

BICHAT XAVIER

TREATISE ON THE
ANATOMY AND
PHYSIOLOGY OF THE
MUCOUS MEMBRANES

Xavier Bichat

**Treatise on the Anatomy and
Physiology of the Mucous Membranes**

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Xavier Bichat
Treatise on the Anatomy and Physiology
of the Mucous Membranes / With
Illustrative Pathological Observations

THE TRANSLATOR'S PREFACE

The works of no medical writer deserve a more attentive perusal than those of the illustrious Bichat. Erudite, observant, and industrious, he, at an early age, reared a monument of science, which will perpetuate his name and matchless talents. From the rich treasures he has left, the Translator presumes to present this Treatise in an English costume. Where all is excellent it is difficult to make a satisfactory selection; yet this portion of the author's productions merits the particular attention of medical students and practitioners in general, as it leads to the knowledge of the structure and economy of that part of the animal organization, which, more than any other, is subject to morbid affections.

The aim of the Translator has been faithfulness, clearness, and conciseness, rather than elegance: how he has fulfilled his intention he must leave to the decision of the candid Reader.

Saffron Walden,
July 1, 1821.

SECTION I. OF THE SITUATION AND NUMBER OF MUCOUS MEMBRANES

1. The Mucous Membranes occupy the interior of those cavities, which, by various openings, communicate with the skin. Their number, at the first view, appears very considerable; for the organs within which they are reflected are numerous. The stomach, bladder, urethra, uterus, ureters, the intestines, &c., borrow from these membranes a part of their structure: nevertheless, if it be considered, that they are continuous throughout, that everywhere they are observed to be extended from one organ to others, arising, as they did at first, from the skin, their number will appear to be singularly limited. In fact, in thus contemplating them, not as insulated in each part, but as continued over various organs, it will appear that they are reducible to two general surfaces.

2. The first of these two surfaces, entering by the mouth, nose, and anterior surface of the eye, (1) lines the first and second of these cavities: from the first it extends into the excretory ducts of the parotid and submaxillary glands; from the other it is continued into all the sinuses, it forms the tunica conjunctiva, descends by the puncta lacrymalia through the canal and lacrymal sac to the nose. (2) It descends into the pharynx, and there furnishes the inner surface of the Eustachian tube, and thence it penetrates and lines the internal ear. (3) It sinks into the trachea, and spreads itself over all the air passages. (4) It enters the œsophagus and stomach. (5) It extends into the duodenum, where it furnishes two branches, one destined to the ductus communis choledochus, to the numerous rami of the hepatic duct, to the cystic duct and gall bladder; the other to the pancreatic duct and its various ramifications. (6) It is continued into the small and large intestines, and finally terminates at the anus, where it is identified with the skin.

3. The second general mucous membrane enters, in men, by the urethra, and thence spreads from one part through the bladder, ureters, pelves, calices, papillæ, and uriniferous tubes; from the other it sinks into the excretory ducts of the prostate gland, into the ejaculatory ducts, the vesicula seminales, the vassa defferentia, and the infinitely convoluted branches from which they arise. In women, this membrane enters by the vulva, and from one part penetrates the urethra, and is distributed, as in men, through the urinary organs; from the other part it extends into the vagina, which it lines, as it also does the uterus and the fallopian tubes, and through the apertures at the extremities of these ducts it comes in contact with the peritoneum. This is the only example in the economy, of a communication between the mucous and serous surfaces.

4. This manner of describing the track of the mucous surfaces by saying that they extend, sink, penetrate, &c., from one cavity to another, is certainly not conformable to the march of nature, which forms in each organ the membranes that belong to it, and does not thus extend them from one to the other; but our manner of conceiving is best accommodated by this language, of which the least reflection will rectify the sense.

5. In thus bringing all the mucous surfaces to two general membranes, I am supported, not only by anatomical inspection, but pathological observation also furnishes me with lines of demarcation between the two, and with points of contact between the different portions of the membranes of which each is the assemblage. In the various sketches of epidemic catarrhs made by authors, we frequently see one of these membranes has been affected throughout its extent, whilst the other, on the contrary, has remained untouched. It is not uncommon to observe a general affection of the first, *viz.* that which extends from the mouth, nose, and anterior surface of the eye, into the alimentary canal and bronchi. The last epidemic observed at Paris, with which M. Pinel was himself affected, bore this character: that of 1761, described by Rayons, presented the same feature: that of 1732, described in the Memoirs of the Edinburgh Society, was remarkable for a like phenomenon. Now

we do not see at the same time a corresponding affection in the mucous membrane which spreads over the organs of urine and of generation. Here is, therefore, (1) an analogy between the different portions of the first, by the uniformity of the affection; (2) a line of demarcation between them, by the healthy state of the one and the disease of the other.

6. We observe also, that irritation on any one point of these membranes frequently produces a pain in another point of the same membrane, which is not irritated; thus a stone in the bladder causes a pain at the end of the glans, worms in the intestines produce an itching at the nose, &c. &c. Now in these phenomena, which are purely sympathetic, it is extremely rare that the partial irritation of one of these two membranes produces a painful affection in a part of the other.

7. We ought, therefore, from inspection and observation, to consider the mucous surface in general as formed by two grand membranes, spread over several organs, and having no communication with each other but by the skin, which is intermediate, and which, being continuous with both, thus concurs with them to form a general membrane, entire throughout, enveloping the exterior of the animal, and extending to the interior over most of its essential parts. It should seem, that there exists important relations between the internal and external portions of this unique membrane, and this we shall soon be shown by ulterior researches.

SECTION II. OF THE EXTERIOR ORGANIZATION OF MUCOUS MEMBRANES

8. Every mucous membrane presents two surfaces; the one adhering to the adjacent organs; the other free, beset with villosities, and always moist with a mucous fluid: each of them deserves a particular attention.

9. The adherent surface is attached to muscles almost throughout its extent. The mouth, the pharynx, the whole of the alimentary canal, the bladder, the vagina, the uterus, and part of the urethra, &c. present a muscular bed, embracing the exterior of their mucous coat. In animals that have the panniculus carnosus, this disposition perfectly coincides with that of the skin, which, as we shall see, is in other respects analogous in structure to mucous membranes. In man the cutaneous organ presents here and there traces of this exterior muscle, as we observe in the platysma myoides, the palmaris brevis, the occipito frontalis, in most of the muscles of the face, &c. This disposition of mucous membranes places them under the influence of those habitual changes of contraction and dilatation, which are favourable to their secretion, and various other functions.

10. This muscular bed is not immediately inserted into the exterior surface of the mucous membranes, but rather, according to Albinus, into a dense layer of cellular tissue, which all the ancient authors have denominated, in the stomach, intestines, and bladder, the nervous coat; but when well examined it presents no character analogous to that which the name indicates. The experiment of inflation, by which it is brought into its primitive state, is not so easy as Albinus and others have pretended; which led me to think that its nature might not be cellular, but that it was probably of a fibrous texture, formed by a web of extremely delicate and scarcely visible tendons, offering points of origin and insertion to all the fleshy fibres of the muscular bed, which, as we know, never describe entire circles, but rather different segments of that curve. I confess that this conjecture, though very likely, is not founded upon any decisive and rigorous experiment.

11. Whatever may be the nature of this intermediate membrane to the mucous and muscular coats, it evidently has a dense, close texture, which gives it a resistance very analogous to one of the fibrous membranes. It is from this that the organ receives its form; it is this which maintains and controls its shape, as may be proved by the following experiment. Take a portion of intestine: remove in any part of the bowel a part of this membrane, with the serous and muscular membranes: having applied a ligature to the inferior end, inflate it, the air will produce in the denuded part an hernia of the mucous coat. Take another portion of intestine, turn it, dissect off a small part of the mucous membrane and of this coat: inflation will produce upon the serous and muscular coats the same phenomenon as in the preceding case it did in the mucous membrane. It is therefore to this intermediate tunic that the mucous membrane owes its power of resistance to substances which distend it. This applies equally to the stomach, bladder, œsophagus, &c.

12. The free surface of mucous membranes, or that which is continually moistened by the fluid from which they borrow their name, presents two kinds of wrinkles or folds, the one inherent in their structure and which is constantly present, whatever may be their state of contraction or dilatation, such as the pylorus, the valvula conniventes, the valve of the colon, &c. These folds are formed, not merely by the mucous membranes, but also by the intermediate membrane mentioned above, and which in these parts takes a remarkable density and thickness.

13. The other folds may be called accidental, and are only observed during the contraction of the organ; such are those of the inner surface of the stomach, and of the large intestines, &c. In most of the human subjects brought to our amphitheatres, these folds in the stomach, of which so much has been said, are not perceptible, because generally the subject has died of a disease which

has impaired the vital powers, without preventing all the action of this viscus; so that, although it is frequently found empty, its fibres are not in the least contracted.

14. In experiments on living animals, on the contrary, these folds are very apparent; and observe how they may be demonstrated. Let a dog eat or drink copiously; open it immediately, and make an incision into the stomach the whole length of its greater curvature, no fold will then appear, but it soon contracts, its edges are drawn in, and the whole of the mucous surface is covered with numerous prominent plicæ in the form of circumvolutions. The same result may be observed in the stomach of a recently killed animal by distending it with air, and then opening it; or, what is still better, by laying it open whilst empty, and stretching it, the folds will disappear, and when we cease to make the extension they immediately form again and are very apparent.

15. I would observe on the subject of inflating the stomach, that by distending it with oxygen gas the application of this fluid does not produce more prominent folds, and therefore no stronger contraction, than when carbonic acid gas is used for the same purpose. This experiment presents a result very similar to what I have observed when I have rendered animals emphysematous by different æriform fluids. Frogs and Guinea pigs (these are the two kinds I have chosen, the one being an animal of red and cold, and the other of red and warm blood) presented very little difference in their irritability, or their Galvanic susceptibility, whether inflated with oxygen gas or with carbonic acid gas. They live very well with this artificial emphysema, which gradually disappears. Inflation with nitrous gas is always mortal, and its contact appears to strike the muscles with atony. The stomach distended with it very soon loses its power of contracting, and its folds disappear. Here, as in all the experiments which have the vital powers for their object, we frequently obtain very variable results.

16. It follows, from what we have said respecting the folds of mucous membranes, that in the contraction of the hollow organs, which are lined by them, they suffer but a very trifling diminution of surface, they scarcely contract at all, but fold themselves within; so that in dissecting them upon their contracted organ, we have an extent of surface nearly equal to that which they present during its dilatation. This assertion, which is true concerning the stomach, the œsophagus, and the intestines, is, perhaps, not quite so as respects the bladder, whose contraction does not show within such prominent folds, but they are sufficiently marked to bring the mucous membrane of this organ under the general law. It is, also, nearly the same with the gall bladder; yet we find here another cause; observed alternately, in a state of hunger and during digestion, it will be found to contain double the quantity of bile in the former case that it does in the latter, as I have had the opportunity of seeing in numerous instances, in experiments made with this object in view, or with other intentions. Now, when it has evacuated part of its contents it does not contract upon the remainder of the bile, with the energy of the stomach when it contains but little food, nor with the power of the bladder when it contains but a small quantity of urine, but is then flaccid, so that its distention or nondistention has but very trifling influence upon the folds of its mucous membranes.

17. Moreover, in saying that the mucous membranes present with trifling variation the same extent of surface in the dilatations as during the contraction of their respective organs, I intend to speak of the ordinary state of the functions only, and not of those enormous dilatations which are frequently seen in the stomach and bladder, more rarely in the intestines. In such cases there is doubtless a real extension, which in the membrane coincides with that of the organ.

18. One remarkable observation that the free surface of mucous membranes affords us, and which I have already pointed out, is, that this face is everywhere in contact with bodies of a different nature to that of the animal: these bodies are either introduced from without for its nourishment, and are not yet assimilated to its substance, as we see in the alimentary canal and in the trachea, or they are produced within, as we observe in the excretory ducts of the glands, which all open into cavities lined by mucous membranes, and discharge those particles, which, after having for some time formed a part of the composition of the solids, become heterogeneous to them, and are thrown off by that habitual action of decomposition, which takes place in living bodies. According to this observation

we must consider the mucous membranes as defensive coats, placed between our organs and foreign bodies, and that they consequently serve the same purpose internally which the skin does externally, as respects bodies that are in contact with it.

SECTION III. OF THE INTERIOR ORGANIZATION OF MUCOUS MEMBRANES

19. Between the mucous and other membranes, as respects their interior organization, there is this essential difference, that they are always formed by several thin fibrous layers; these layers or coats are, with the exception of the rete mucosum, the same as those which compose the skin with which these membranes have the most exact analogy. We are about to examine separately each of these layers, which are the epidermis, the corps papillaire, and the chorion, in their general attributes; we shall afterwards consider the particular modifications which they undergo in the different parts of the mucous surfaces.

20. All authors have admitted the epidermis of mucous membranes: it appears, even, that the greatest part of them have believed that it is merely that portion of the skin which descends into the cavities to line them; Haller in particular is of this opinion; but the least inspection is sufficient to show, that here, as in the skin, it forms but a layer superficial to the corps papillaire and chorion; boiling water, which detaches it from the surface of the palate, the tongue, and even from the pharynx, leaves the two other coats denuded and apparent.

21. This epidermis is very distinct upon the glans, at the anus, at the orifice of the urethra, at the entrances of the nasal fossæ, and of the mouth, and in general wherever the mucous membranes arise from the skin. It is demonstrated in these different places by the frequent excoriations which occur on them; it may be raised from the lips by a very fine lancet by the action of boiling water, a hot iron, or even by epispastics, as the method of the ancients proves, who employed them to produce a fresh raw surface for the cure of the hare lip.

22. But in proportion as we go into the depth of the mucous membranes, the existence of this coat becomes more difficult to be demonstrated; it cannot be raised by the finest instrument, nor detached by boiling water, at least in the gall bladder, in the stomach, and intestines. I have made these experiments in fresh slain animals, and also in those where the natural heat had quite left them. But what our experiments cannot effect, inflammations will often produce. All the authors, who have written on the affections of the organs which are lined by these membranes, mention instances in which flakes, more or less considerable, have been voided by the urethra, anus, mouth, nostrils, &c. Haller has collected a great number of similar observations. Without doubt the separation of the epidermis in these cases is produced nearly in the same way as we observe it in cutaneous inflammations. In many subjects that have died with symptoms of inflammation of the mucous membranes, and which I have already had the opportunity of dissecting, or of seeing dissected, I have not yet been able to observe this separation going on; that is to say, the epidermis separated at one point, and still remaining adherent at others, as in erysipelas. I have tried in vain to produce this effect by the application of an epispastic to the inner surface of the intestines of a dog.

23. This epidermis is subject, like that of the skin, to become callous by pressure. Choppart cites a case of a shepherd, "dont le canal de l'urètre présentait cette disposition, à la suite de l'introduction fréquemment répétée d'une petite baguette pour se procurer des jouissances voluptueuses." We know the density that this envelope takes in the stomachs of the gallinacea. In certain circumstances, where the mucous membranes are protruded from the body, as in prolapsus ani, inversion of the vagina, in the artificial anus, &c., sometimes the pressure of the dress produces in this epidermis a thickness evidently more considerable than is natural to it.

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