

**Case of a large bony tumor in the face completely removed by spontaneous separation. To which are added, observations upon some of the functions of the soft palate and pharynx / [John Hilton].**

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CASE OF  
A LARGE BONY TUMOR IN THE FACE  
COMPLETELY  
REMOVED BY SPONTANEOUS SEPARATION.

TO WHICH ARE ADDED,  
OBSERVATIONS UPON SOME OF THE  
FUNCTIONS OF THE SOFT PALATE AND PHARYNX.

BY MR. HILTON.

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THOMAS MOORE, aged 36, is a well-formed man; and has enjoyed perfectly good health, with the exception of the local disease under which he has laboured, and the circumstances attending the separation of the tumor. The origin of this he describes in the following words.—“About 23 years ago, “a little pimple, like a wart, appeared just under my left “eye, close to my nose. I scratched off the head of this “pimple; which formed a scab; and ever since there has “been a growth from under that spot.”

The tumor, although slow in its growth and free from pain, gradually increased in size, became more conspicuous, and proceeded to produce extreme disfigurement of the face. The turbinated and cellular apparatus on the left side of the nose were destroyed; the septum nasi was pushed towards the right side, so as nearly to obliterate the right nostril; and the left orbit was thrust outwards.

In a short time, the growth of the tumor displaced the inner wall of the orbit; and the globe of the eye, being then subjected to pressure, became the seat of most excruciating pain, though vision was very little impaired: the symptoms however continued; until, about 17 years ago, the globe, yielding to the pressure, burst, and gave exit to its fluid contents. The cicatrix of the cornea is still obvious, pointing out the part of the globe which gave way.

This yielding of the globe was attended with very little



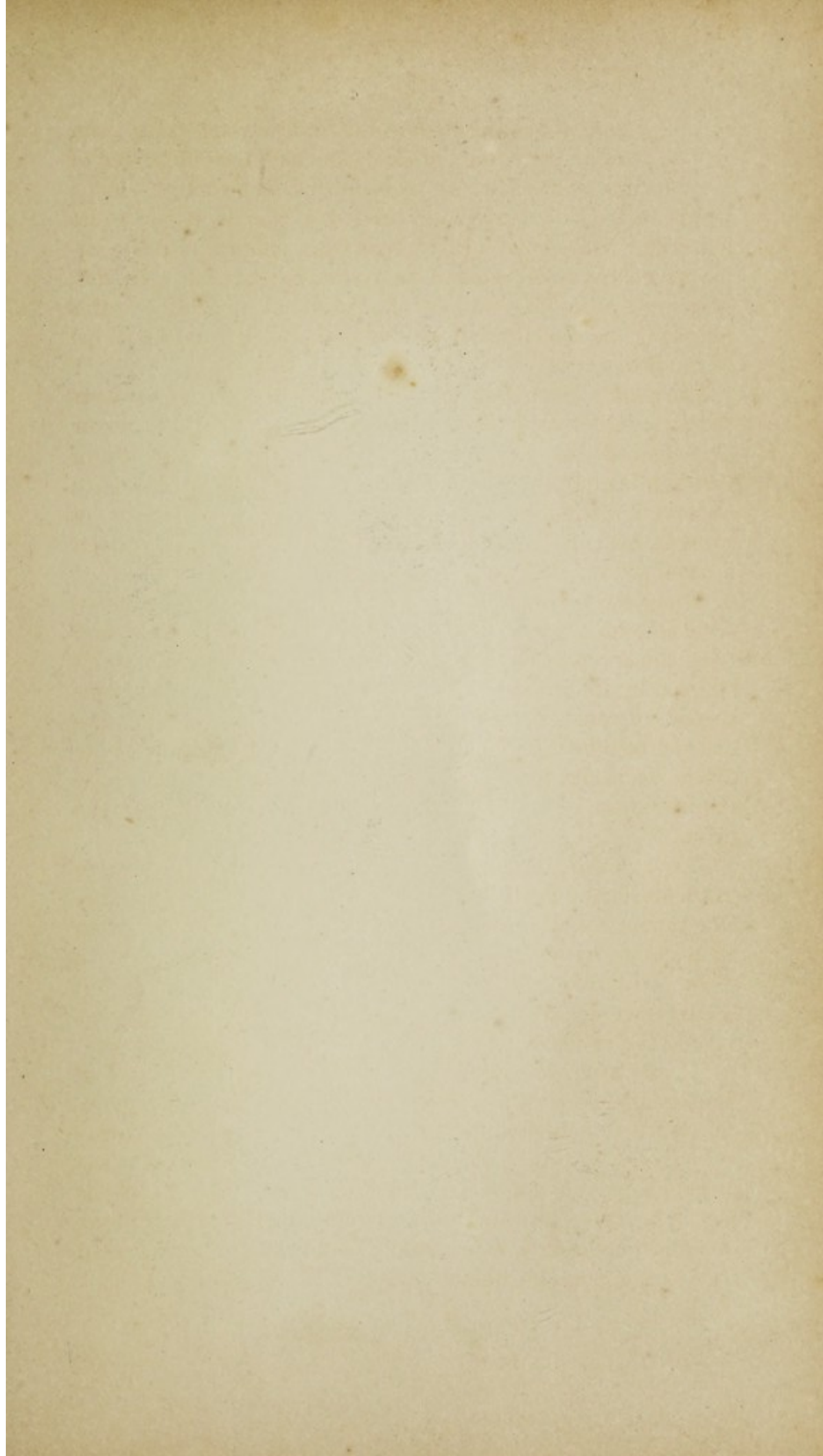
bleeding, but it produced almost complete relief from pain. In less than an hour, the patient, who had been deprived of rest during several weeks, was buried in profound sleep; which lasted so many hours, that his friends began to be alarmed. He awoke nearly free from pain; and this comparative ease has continued up to the present time. He has, however, been the subject of occasional neuralgic pains following the distribution of the first and second divisions of the fifth nerve.

The tumor fortunately did not extend backwards towards the pharynx or air-passages; so that the patient has never experienced any difficulty in swallowing, or breathing through his mouth; and has always been able to speak with as much distinctness and clearness of articulation as at present, his voice being now characterized by what is termed a nasal sound.

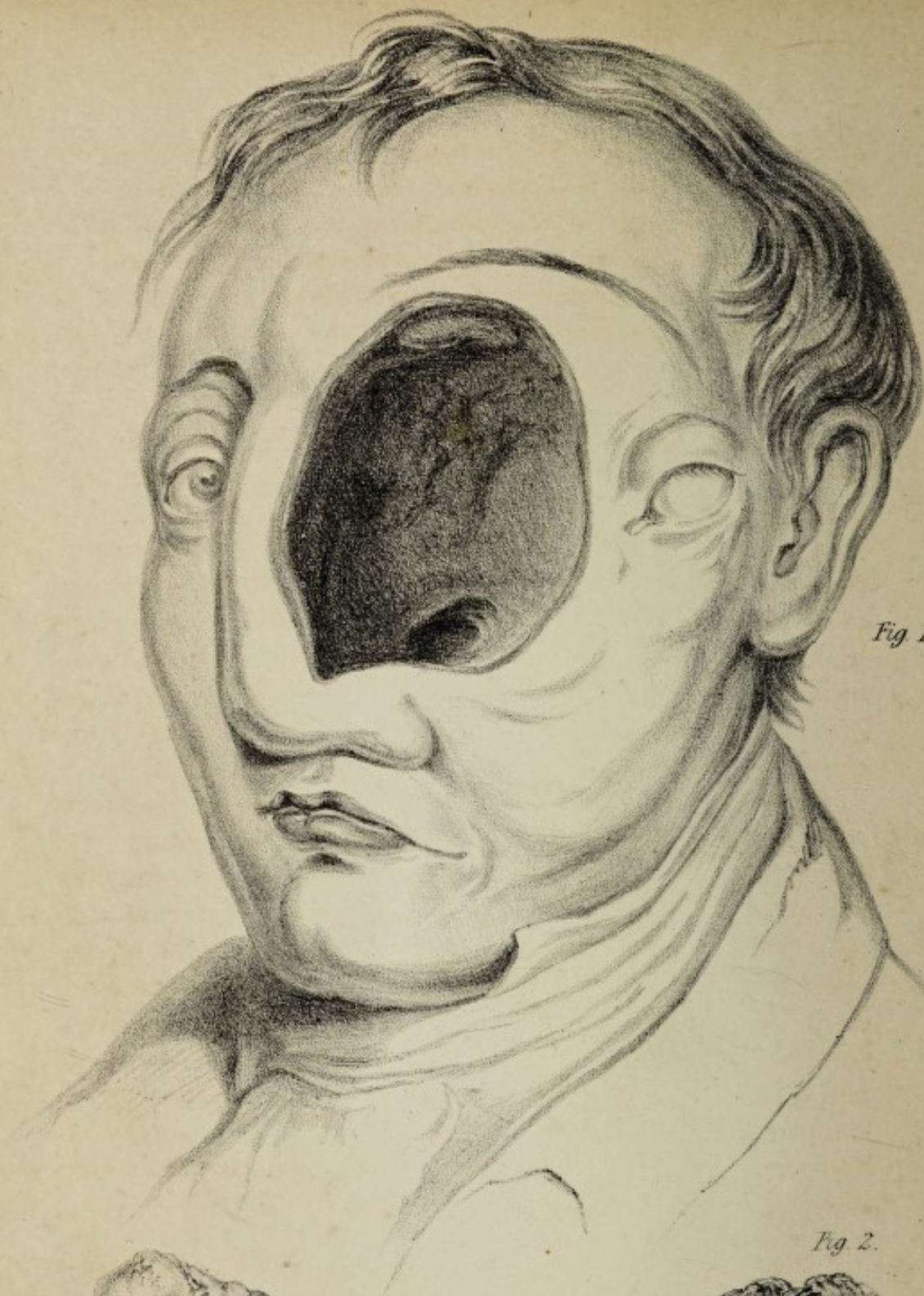
About six years ago, the tumor was observed to be somewhat loosened, and detaching itself by ulcerative absorption from the surrounding soft parts, the integuments being destroyed by its pressure forwards. This process was accompanied by copious suppuration, and occasionally by profuse arterial hæmorrhage, proceeding not from the vessels of the tumor itself, but from those of the adjacent structures about the situation of its origin, near the internal angle of the orbit.

Through the kindness of my friend Mr. Gilson, surgeon at Chelmsford, I saw this patient about eighteen months ago. The tumor was then exposed and moveable; and retained in its situation by bands of integument, which we proposed to divide, with a view to the removal of the bony mass: but the circumstances under which the patient was placed prevented the performance of this operation.

Shortly after this time, several small irregular portions of bone came away: but the large mass, without causing pain, continued to be maintained in its situation until the transverse bands of skin were divided by ulceration; when, to the patient's great astonishment, the whole tumor fell from his face. Neither pain nor bleeding attended this separation; but a large chasm was left, which is accurately represented in the accompanying sketch. (PLATE I. *Fig. 1.*)





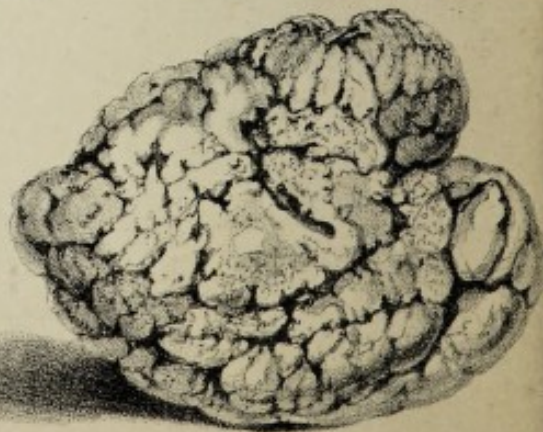


*Fig. 1.*

*Fig. 3.*



*Fig. 2.*



*by J. C. Canton.*

*Engraved by Chapman & Co.*



It was bounded *below* by the nasal surface of the hard palate and the floor of the left antrum: *above*, by the left frontal sinus and left half of the cribriform plate of the æthmoid bone: *internally*, by the septum nasi, which presented a general concave surface, with a small opening through it, at the lower part, communicating with the right nostril; and *externally*, by the left orbit. *Posteriorly*, it opened into the pharynx.

The roof, the outer wall, and part of the inner are now covered with granulations, more or less abundant, with here and there small portions of bone, denuded but not presenting any malignant character. On comparing the measurements from the median line of the face to the malar edges of the orbits, the distance on the left side is nearly an inch more than that on the right. The soft parts forming the left eyebrow are also elongated in the same direction, about half an inch; and the cerebral cavity appears to have been encroached upon, by the upward pressure of the tumor.

The tumor weighs fourteen ounces and three quarters. Its density is remarkable, the specific gravity being 1.80. Its greatest circumference measures rather more than eleven inches, and its least nine inches. The external surface (Plate I. *Fig. 2*) is irregularly nodulated; and an uneven concavity (Plate I. *Fig. 3*) exists at the posterior part. A section (Plate II. *Fig. 2*) presents a very hard polished surface resembling ivory; and exhibiting lines, to the number of fifty, arranged in concentric curves, enlarging as they are traced from the posterior part. The formation and structure of the tumor is described in the following letter, addressed to me by Dr. Hodgkin.

“DEAR FRIEND—The form of the bony tumor, which thou  
“hast been kind enough to send for my inspection, is so  
“irregular as almost to defy description. As a good idea  
“of it may be formed from the graphic representation which  
“accompanies thy paper, it will be needless to attempt to  
“give one in words, beyond that which may be required to  
“render its structure intelligible.

“Notwithstanding the numerous inequalities and fissures  
“which its surface presents, it has few salient asperities; the



“most prominent parts being, almost invariably, rounded,  
“occasionally flattened, and sometimes over-hanging the  
“fissures between them. Where the surface presents large  
“and nodulous inequalities, it approaches to the botryoidal  
“character; but where the inequalities are smaller and the  
“depressions numerous, deep and narrow, it is more like  
“that of some species of fungi. Some of the cavities, which  
“give an irregular figure to a part of the surface, and even  
“extend to the interior of the mass, have somewhat the  
“character of cells. The section exhibits a structure of  
“great compactness, more resembling ivory than bone, but  
“possessing, I conceive, still more nearly the character of  
“the crusta petrosa in the molar tooth of an elephant.

“The whole appearance of the natural and incised surfaces  
“is so characteristic, as, in my apprehension, to leave no  
“doubt as to the mode of formation of this remarkable tumor.  
“It is evidently one of those adventitious productions which  
“may be referred to the type of compound serous cysts, on  
“the peculiarities and importance of which I have insisted  
“in a paper published in the *Medico-Chirurgical Trans-*  
“*actions*. With this view, the inequalities of the tumor  
“appear to be sufficiently intelligible. The surface, being  
“opposed to soft parts, retains the rounded form; whilst the  
“sides of the component cysts have been modified by mutual  
“pressure. The principal depressions appear to be occa-  
“sioned by the septa formed by these cysts: a few of them  
“may be owing to the passage of nutrient vessels. There  
“is one broad, but shallow furrow, which appears evidently  
“to be of this description.

“This bony tumor, not merely in appearance, but also in  
“character, may therefore be regarded as bearing some  
“resemblance to the masses of bone which are sometimes  
“found in the substance of the uterus; where they are produ-  
“ced by deposition of earthy matter, in tubercles, referrible  
“to the type of compound serous cysts, and often erroneously  
“styled fibrous tubercles of the uterus. This tumor, however,  
“is more nearly resembling, if not absolutely identical with,  
“some forms of exostosis which evidently depend on the  
“production of cysts. Such exostoses present a nodulous  
“surface. When cut into at an early stage of their formation,



“the cells, which are very evident, are seen filled with a  
“transparent substance, which appears to be a kind of thick  
“mucus. It seems, in fact, to be a specimen of gelatinous  
“or gum cancer, in which the cells are on a small scale. In  
“a more-advanced stage, the substance of the excrescence  
“resembles cartilage; and in this latter, bony or earthy  
“matter is ultimately deposited.

“The remarkable tumor growing from the face of a young  
“man, of which a description was given by our friend J.  
“Morgan, in the last Number of our Reports, appears to have  
“been of this description. Although it did not appear to be  
“of a malignant character, it evidently presented, on exami-  
“nation after its amputation, the structure referrible to the  
“production of cysts: on which account I regarded it as  
“bearing the same relation to osteo-sarcoma, which is a  
“malignant disease of bone, that common non-malignant  
“ovarian dropsy does to fungoid disease of that organ (see  
“the Medico-Chirurgical Transactions for 1829): the absence  
“of malignity depending upon the material, to which the  
“peculiar structural arrangement is given, resembling tex-  
“tures natural to the body, and consequently capable of re-  
“maining as a perfect structure. The almost infinite gra-  
“dation in this character constitutes the chief, if not the  
“only difficulty in distinguishing malignant tumors, and  
“those which are not so: and, as a tumor may possess the  
“one character in the first-formed parts, and the other in  
“those which are superadded at a later period, it is evi-  
“dently most expedient to have recourse to early extirpa-  
“tion. The disposition to deposit bony or earthy matter,  
“inasmuch as it tends to produce a permanent structure, re-  
“moves the new growth from the character of malignity.

“The remarkable tumor, from the description of which I  
“have made this digression, has possessed the ossific ten-  
“dency in the highest degree. It possesses a degree of  
“hardness, which seems to exceed that of bone or ivory.  
“Where not discoloured by the decomposing secretions with  
“which it was in contact before it dropped, it is of a dead  
“white: the surface of the section bears a high polish; and  
“exhibits concentric lines, conforming themselves to the  
“circumference of the tumor. I imagine that these lines



“depend on the progress of the ossific process, rather than  
 “on that of the original structure which afforded the nidus  
 “for bone. One remarkable feature in this tumor is, that  
 “its attachment to the bones of the face, if it ever possessed  
 “any, was so extremely limited, that it cannot be made out  
 “in its present state;—a circumstance which may have  
 “contributed both to its ossification and separation. The  
 “striking degree of eburnation exhibited in this specimen  
 “has been observed in some other instances of bony  
 “tumor about the face; and seems to point to some condi-  
 “tion favourable to its production, respecting which I will  
 “not at present offer a conjecture. The female represented  
 “in our cast, No. 2757, had her orbits filled with large  
 “exostoses, which appeared to possess precisely the charac-  
 “ter of the tumor which forms the subject of thy paper.

“Thine truly,

“*Finsbury Circus, 31, 8, 1836.*

“THOMAS HODGKIN.”

#### ANALYSIS OF THE TUMOR BY MR. BRETT.

100 parts consist of animal matter, probably of a gelatinous nature . . . . .	28.58
Phosphate of lime, with a very small propor- tion of phosphate of magnesia, and traces of oxide of iron . . . . .	68.87
Carbonate of lime, and traces of an alkaline chloride . . . . .	2.00
Loss . . . . .	55
	<hr/> 100.00 <hr/>

#### THE COMPOSITION OF HEALTHY BONE ACCORDING TO THE ANALYSIS OF BERZELIUS.

Animal matter . . . . .	33.30
Phosphate of lime, with phosphate of mag- nesia, and traces of fluoride of calcium. . . . .	54.20
Carbonate of lime, with alkaline chloride and free soda . . . . .	12.50
	<hr/> 100.00 <hr/>



In these quantitative analyses the ingredients of the two substances differ in their proportions. The tumor contains less animal matter, more earthy phosphates, and less carbonate of lime than ordinary human bone; and it also differs very materially from adventitious bony deposits: they generally contain carbonate of lime in a larger proportion than healthy bone.

*July, 1836.* The patient, with the aid of good diet, continues in excellent health. The chasm in the face has diminished a little. The left orbit is not turned so completely outwards as when the tumor first escaped from the face. On the walls of the cavity the granulations are now more abundant and healthy, and the integuments at the edge of the wound are also increased; so that we may hope, with the assistance of nature, and a better adaptation of the soft parts, to afford some little relief to his present condition, and improve his appearance. The discharge from the granulations is not profuse, nor does it quickly pass into a state of putrescency. The local treatment has been, to wash the surface twice a day with lotions of nitric or nitro-muriatic acid, nitrate of silver, chloride of soda or lime; to leave the surface covered with dry lint; and to support and draw together the edges of the wound by slips of plaster.

The opening in the face, previously occupied by the tumor, now exposes, in their perfect state and natural position, the pharynx, and the hard and soft palate; and admits a view of them, as employed in simple respiration, or in those circumstances or efforts, to the due performance of which either inspiration or expiration is essential; as, for instance, in the completion and full evolution of the voice, the formation of letters, the construction of words, and also during the process of deglutition.

This rare opportunity of viewing the soft palate and pharynx engaged in their natural actions enables me to describe their modes of operation: and their condition in this case was so healthy, and their motions and adaptations so obvious, as to leave little room for doubt or disputation, and to render unnecessary any reference, on my part, to the opposing opinions of physiologists.

*Respiration*—In the first place, it is to be remarked, that



although the opening in the face is much more extensive than the nasal cavity in its natural condition, it must still be considered to represent, or be analogous to it, during the performance of nasal respiration.

During quiet and unconstrained breathing, *with the lips closed* so that the air must pass through the nose and opening, there is not any perceptible movement upwards of the soft palate; nor does the pharynx advance. The latter remains perfectly still; and the former, we may conclude, as it disappears in the descending direction, is closely adapted to the back part of the mouth, so as to leave, for the air passing to and from the larynx, a free and spacious canal.

When *the lips are slightly separated*, so that the respiration is in part carried on through the mouth, the soft palate is seen to be carried, or rather, perhaps, drawn upwards and backwards at each inspiration, and at each expiration again to decline; the pharynx continuing almost at rest, but having a slight disposition to advance.

Upon taking a full inspiration through the mouth, the palate is directed more completely upwards and backwards, and adapts itself to the advancing pharynx. This adaptation remains until the expiration has nearly terminated: but it should be remarked, that the sides of the pharynx do not, even in this case, approximate so much as during deglutition.

From these observations we may conclude, that during hurried or forced inspirations and expirations made with the mouth widely opened, nearly all, if not the whole of the air which enters and escapes from the pharynx and larynx is excluded from the nose, and takes its course through the mouth.

This arrangement appears suited to prevent the forced admission of air into the tympanum, through the Eustachian tubes; which would influence very materially the condition of the membrana tympani, and render it insusceptible of proper modification through the medium of the chain of bones.

It likewise serves to maintain the olfactory apparatus in an uninterrupted state of efficiency; which would doubtless be impaired, were the mucous lining of the organ of smell



rendered dry, by too much exposure to the rapid transit of air. The importance of this provision is forcibly exemplified in the condition of a dog hunting by scent: for occasional inspirations only being made through the nose, the delicate sensibility of the olfactory organ is maintained.

Thus, by a simple provision, determining the direction of the air, the functions of hearing and smelling are preserved in an effective state.

During the act of smelling, which is an inspiration through the nose with the mouth closed, there is no perceptible movement of the palate, nor of the walls of the pharynx; and a clear passage is thus permitted to the lower part of the pharynx.

If the odoriferous particles employed be very *pungent*, a different result takes place; as was observed in the following experiment:—A piece of wood, previously dipped into liquor ammoniæ, was held within the large cavity in the face. The patient did not smell it, nor did it make him sneeze; although it created a sensation of heat in the nose. This sensation of heat, gradually extending into the pharynx, its parietes involuntarily advanced, and the palate was raised so as to preclude the further descent of the ammoniacal vapour.

The same co-aptations between the palate and pharynx occur if the scent be in any way *disagreeable*. I suppose these to be the involuntary movements we usually experience in the throat, when we meet with any thing so offensive to the nose, that we feel a momentary disposition to vomit; until the offending air has been forcibly expelled from the upper part of the pharynx and the nose by a violent expiration through those parts. The intention of this sensibility in the pharynx and palate to pungent or irritating qualities of odoriferous particles, as a stimulus to involuntary muscular action, is doubtless to prevent the noxious air descending into the lungs: hence we are enabled to employ the nasal part of the respiratory tube as a means of intelligence, without at the same time implicating the more vital organs of respiration: and this I apprehend to be one of the important functions especially appropriated to the soft palate.



In whistling, which is produced by forcible expiration through the mouth, the palate is seen to ascend rather more completely than in full and easy respiration; and there is but very slight advance of the pharynx, but sufficient to compel the column of air passing from the chest to obtain its exit through the mouth. The whistle, however, can be but imperfectly effected, in consequence of some of the muscles of the lips having lost their bony attachments or fixed points; and also from the facial, their motor nerve, having been in part destroyed.

As soon as the expiration has apparently ceased, the palate descends, and the pharynx retires to its state of repose.

The same remarks apply in reference to the movements of the soft palate and pharynx, during the act of coughing; and we may infer that the air in neither case receives a direct impulse from the palate or pharynx.

In holding the breath, as it is termed, or forcibly retaining the air in the chest, either with the lips closed and the tongue depressed; or with the tongue raised and adapted to the concave surface of the hard palate, and the lips separated; or, lastly, with the superior and posterior portion of the tongue applied, by great voluntary effort, to the concave commencement of the soft palate, the lower jaw being depressed and carrying with it the genial portions of the genio-hyo-glossi muscles; the pharynx advances, and the palate is much raised, presenting a convex surface upwards, undulating, with a somewhat tremulous motion, upon the subjacent column of air.\*

I may also remark, that unless, superadded to this essential condition of the palate and pharynx, some one of these adaptations takes place, namely, of the lips to each other, or of the tongue to the roof of the mouth, or of the dorsum of the tongue to the origin of the soft palate, an expiration cannot be prevented from following inspiration almost immediately; clearly shewing, that the retention of the air in the chest cannot be accomplished, or, at most, can only

\* The forced muscular effort, here referred to, is produced by the stylo-glossi muscles supplied by the lingual nerve.



be kept up for an exceedingly short time, by the thyro-arytenoid and arytenoid muscles bringing the inferior chordæ vocales into approximation.

The integrity of the soft palate, then, is to be considered of importance, in keeping the chest distended with air;—a condition, on certain occasions, highly advantageous, in giving stability to those points to which the origins of some of the muscles of the upper extremity are attached.

Sneezing may be described as composed of two efforts—inspiration through the mouth, followed by expiration through the nose. During this act, the whole of the air retrogrades through the upper part of the pharynx and the nose, the palate being adapted to the back of the mouth, and the pharynx tranquil: but if sneezing happens many times in quick succession, so that the palate has scarcely time after its elevation, during the oral inspiration, to descend to the back of the mouth before the air returns from the chest, the palate is then seen violently agitated by the air in its ascending direction, being at that time obliquely placed with respect to the expired air, so that a portion of the air passes through the nose, and a portion through the mouth, giving the coarse tearing sensation to the palate, and flapping motion of the lips, experienced in the imperfect attempt to sneeze.

The sensibility of the left side of the septum nasi continues very good, but impressions made upon it do not induce sneezing.

*Deglutition.*—When the mouth is open to receive the food, the palate is raised, but not so completely as in full oral inspirations: the sides of the pharynx also approximate, but not so closely as on drawing the breath inwards: the posterior part of the pharynx advances but slightly. Directly the food, either solid or fluid, is placed in the mouth, the palate descends, and continues, during the detention of the food, closely adjusted to the back part of the mouth, the pharynx remaining perfectly quiet. These conditions are to be observed during the process of mastication, performed with or without food in the mouth. Extreme lateral movements of the jaw encroach upon the pharynx but very slightly; and in the ordinary lateral motion, there is no difference



to be observed in its capacity. Immediately antecedent to that part of the process of deglutition occurring in the passage of the food between the fauces and pharynx, or when the food is passing backwards over the upper opening of the larynx, the palate is carried *completely* upwards and backwards, and the pharynx advances, the sides of which more especially approximate. At this time the thyroid cartilage rises. These movements of the larynx and palate occur nearly simultaneously, those of the palate having but a momentary precedence. The palate and pharynx being now nicely adjusted, their common surface presents, from above, a hollow cone, in consequence of the partial descent of the palate; but so closely is their adaptation maintained during the deglutition, that not the slightest portion of the passing substance is perceived above the palate. At that moment the pharynx is indeed divided into two distinct cavities; one at the upper part common to the nose and pharynx, the other open to all the apertures below the palate. As the fluid or food passes into the lower part of the pharynx, the upper portion recedes or retires from the palate; the soft palate falls; and, last in this succession of events, the larynx, as is indicated by the motion of the thyroid cartilage, descends.

The sensibility to pressure, as a stimulus to action, of the back part of the soft palate, and of the internal aspect of the pharynx, seems much diminished whilst mastication is proceeding: at that time, the soft palate, occupied in keeping the food in the mouth, may be touched, without inducing the disposition to swallow; but if similar pressure be exerted upon the same part when there is no food in the mouth, the process of deglutition is induced, accompanied by a sensation of tickling. The sensibility of the back part of the palate is not quite so acute as that of the anterior.

Whilst detaining *a very large and distending quantity* of fluid in the mouth, the palate is extremely raised, presenting a convex surface upwards. This state can be maintained for some time, although with difficulty and fatigue, in consequence of the extremely convex position and retraction of the tongue, which are necessary, to adapt it to the elevated palate. Any pressure upon the back part of the palate at



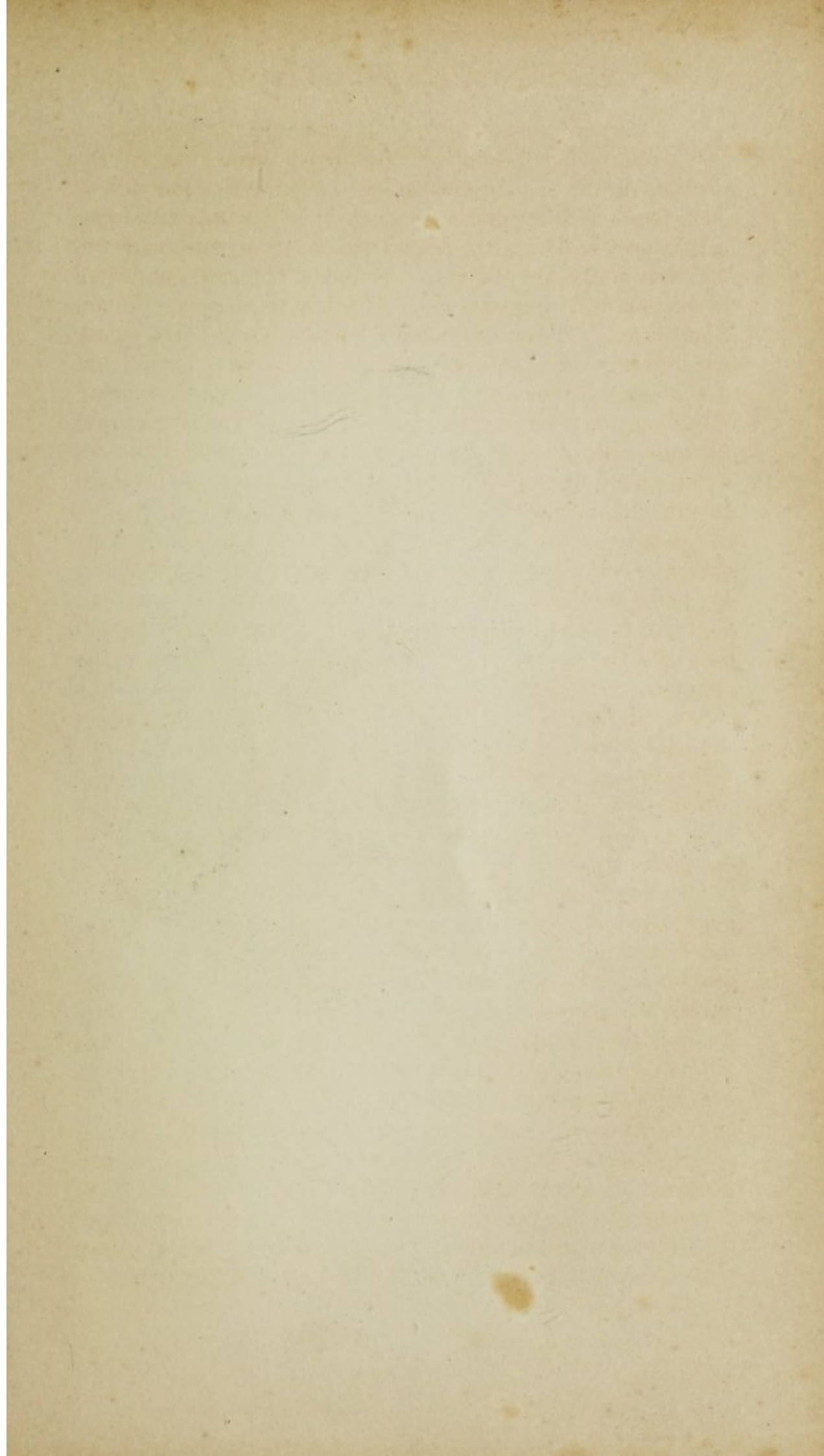




PLATE II.

Fig. 1.

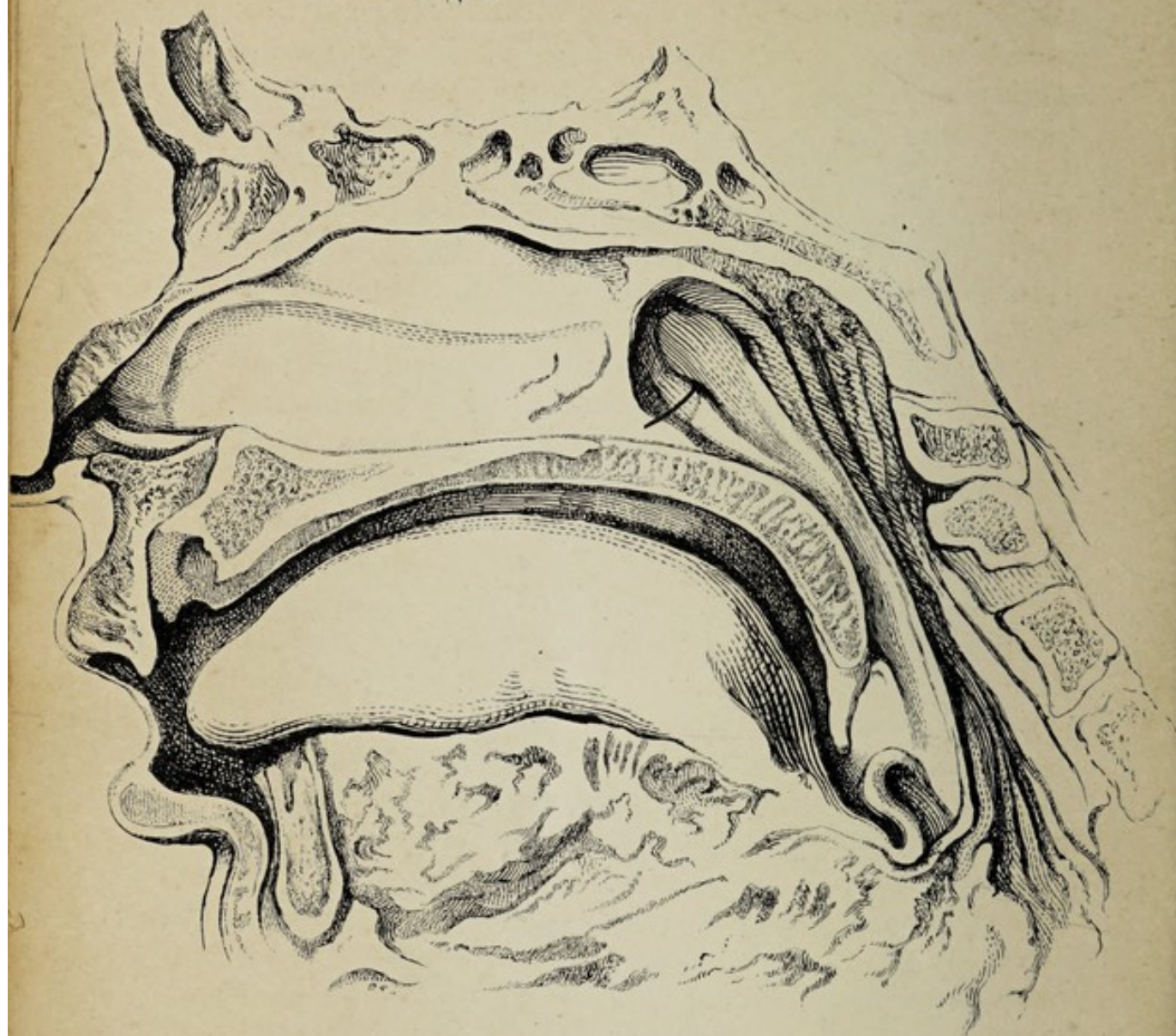


Fig. 2.





this time induces the pharynx to come forward involuntarily, in the same manner as it does in the process of deglutition.

*Position of the palate during the formation of letters and words.*—Complete utterance occurs only during expiration; and whilst repeating the alphabet, the soft palate rises at the beginning, and again descends at the termination of each letter or expiration: the sides of the pharynx, also, slightly approximate. The louder the voice, the more apparent are these actions in the palate and pharynx. The extent of this adaptation of the palate and pharynx in the ordinary voice resembles that which occurs in the mildest oral expiration; with this difference only, that the palate is rather more steady in the process of articulation or formation of the letter, than in simple expiration.

The articulation of each of the vowels, and the letter Y, produces about the same extent of elevation of the palate.

I have not had time to note and classify the relative elevations of the palate in the formation of the consonants; but, from what I did observe, it appeared that, in the formation of the letters H, M, and N, the soft palate is employed actively, and especially so in the letter M.

Whilst forming the other consonants, and the vowels, the function of the palate seemed to be rather passive than active; its use on this occasion being rather to direct the air in the expiration through the mouth, and to prevent its passing through the nose, than to give any additional impulse to it. But I hope to be able to contribute some additional interest to this case at a future time, by further observations upon the palate during articulation. The intention of the accompanying sketch (Plate II. *Fig. 1.*) is to shew clearly the relative position and proportion of the hard and soft palates of the adult, in their healthy and natural state; and, also, to point out, that the soft palate, as we trace it backward from the hard palate, makes a very gentle curve or sweep; and that it is not properly described, when we say that it hangs from the hard palate like a curtain; as the inference from that expression would be, that it is placed in a vertical position.

The general convex surface of the tongue is not unworthy of notice, as being the best form to adapt itself to the roof



of the mouth. And here I would draw attention to this correspondence in form of the tongue and hard palate; a fact which has not been sufficiently noticed, although extremely important, in permitting the easy, entire, and complete adaptation of the one to the other. The want of conformity and due proportion between these parts is possibly one of the insurmountable difficulties felt by some, in their attempts to articulate certain letters.

Reverting to the position of the palate in its quiescent state, it may be described as presenting an anterior concave surface, facing downwards and forwards; a posterior convex surface, facing upwards and backwards; an anterior attached edge; and posterior free or uvular edge.

The closest adaptations between the palate and pharynx seem to occur in the attempts to retain the air in the chest and pharynx, and during deglutition. In the former case, the excess of effort appears in the palate: in the latter, the chief action devolves upon the pharynx.

During these close adaptations, the posterior or uvular edge of the palate has a direction towards the pharynx, each side of which presents a convex surface, probably produced by the contractions of the petrous origins of the superior constrictor. These convex surfaces look inwards and forwards; and fit into the concave edges of the soft palate, between the uvula and pillars of the fauces. The uvula itself is received into the hollow created in the middle of the posterior surface of the pharynx, in consequence of that middle or occipital portion being more fixed; which may be partly attributed to the strong cellular attachment of the superior and middle constrictors to the anterior aspects of the first and second cervical vertebræ.