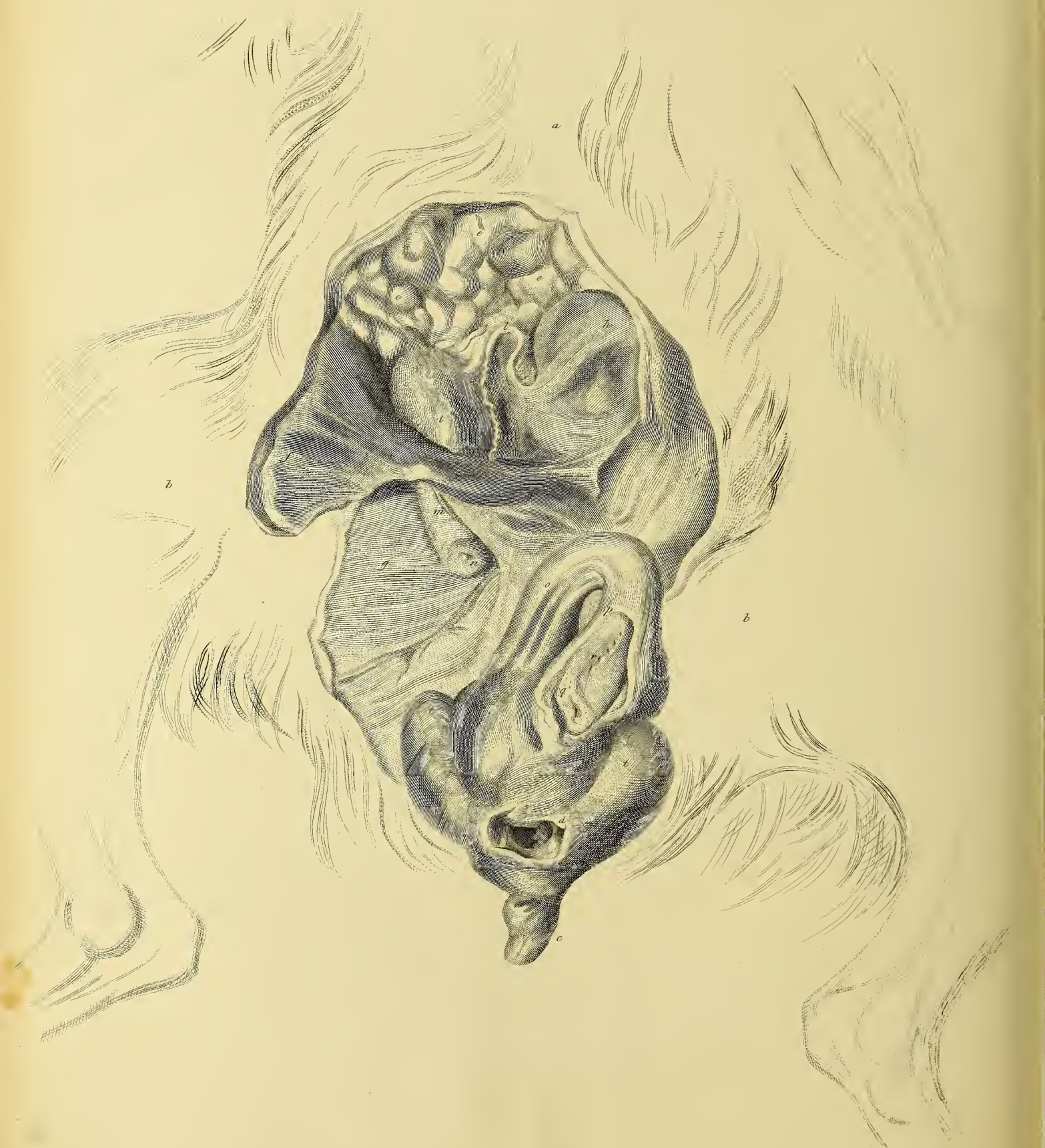
† No. 133. *Manuscript Catalogue of Drawings.*

W.m Bell, del.

Zeitter, sc.

Wm. Bell, del.

Zeitter sc.



W. Rymsdyk del.

T. Bradley sc.

PLATE LII*.

EXTERNAL ORGANS OF GENERATION OF THE AGOUTI.

" The animals of the tribe which I have called *Scalpris Dentata*, are wholly retromingent, arising from the penis (when not erect), after having passed forwards for a little way, making a quick turn backwards, almost to the anus in some species.

" They can hardly be said to have any scrotum; the true situation of the testicles being in the abdominal rings, which are wide, by which means the testicles are sometimes on the outside of the rings, making a rising there; and at other times entirely within the cavity of the abdomen."

In the present figure the animal is represented of half the natural size.

a, The penis rising under the skin as it passes backwards.

b, The glans.

c, The anus.

d, *d*, The scent-glands on each side of the anus.

PLATE LIII†.

MALE ORGANS OF GENERATION OF THE AGOUTI, NATURAL SIZE.

" In the figure the skin is removed from the penis, the pubis on one side, and from part of the thigh of the same side, with the abdomen opened at the lower part, sufficient to show the situation of the testicle."

a, The body of the animal.

b, *b*, The thighs.

c, The tail.

d, The anus.

e, *e*, The intestines.

f, The flap of the abdominal muscles turned out.

g, The muscles on the upper part of the right thigh.

h, The urinary bladder.

i, The testicle of the right side.

* No. 130. *Manuscript Catalogue of Drawings.*

† *No.* 131, *Ibid.*

k, The testicle of the left side, under the abdominal muscles.
l, The vas deferens of the right testicle.
m, The passage for the exit of the testicle.
n, The orifice made by the inversion of the cremaster.
o, The penis bent.
p, The slit edge of the prepuce.
q, The glans penis.
r, The dentated horny style on the side of the penis.
s, *s*, Erectores penis.
t, *t*, The two glands on the sides of the anus.

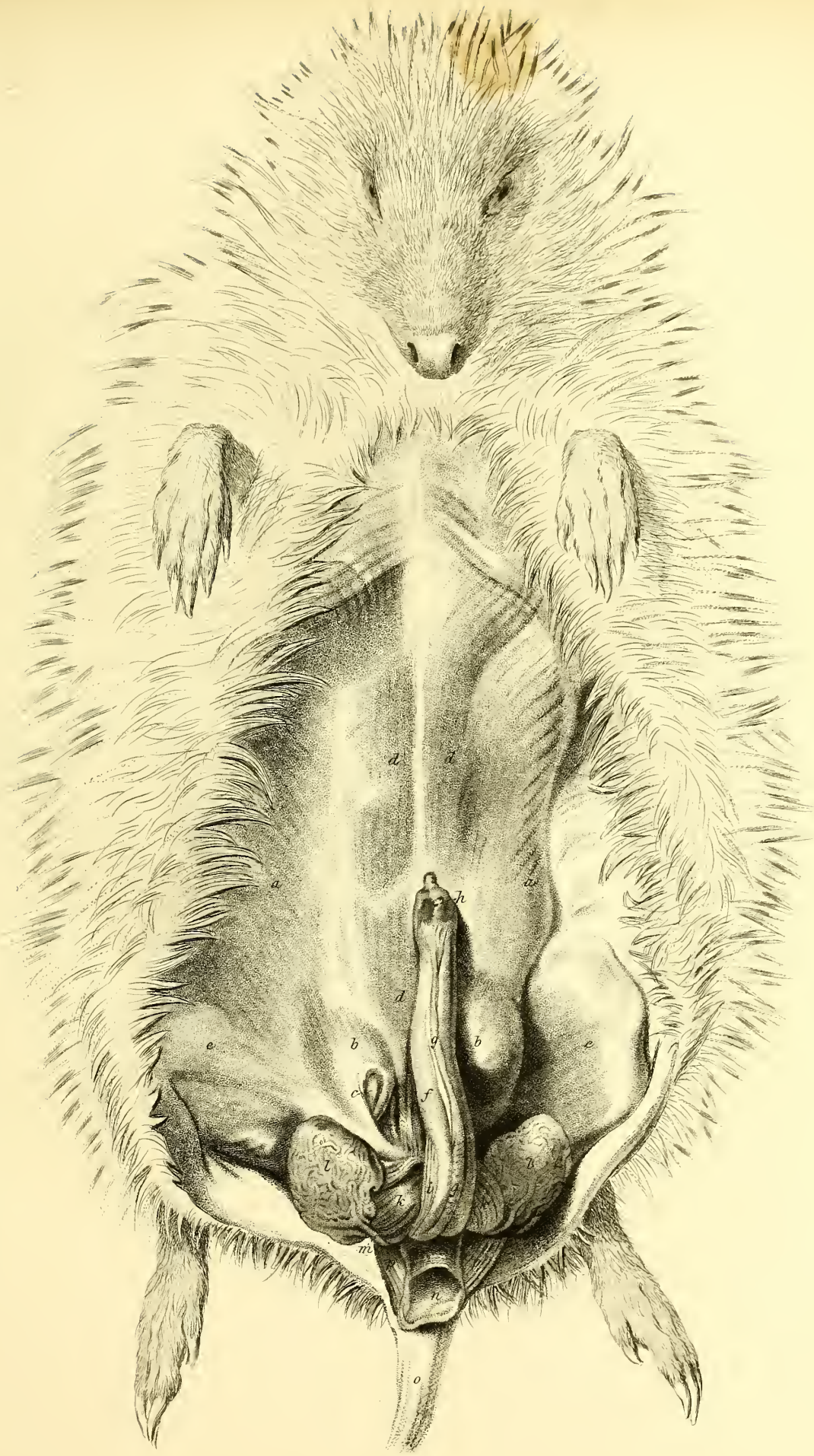
PLATE LIV*.

MALE PARTS OF GENERATION OF A HEDGE-HOG.

The skin of the abdomen is dissected off, exposing the abdominal muscles with a small part of the thighs and the external parts of generation.

a, *a*, The external oblique muscles.
b, *b*, The prominences formed by the testes, retracted within the external abdominal rings.
c, The external abdominal ring.
d, *d*, The recti abdominis.
e, *e*, The muscles of the thighs.
f, The penis.
g, The urethra.
h, The glans penis.
i, A small muscle, on the side of the penis, (one of the 'retractores' shown in No. 2512 A.).
k, *k*, The erectores penis.
l, *l*, Two glands on the side of the pubis (Cowper's glands).
m, The duct of one of these glands, as it passes round the ischium.
n, The rectum, with the sphincter, and opening.

* No. 136. *Manuscript Catalogue of Drawings.*

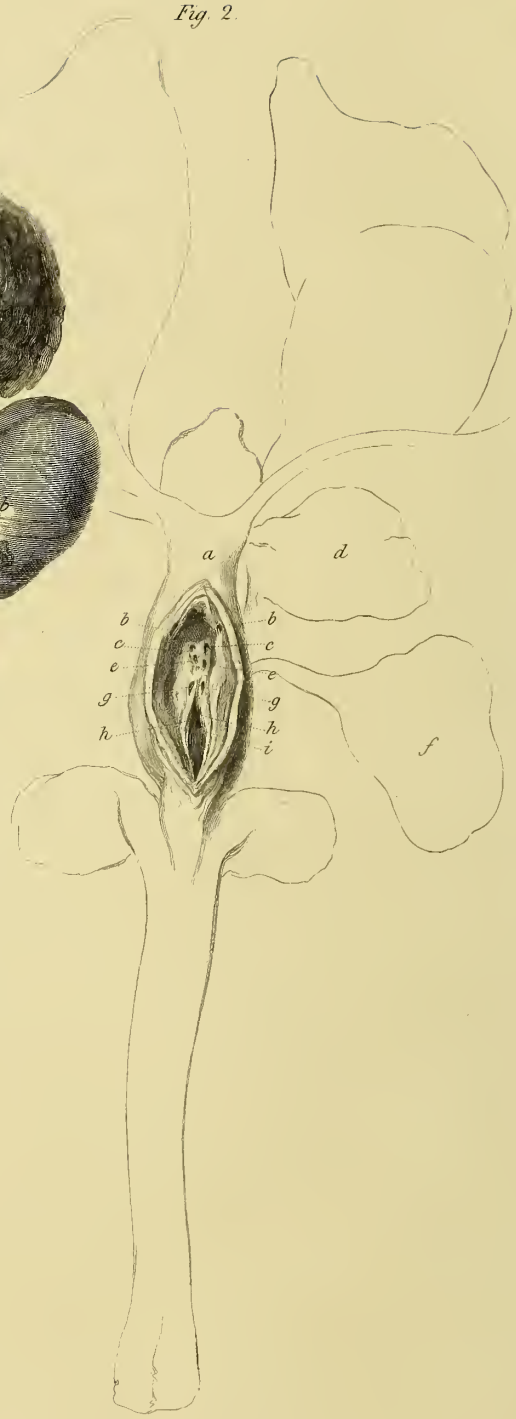


Wm. Bell, del.

Zeitter sc.

Fig 1.

Fig. 2.



W.m Bell. del.

Wedgwood. sc.

o, The tail.

p, *p*, Two muscles of the tail.

PLATE LV.

Fig. 1*. Male organs of generation of a Hedgehog, after being taken out of the body; and almost the whole of the bladder removed, with the fore-part of the urethra slit open from the bladder to the bulb.

a, The rectum passing behind the bladder.

b, *b*, The testicles; part of the inverted cremaster.

c, *c*, The vesiculæ seminales.

d, *d*, The two prostate glands.

e, The two ducts of the prostate gland, as they pass along the urethra, to terminate at the edge of the opening of the foramen cæcum (*k*); so that that hole is under these ducts.

f, One of the glands that lie on the side of the pubis (Cowper's gland).

g, Its duct.

h, The posterior part of the cavity of the bladder, with the two openings of the ureters.

i, The two cut surfaces of the membranous (muscular) part of the urethra.

k, The urethra slit open beyond where the foramen cæcum has joined it.

l, The crura penis with their muscles not put into any order before drawing.

m, The body of the penis.

Fig. 2. Is the membranous part of the urethra slit open on that side where the rectum adheres, as far back as the bottom of the foramen cæcum; which shows the opening of the vasa deferentia, vesiculæ seminales, and the two glands on the sides of the pubis: for as they open within the foramen cæcum, and on the septum, between the foramen and urethra, they could not be shown in the other view.

a, The posterior part of the urethra between the bladder and the bottom of the foramen cæcum: this is laid open to show,

b, *b*, The orifices of the vasa deferentia.

c, *c*, The orifices of the vesiculæ seminales.

* No. 138. *Manuscript Catalogue of Drawings.*

d, Outline of one of the prostate glands.

e, *e*, The orifices of the prostate glands.

f, Outline of one of Cowper's glands.

g, *g*, The orifices of the same glands, entering near the bottom of the foramen.

h, *h*, The septum between the foramen cæcum and urethra.

i, The opening or communication between the foramen cæcuum and urethra.

PLATE LVI*.

THE WINDING PENIS.

This plate exhibits all that part of the winding penis of a Goat, which lies in the perinæum, or between the scrotum and anus.

a, *a*, The scrotum.

b, *b*, The two nipples.

c, The under side of the setting on of the tail.

d, The anus.

e, *e*, The cut edges of the skin of the perinæum turned aside to expose the penis, &c.

f, *f*, The muscles of the thighs arising from the pubis.

g, *g*, The body of the penis.

h, The bend of the penis.

i, The urethra.

k, *k*, The erectores penis.

l, *l*, The acceleratores urinæ.

m, *m*, The transversales perinæi.

n, *n*, The retractores penis.

PLATE LVII.†

Male parts of generation of a Porpesse, (*Phocæna communis*, Cuv.) *in situ*.

" The parts of generation in a Porpesse are similar to those parts in most of the ruminating animals ; especially in the male, as regards the penis. I could not observe the buttons for the attachment of the cotyledons of the fœtus in the uterus of the female. How far they " (the *Cetacea*)" copulate similarly to the

* No. 140. *Manuscript Catalogue of Drawings.* † No. 141. *Ibid.*

Wm. Bell del.

Tho. Braa[illegible] sc.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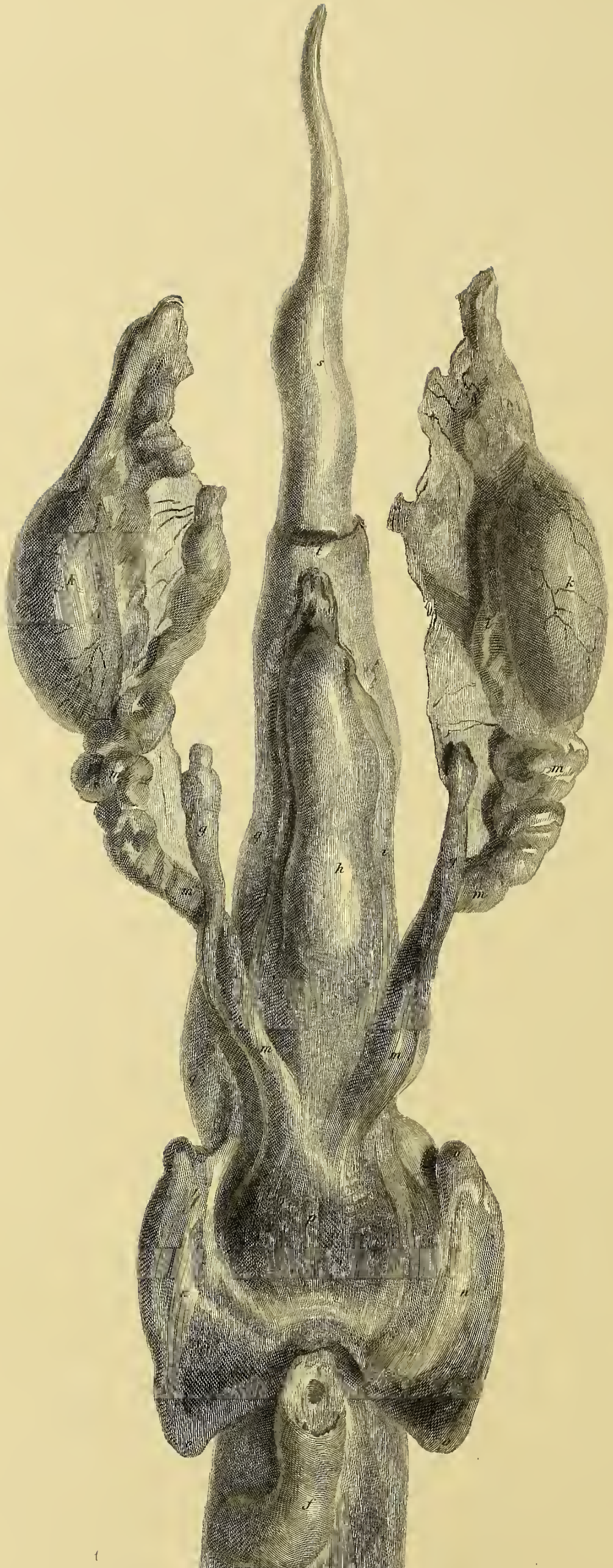


J. Van Rymsdyk del.

Engraved by [illegible]

ruminants I do not know. It is curious that their stomachs should be similar in the number of cavities."

"This Plate shows a section of the lower part of the belly of a Porpesse, with the contents of the lower part of the belly, and what answers to the contents of the pelvis in man, exposed."

a, a, The common integument.

b, b, The cut surface of the fat or blubber immediately under the skin.

c, d, The muscles going down to the tail.

e, e, The intestines.

f, The rectum.

g, The anus.

h, The urinary bladder.

i, The remains of the hypogastric artery.

k, The body of one of the testicles.

l, The epididymis.

m, The vas deferens.

n, The erector penis of the left side.

o, The bone which gives origin to that muscle.

p, Muscle inserted into the root of the penis.

q, The body of the penis which is constantly within the body of the animal, and which makes a turn upon itself at this part, being drawn back by the muscle *r*.

s, The glans penis, which protrudes when erect.

t, The line where the prepuce is reflected upon the glans.

v, The preputial orifice.

PLATE LVIII*.

The same parts taken out of the body; looking on that surface which is next to the rectum.

a, The inside of the skin and fat of the belly just above the anus.

f, The rectum,

g, g, The ureters.

* No. 142. *Manuscript Catalogue of Drawings.*

h, The urinary bladder.

i, *i*, The remains of the hypogastric arteries.

k, *k*, The testicles.

l, *l*, The epididymides.

m, *m*, The vasa deferentia.

n, *n*, The crura penis and their muscles.

o, *o*, The bones, or rudimentary ischia, to which they are attached.

p, The prostatic and muscular portions of the urethra, (the muscular layer is remarkable for its thickness).

q, The body of the penis or bent portion.

s, The glans penis.

t, The line where the prepuce is reflected upon the body of the penis.

PLATE LIX*.

Female generative organs of the Lamprey (*Petromyzon marinus*, Linn.).

" The ovarium of the Lamprey differs in some respects from that of the common Eel: it does not go so far down beyond the opening of the anus; and this is owing to the anus being more at the lower end of the abdomen than in the Eel.

" In the common Eel there are two distinct ovaria, having a pretty even edge, with the intestine passing between them attached to the back by its mesentery; but in the Lamprey the ovaria of both sides have but one root or attachment, spreading out on each side; it also forms not so regular a membrane as the ovaria of the common Eel, but is rather made of folds passing across; each fold terminating distinctly on each side. The intestine passes along, as it were, lying on it; and is not attached to the back by a mesentery."

Fig. 1. " Is an oblique view of the lower part of the cavity of the abdomen, with the intestine removed to within an inch of the anus. The ovary, kidneys, ureters, with their opening, part of the rectum, and anus are exposed."

" *a*, *a*, The cut edges of the parietes of the abdomen, the right being wholly removed.

* No. 149. *Manuscript Catalogue of Drawings.*

Fig. 1.

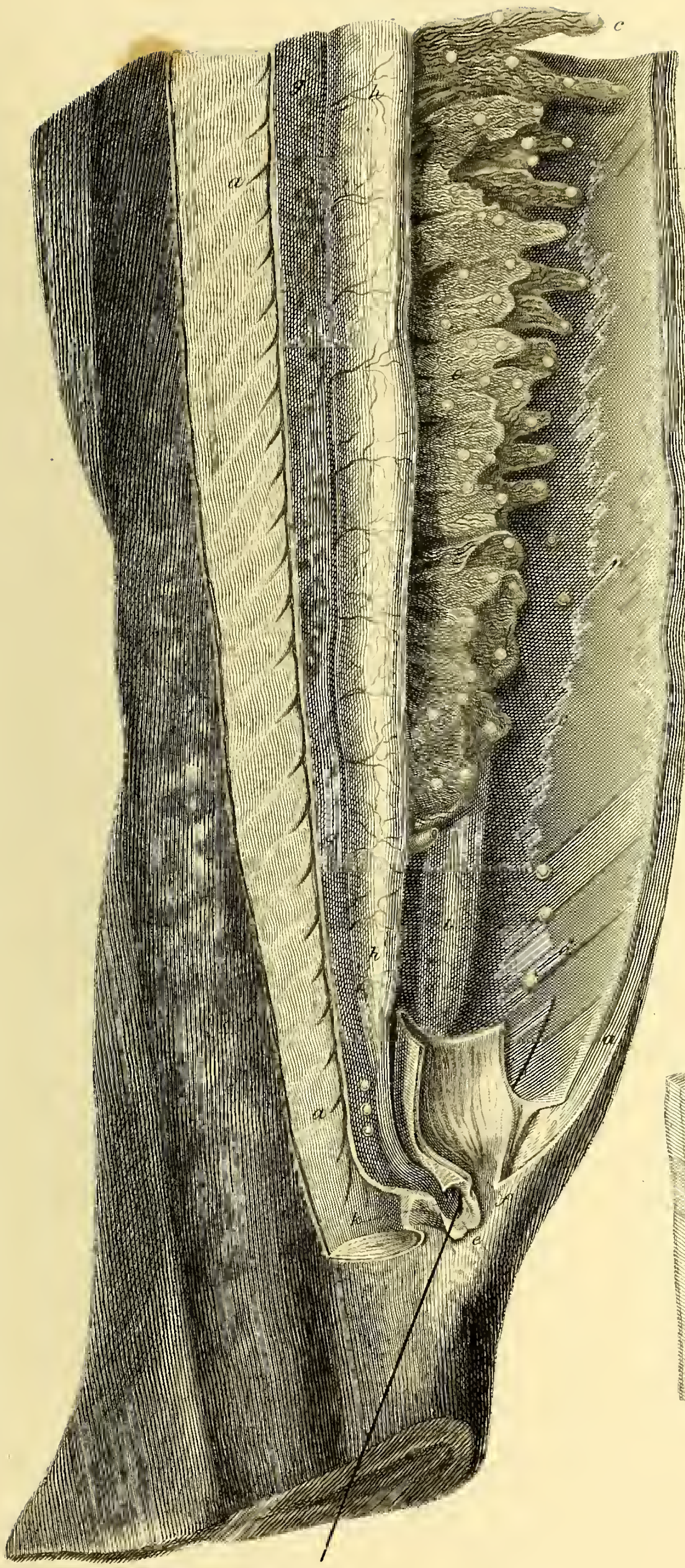


Fig. 3.

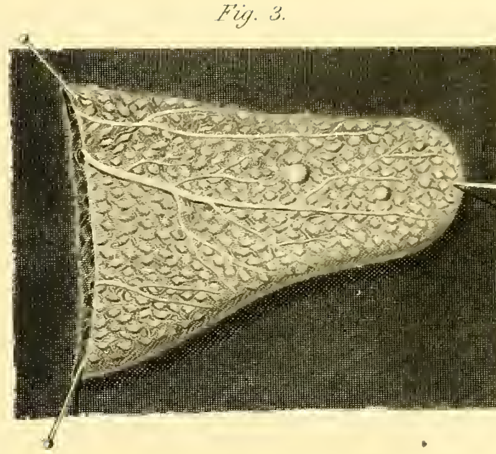
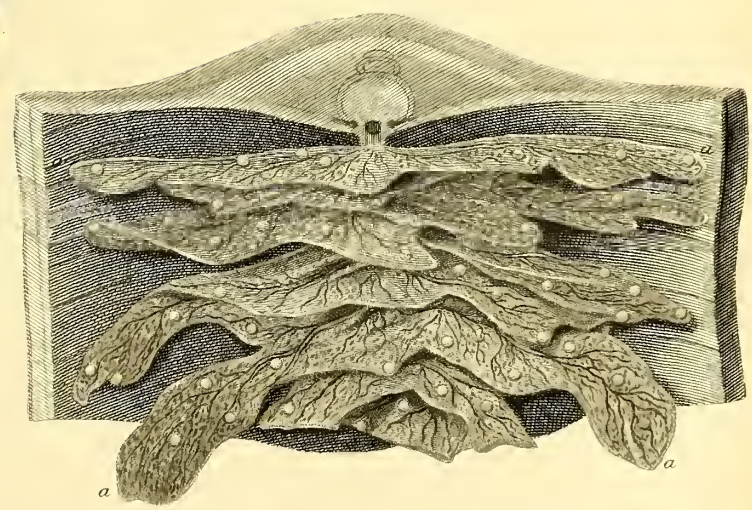


Fig. 2.



Wm. Bell, del. Js. Basire, sc.

Fig. 1.

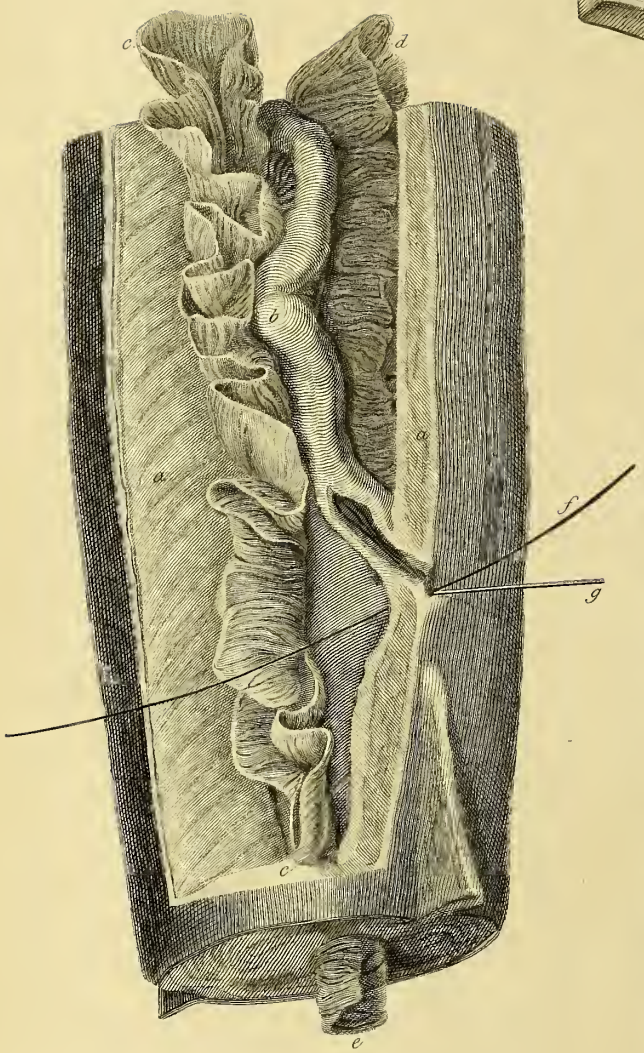


Fig. 2.

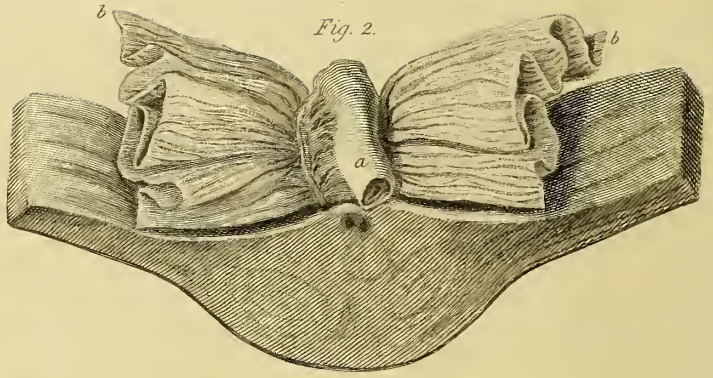
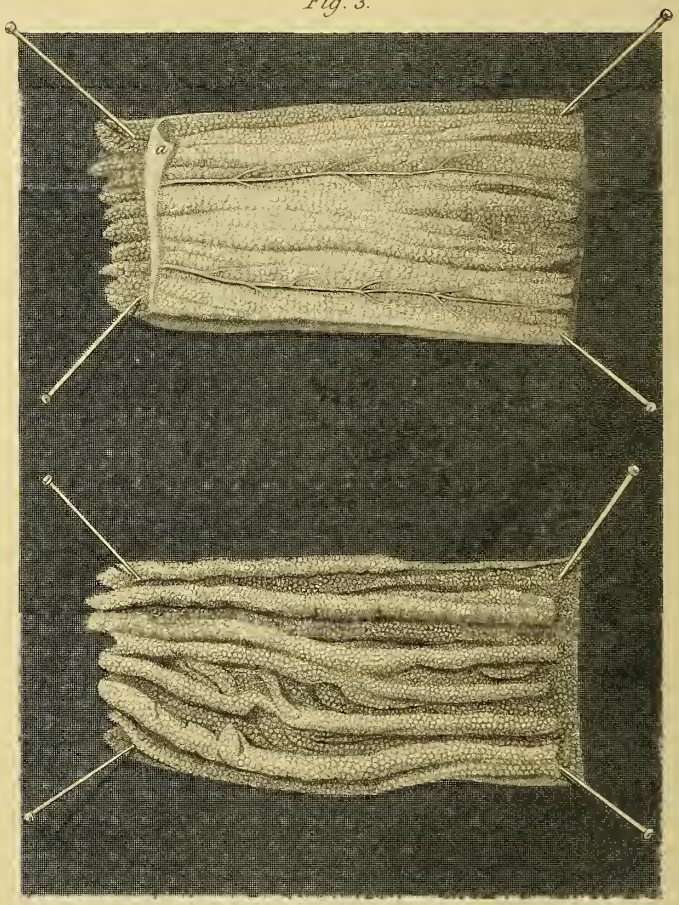


Fig. 3.



" *b*, The inside of the abdominal muscles of the left side.

" *c*, *c*, The ovarium ; the left side is seen beyond the right : in which ovarium there are round bodies, which I suppose to be ova ; some of which are detached and loose in the cavity of the abdomen, seen at *d*.

" *e*, Is the opening from without into the general cavity of the abdomen, slit open through its whole length on the right side; with a bristle introduced into that of the left side. These two passages open externally by one opening, just beyond the anus, which projected a little beyond the surface of the animal ; probably more than usual at the time of spawning, as I conceive this was."

" *f*, The anus.

" *g*, *g*, The right kidney, as it passes along the back.

" *h*, *h*, The right ureter which passes along the surface of the kidney, receiving the urine by small ducts. It is very large, and may be considered as a kind of bladder, becomes smaller at the lower end, and opens into the passage from the abdomen outward.

" *i*, The ureter of the right side.

" *k*, The orifices of the two ureters."

Fig. 2.* " Is a transverse section of the same Lamprey, with the intestine removed ; showing the ovarium, which is composed of folds, terminating laterally in distinct ends, having one general attachment to the spine. On these, as in the former, are seen the ova which are most advanced in size."

a, *a*, The termination of the folds of the ovarium.

Fig. 3. " Is one of those terminations magnified, to show the mottled appearance on the surface, which I suppose to be small ovaria or the calices of the ova spawned, with two of a larger size."

PLATE LX.

OVARIA OF THE EEL.

" The ovaria of this animal are two ; one on each side of the spine, passing along almost the whole length of the abdomen, one on each side of the stomach

* *No.* 150. *Manuscript Catalogue of Drawings.*

and intestines. At the lower end they pass down lower than the opening of the anus. Each is a thin membrane of some breadth, having one edge attached to the back, which edge appears as if gathered; which throws the loose edge into folds like the edge of a ruffle or ruff. The outer surface, for instance, that which is next to the abdominal muscles, is smooth; the other is thrown into transverse rugæ, or slightly plaited, in which the ova are formed.

"There is in this class of Fish no cavity in the ovarium, as in the roe in other fish: nor is there any oviduct as in other classes of animals.

Fig. 1.* "Is a section of an Eel, including some inches of the animal on each side of the anus. The belly is open more on the right side, which exposes the last gut with the two ovaria; as also bristles in the two passages, one from each side of the general cavity of the abdomen, which open externally just at the opening of the anus, but posterior to it,

"*a*, *a*, The cut edges of the abdomen, the right principally removed, which renders this surface the broadest, from being cut so much nearer the back.

"*b*, The rectum, which is laid open at the anus to show its cavity there.

"*c*, *c*, The right ovarium, which is most exposed, from the view of the abdomen being a little oblique.

"*d*, The left ovarium.

"*e*, The two ovaria passing down beyond where the body was cut through.

"*f*, The bristle in the passage of the abdomen of the right side, a continuation of which is seen within the cavity.

"*g*, A bristle passing into the abdomen through the passage on the left side; the part within the cavity not seen."

Fig. 2.† "Is a transverse section of the same Eel, which gives a view of the two ovaria, with their attachments to the back; with the gut passing down between them at those attachments."

a, The gut.

b, *b*, The two ovaria with their unattached edges thrown into folds.

Fig. 3. "The upper figure shows the outer surface of a part of the ovarium, magnified somewhat more than twice. The outer surface is smooth, but

* No. 147. *Manuscript Catalogue of Drawings.* † No. 148. *Ibid.*

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appears thinner at different parts. It is covered by the peritoneum, which is turned up at *a*. Vessels may be seen ramifying upon it. The whole surface may be observed to be mottled or studded with small white bodies, which are now observable from its being a little magnified, and which I conceive to be the ova. The lower figure is the inside of the same, showing the rugæ or valvular structure, having the ova more distinct, not appearing to be covered by the peritoneum."

PLATE LXI.

A view of the viscera, *in situ*, of a female Dog-fish (*Spinax Acanthias*, Cuv.), to show the commencement and termination of the oviducts.

a, *a*, Cut edges of the skin and muscles of the abdomen.

b, *b*, Cut surfaces of the cartilaginous arches of the pectoral and ventral fins.

c, The heart.

d, The cardiac portion of the stomach.

e, The reflected narrow pyloric canal.

f, The commencement of the intestine.

g, The enlarged valvular part of the intestine.

h, The anus.

i, *i*, The elongated lateral lobes of the liver.

k, The lobulus Spigelii.

l, *l*, Bristles inserted into the veins from the abdominal parietes going to join the Vena Portæ.

m, Spleen.

n, *n*, The ovaries.

o, Aperture of the common sinus, leading to the beginning of the oviducts.

p, *p*, The ligaments of oviducts.

q, *q*, The commencement, and *r*, *r*, the termination of the oviducts.

s, Their common outlet behind the clitoris.

t, The clitoris.

u, *u*, Outlets of the peritoneal canal.

PLATE LXII.

Female organs of a Dog-fish.

Fig. 1. shows the whole course of the oviducts, the chylopoietic viscera being removed.

a, *a*, Cut edges of the abdominal parietes.

b, *b*, Cut cartilaginous arches of the pectoral and pelvic fins.

c, The heart exposed in the pericardium.

h, *h*, Termination of the rectum, and rectal cæcum.

n, The right ovarium.

o, The common opening of the two oviducts. *q*, *q*, The dotted line leads to the orifice of the right oviduct; that of the left is laid open.

p, The oviducal or nidamental gland.

r, The dilated uterine segment of the oviduct.

s, *s*, The terminal orifices of the oviducts.

t, The process on which the ureters terminate.

u, *u*, The peritoneal canals.

Fig. 2. Part of the uterus magnified, showing the wavy folds and their vessels.

PLATE LXIII.*

"The female parts of generation of a Crocodile. As these lay principally upon the kidneys to show them in their natural situation, it is necessary to show these parts also.

"*Fig.* 1. An anterior or lower view of the above parts.

"*a*, *a*, The kidneys.

"*b*, *b*, The ureters.

"*c*, What I take to be the capsulæ renales; one half is sliced off from the right capsula, exposing to the two substances.

"*d*, *d*, The rectum, passing along the hollow between the two kidneys.

"*e*, *e*, The oviducts." (The ovaria in the present immature example are repre-

* No. 151. *Manuscript Catalogue of Drawings.*

Fig. 1.

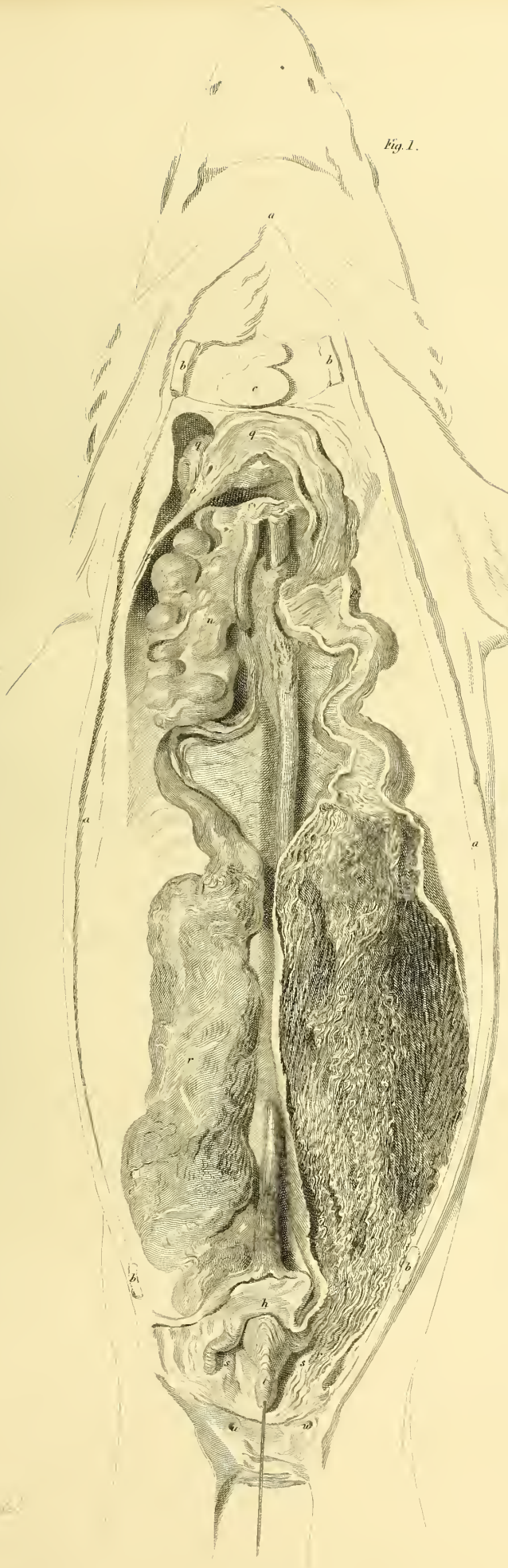
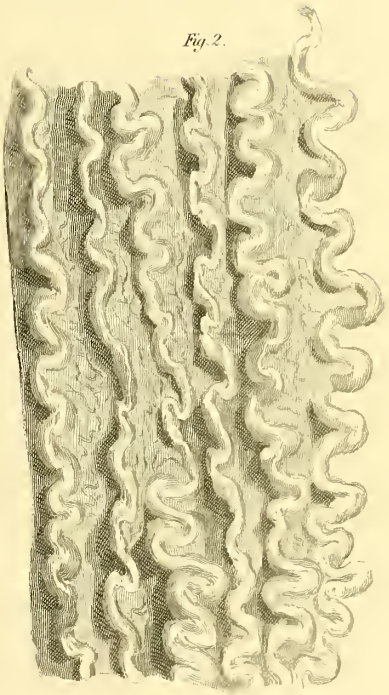


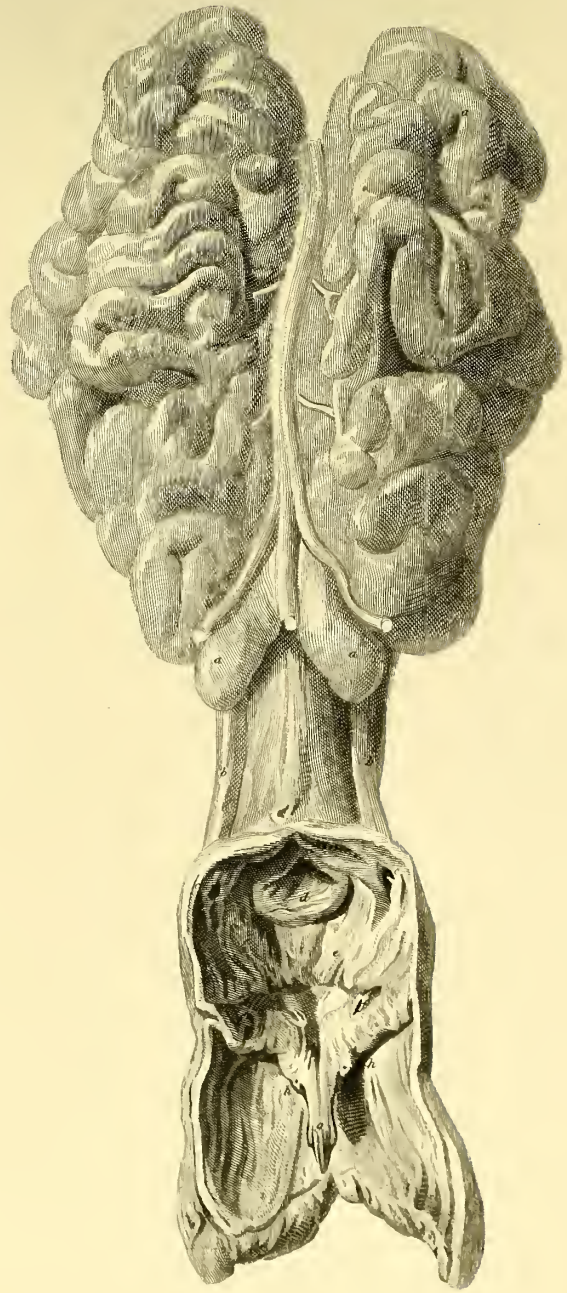
Fig. 2.



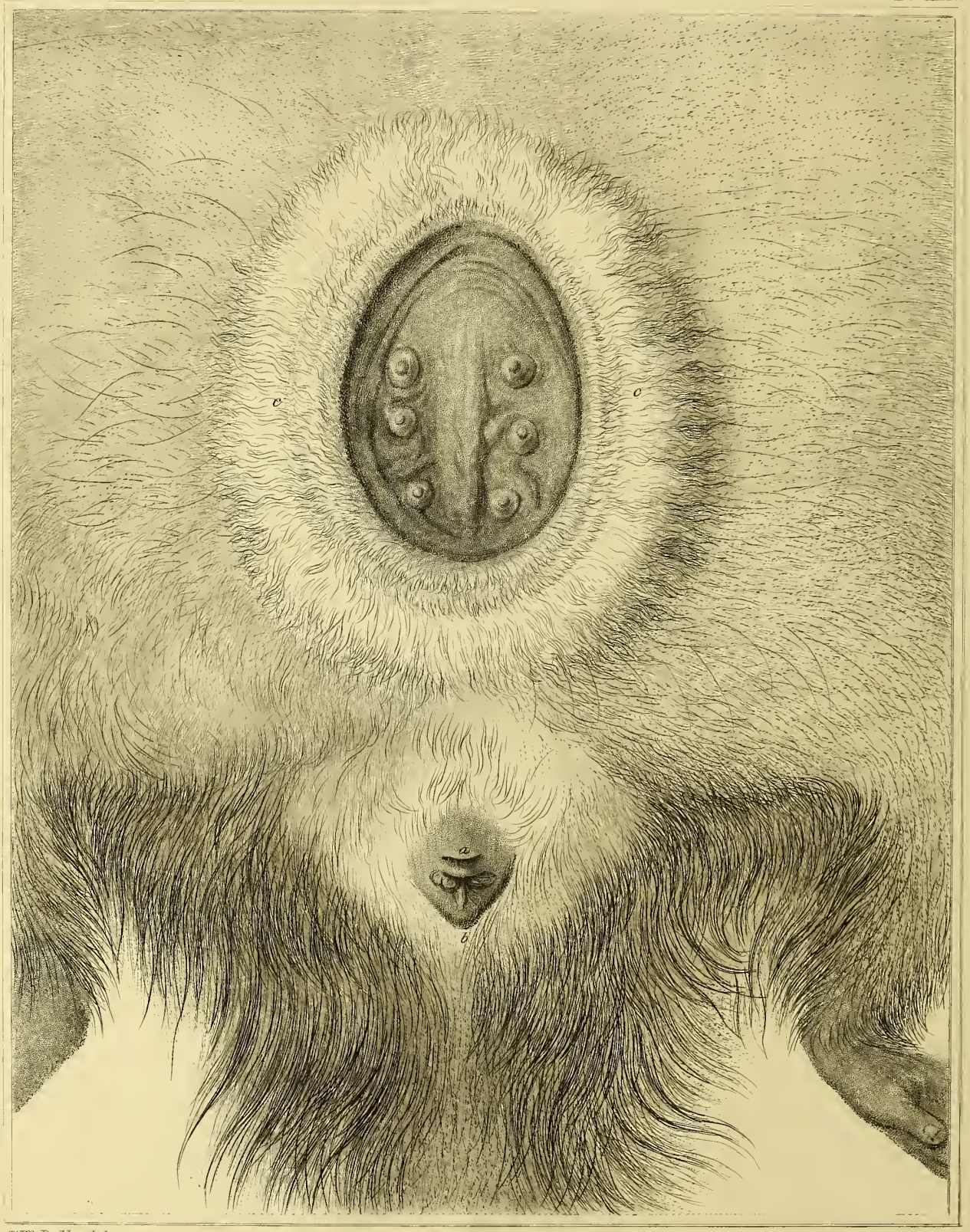
T. Van Heymsbergh del.

Fig. 1.

Fig. 2.



J. Van Rymsdyk. del.



Wm. Bell, del.

Zeitter, sc.

byk del.

Engraved by W. S. Taylor

sented by a granular structure of the membrane covering the parts called *capsulæ renales* by Hunter.)

" *f, f,* The broad ligaments, or meso-oviducts.

" *g, g,* The crura clitoridis.

" *h,* The glans clitoridis.

" *i,* The sphincter ani and vaginæ."

Fig. 2. A posterior or upper view of the same parts.

a, a, The kidneys.

b, b, The ureters.

c, c, The openings of the ureters.

d, The opening of the rectum in the common passage.

e, The urinary division of the common passage.

f, f, The openings of the oviducts.

g, The clitoris.

h, h, The papillæ at its base, on which are the openings of the peritoneal canals.

i, i, The external compartment of the cloaca.

PLATE LXIV*.

" Is the external parts of the common large female Opossum from North America " (*Didelphys Virginiana,* Shaw)," with the bag on the belly for containing its young; which might be called its nest.

" *a,* The opening of the vagina, which is so close to the anus, *b,* that when these parts are drawn in, the opening of the vagina is almost brought within the anus; at least there appears to be but one opening to both passages.

" *c, c,* The surrounding hair of the bag, which is turned out to show the bag, and which is longer and thicker here than on the other parts of the belly, and which hides the mouth of the bag when its mouth is shut. Six nipples belonging to the mammæ are seen in the cavity of the bag."

PLATE LXV.†

" A side view of the contents of the pelvis of a female Fox, the ilium of the

* No. 152. *Manuscript Catalogue of Drawings.* † No. 156. *Manuscript Catalogue of Drawings.*

left side being taken off to show the general position which the parts bear to one another in the quadruped. Also, a gland and bag for the secretion of mucus at the side of the anus, which is common to a great number of animals."

"*The surrounding Parts.*

"*a*, The outline of the thigh.
"*b*, The root of the tail.
"*c*, The symphysis pubis.
"*d*, The articulation of the sacrum to the ilium.
"*e*, Muscles of the back.
"*f*, Muscles of the abdomen.
"*g*, The anus.
"*h*, The vulva."

"*The Contents.*

"*i*, The bladder.
"*k*, *k*, The ureters.
"*l*, *l*, The rectum.
"*m*, *m*, The ovaries.
"*n*, *n*, The ovarian sac.
"*o*, *o*, The ovarian ligaments.
"*p*, *p*, The Fallopian tubes.
"*q*, *q*, The horns of the uterus.
"*r*, The body of the uterus.
"*s*, The vagina.
"*t*, The clitoris.
"*v*, The perineal or preputial gland covered by the sphincter vaginæ.
"*w*, The anal gland covered by the sphincter ani."

PLATE LXVI.*

THE FEMALE PARTS OF A PORPESSE.

"The parts of generation of the cetaceous tribe, of which the Porpesse is one,

* No. 159. *Manuscript Catalogue of Drawings.*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are more like the ruminating animals than any others that I am acquainted with: and although it is most probable they do not ruminate, yet their stomachs are made upon the same construction. The penis in the male, the vagina, uterus, ovarium, &c., in the female, are very much the same in their construction. In the present plate the female parts are taken out, and laid open from behind, to show their internal structure."*

a, That part which is seen between the clitoris and anus.

b, The clitoris.

c, *c*, Orifices of ducts of glands at the mouth of the vagina.

d, The internal surface of the beginning of the vagina, where it is pretty smooth.

e, *e*, Folds of the vagina near the os tincæ.

f, *f*, The os tincæ slit open.

g, The internal surface of the common uterus.

h, The mouth of the right horn of the uterus.

i, The beginning of the left horn slit open.

k, The internal surface of the left horn.

l, The beginning of the Fallopian tube slit open.

m, The internal surface of the tube.

n, The mouth, or fimbriæ.

o, The left ovarium cut open.

p, The right horn of the uterus.

q, The Fallopian tube.

r, Its mouth.

s, The ovarium.

t, The meso-cornua, or broad ligaments of the uterus.

* The female organs of generation of the Cetacea resemble in external form those of the Pachyderma, at least as much as those of the Ruminantia; and in their internal structure, as in the absence of the cotyledonal processes of the uterus, and the presence of the transverse folds of the vagina *e e*, they bear a much closer similarity to the Pachydermatous type.

END OF VOL. IV.

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