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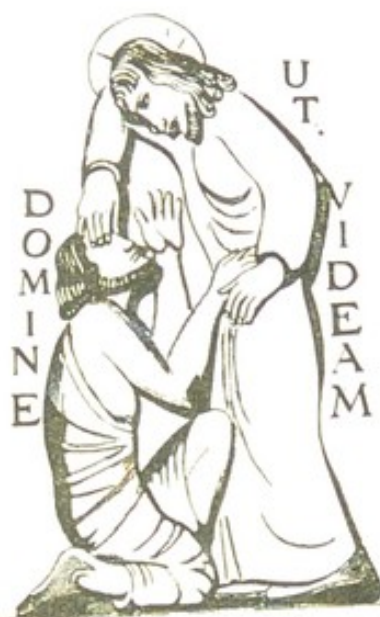
DR. ONODI'S ATLAS OF THE  
NASAL CAVITY AND SINUSES

ST. CLAIR THOMSON



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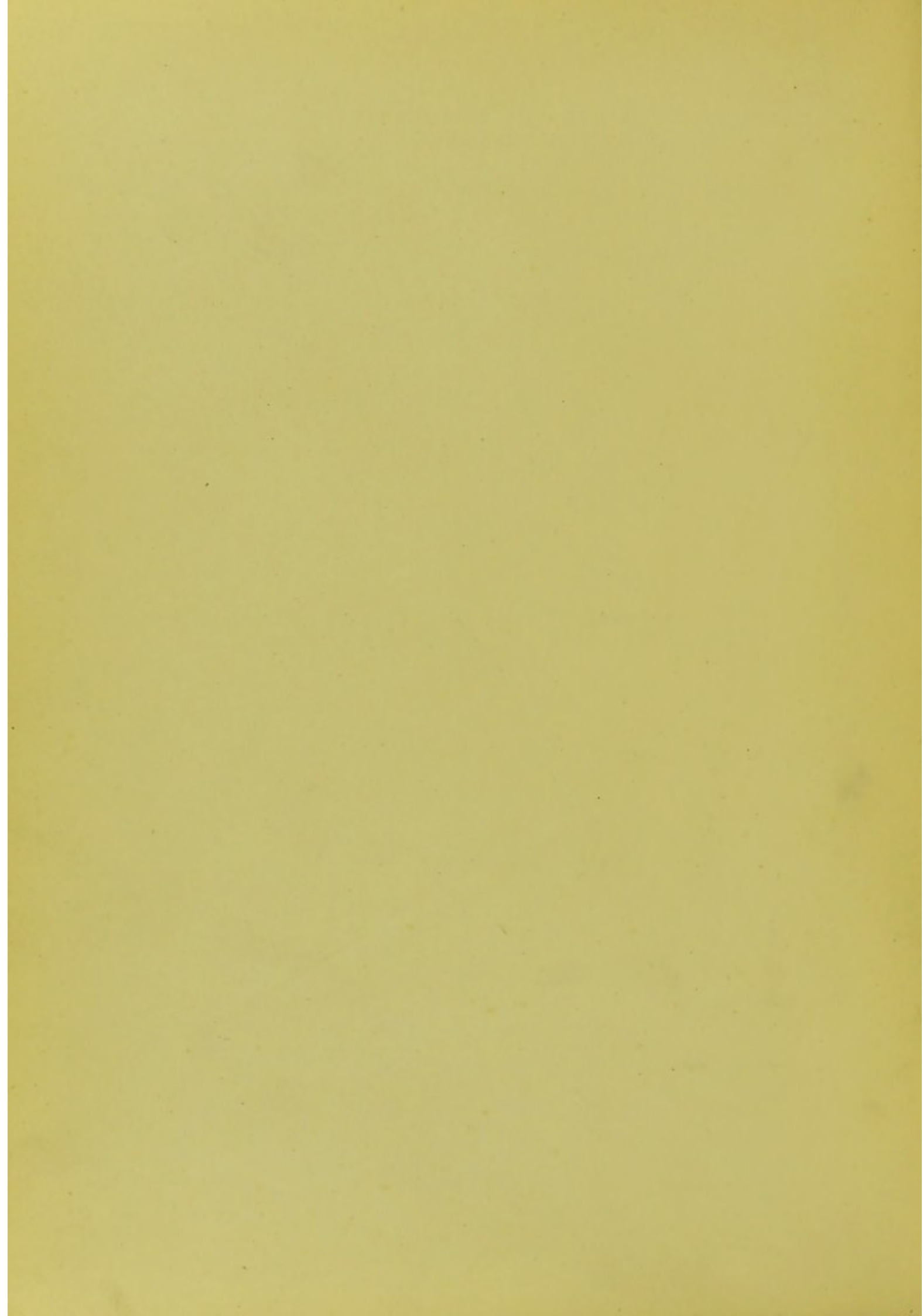
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THE ANATOMY OF THE NASAL CAVITY.







*Ed. Revised  
1928. Manuscript*

THE  
ANATOMY OF THE NASAL CAVITY  
AND  
ITS ACCESSORY SINUSES

AN ATLAS FOR PRACTITIONERS AND STUDENTS

BY

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LECTURER ON RHINO-LARYNGOLOGY IN THE UNIVERSITY OF BUDAPEST

TRANSLATED FROM THE SECOND EDITION

BY

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## TRANSLATOR'S PREFACE.

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The following work will doubtless be chiefly consulted on account of the accuracy and excellence of the engravings. To facilitate their study I have considerably enlarged the explanation which faces each plate.

Students will, I trust, find the Atlas of considerable assistance. There are many difficulties in the way of acquiring a practical knowledge of nasal anatomy, and a correct idea of the topographical relations of the nasal fossæ can only be obtained by the study of sections.

These sixteen plates have been chosen from among more than fifty sections. The selected preparation has been photographed and then engraved, consequently each figure is perfectly true to nature and is not produced by combining in one picture the results of several dissections.

The work has passed through two Hungarian editions. It has also appeared in German, and has been translated into Italian by Professor Massei of Naples.

ST CLAIR THOMSON.

28, *Queen Anne Street, W.*,  
*November, 1894.*





## AUTHOR'S PREFACE TO SECOND EDITION.

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This work was published for the first time only last year. I then gave notice of my intention of devoting the greatest pains to enriching future editions, and the present one has been enlarged by the addition of four new plates. That my efforts have been attended with success is evidenced by the fact that the work has already been brought out in an Italian translation by Professor Massei, and in an English one by Dr. St Clair Thomson.

The object of this second and enlarged edition is to make the work of still greater service to practitioners and students.

I avail myself of this opportunity to tender my best thanks to my esteemed friend Dr. Henrik Halász, Acting Professor in the University, for his obliging help and co-operation.

A. ÓNODI.

*April, 1894.*





## AUTHOR'S PREFACE TO FIRST EDITION.

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In view of the great practical importance of the nasal cavity and its accessory sinuses, I have thought that it would be useful to make a series of anatomical specimens which would easily show the topographical relations of this region. From these I have prepared a set of plates, and I have been particularly careful to choose such as would be most instructive for practitioners and students as well as for specialists. Accordingly I have selected those preparations which display the relations of these cavities with neighbouring organs (eye and ear), so that a glance at the plates should be sufficient to show their arrangement and mutual connections.

The various cavities have been opened by sections made in different directions, and the preparations have then been faithfully reproduced by photography. The anatomical preparations were made in the laboratories of Professors G. von Mihalkovics and L. von Thanhoffer, and I feel it my duty to express my warmest thanks to these esteemed teachers for their friendly help.

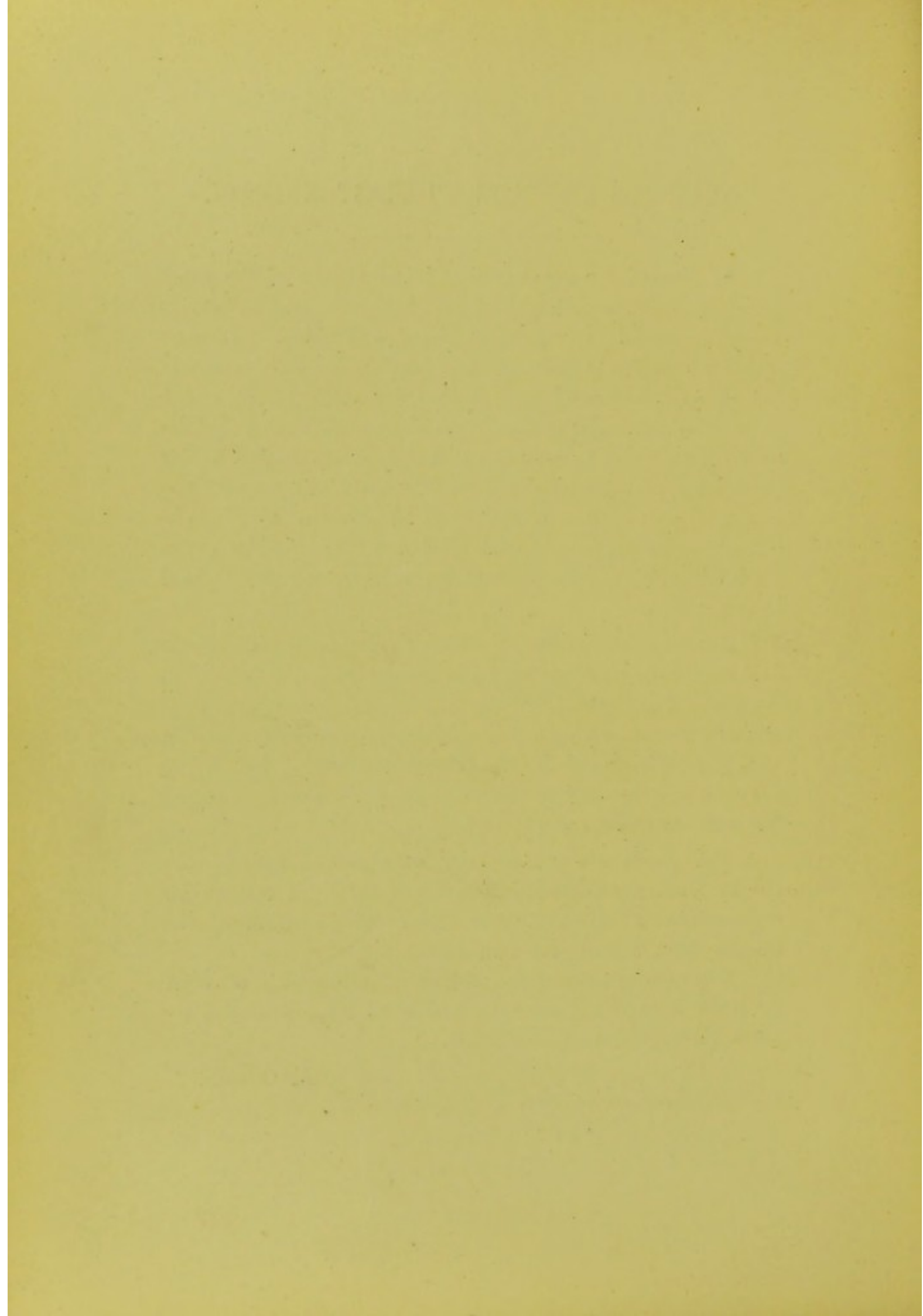
The plates are prefaced by an abridged introduction chiefly from a topographical point of view. I reserve for a handbook of Rhinology a wider consideration of the subject from a practical standpoint.

The photographs were taken in the studio of Herr P. Kalmár in Budapest; the woodcuts were prepared by Herr F. X. Matoloni of Vienna.

A. ÓNODI.

*Budapest, March, 1893.*





## INTRODUCTION.

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The septum divides the nasal cavity into two entirely separate parts, which join with the naso-pharynx at the choanæ.

The nasal cavity has four walls. The lower wall, or floor of the nose, is formed by the hard palate. This consists of the palate plate of the superior maxilla and the horizontal plate of the palate bone. The width of the floor varies from 12 to 15 millimetres ( $\frac{1}{2}$  in. to  $\frac{3}{4}$  in.).

About 2 centimetres ( $\frac{3}{4}$  in.) behind the anterior nares, close to the septum and on each side of it, is found a bony canal—the incisor canal—into which the mucous membrane dips, and through which vessels and nerves pass to the hard palate. Posteriorly, the floor of the nose forms the lower wall of the choanæ and becomes continuous with the soft palate.

Plate XIV.—after removal of the inferior turbinals—shows the floor of the nose (*f. n.*) in the whole of its extent; near the septum the incisor canal (*i. c.*) is well seen.

Plates VIII., IX., and X. show in coronal section the floor of the nose. In the sagittal section of Plate III. the whole length of the floor is exposed, and also the connection of the hard (*h p.*) and soft (*u.*) palates.

The inner wall of the nasal cavity is formed by the septum, which consists of an osseous and a cartilaginous portion. The osseous portion is formed by the vomer and the



perpendicular plate of the ethmoid. On the septum, about half a centimetre ( $\frac{1}{2}$  in.) above the incisor canal, remains of the organ of Jacobson are found in the shape of a blind canal a few millimetres in length; sometimes it has the form of a furrow or of a small elevation.

The two surfaces of the septum are found in the majority of cases to be unsymmetrical. Generally the cartilaginous portion presents larger or smaller deflections; and as a rule the deviations and the different varieties of crests and spurs are limited to the anterior two-thirds of the septum. Posteriorly the septum divides the choanæ in the middle line, and at this point it is not usual to find any want of symmetry.

Plate VI. shows in a sagittal section the posterior third of the septum (*s.*), with a sharp concave edge in the middle line, and without any want of symmetry. In Plate IX. the septum is slightly deflected. Plate XI. illustrates, in a coronal section, a slight deflection of the septum (*s.*) in an infant. In the coronal section of Plate VIII. a small spur is shown on a curved septum (*s.*), and the same want of symmetry is seen in a greater degree in Plate X. (*s.*).

A slighter deflection is represented in the horizontal section of Plate XIII. (*s.*); and Plate XV. shows, also in horizontal section, a more accentuated deflection and a spur on the right side of the septum (*s.*). Plate XVI. illustrates the relation of the septum (*s.*) to the choanæ and to the nasopharynx (*n. p.*)

The roof of the nasal cavity is shaped like a bow, the anterior portion being the most strongly arched, while the central part is nearly horizontal. The anterior portion is formed by the frontal and nasal bones. The true roof of the nasal cavity is the middle horizontal portion, formed by the thin cribriform plate of the ethmoid bone; the anterior wall



of the sphenoidal sinus forms the most posterior and descending part. The narrowest portion of the roof—that formed by the cribriform plate—generally measures 2 to 3 millimetres in width.

Frontal sections—as in Plates VIII., IX., X., XI., and XII.—show how narrow and thin the roof of the nose is, and at the same time bring out clearly its relation to the cranial cavity. Plates II. and III. show, in sagittal section, the curved shape of the roof of the nose, the anterior ascending portion, the middle horizontal, and the posterior descending.

The outer wall of the nasal cavity is the most important and at the same time the most complicated. It is formed by the superior maxilla, the vertical portion of the palate bone, and the internal pterygoid plate.

With this wall the three turbinals are connected:—The inferior turbinal bone, and the middle and superior turbinal processes of the ethmoid. The inferior is the largest of the turbinals, its length varies between 25 and 40 millimetres (1 in. to  $1\frac{1}{2}$  in.), and its width from 5 to 16 millimetres ( $\frac{1}{8}$  in. to  $\frac{2}{3}$  in.). The middle turbinal is shorter, and sometimes contains a hollow cyst-like cavity in its anterior extremity. Below each turbinal passes the corresponding meatus, the inferior, middle, and superior. The capacity of each meatus depends on the size and prominence of the corresponding turbinal.

The various meatuses are in direct communication with the accessory sinuses of the nose. The nasal duct opens into the anterior portion of the inferior meatus, its orifice being only visible after removal of the inferior turbinal. The shape of the orifice varies, sometimes it is round and at other times oval; generally it presents the appearance of a slit-like groove facing obliquely downwards and backwards.



The nasal duct runs on the outer wall of the nasal cavity between the middle meatus and the maxillary sinus, and courses obliquely downwards to open underneath the inferior turbinal.

The shape and relations of the middle meatus can only be studied after removal of the middle turbinal. When this is done there is brought into view an oblong semilunar cleft, the *hiatus semilunaris*, which is intimately connected with the accessory sinuses. This semilunar fissure is formed by the *bullæ ethmoidealis*, the uncinate process, and the neighbouring portions of bone. It varies in its diameter, being widest at the bottom of the cleft. In its anterior portion is the opening of the frontal sinus; near the latter is the opening of the anterior ethmoidal cells; and close to the posterior extremity of the hiatus is generally found the orifice of the maxillary antrum. This latter sinus sometimes has an accessory opening—also into the middle meatus.

Into the superior meatus open the posterior ethmoidal cells.

Plate II. gives a surface view of the outer wall of the nasal cavity. It shows the turbinal bodies (*i. t.*, *m. t.*, *s. t.*) with their three meatuses (*i. m.*, *m. m.*, *s. m.*), and the relation of the inferior meatus (*i. m.*) to the Eustachian tube (*e. t.*). The meatuses are best viewed in coronal sections. Plate XI. (from an infant) and XII. (from a child), and Plates VIII. and IX. (from adults) illustrate the relations of the turbinals (*i. t.*, *m. t.*, *s. t.*) to the respective meatuses (*i. m.*, *m. m.*, *s. m.*)

Plates VIII. and IX. show, in coronal section, the relations of the *hiatus semilunaris* with the maxillary sinus (antrum of Highmore) (*o. m. s.*). Plate XIII. represents in horizontal section (viewed from above) the outer wall of the nasal cavity, the transverse section of the nasal duct (*n. d.*),



and the opening of the maxillary sinus on the right side (*o. m. s.*). The connection is also well seen of the middle (*m. t.*) and superior (*s. t.*) turbinals with the outer wall of the nasal cavity, as well as the bladder-like space in the anterior extremity of the middle turbinal (*m. t.*). The horizontal section of Plate XV. shows the round opening of the nasal duct (*n. d.*), the roof of the inferior meatus, and the connection of the inferior turbinal with the external wall of the nasal cavity. The sagittal section of Plate III. gives a surface view—after removal of the middle turbinal—of the external wall of the nasal cavity, the *hiatus semilunaris* (*h.*), the *bullæ ethmoidealis* (*b.*), the opening of the anterior ethmoidal cells (*a. e. c.*), the orifice of the maxillary sinus (*o. m. s.*), the opening of the posterior ethmoidal cells (*p. e. c.*) into the superior meatus (*s. m.*), the inferior turbinal (*i. t.*), the inferior meatus (*i. m.*), and the relation of the latter to the mouth of the Eustachian tube (*e. t.*).

Plate IV. shows the middle and inferior meatuses opened laterally—*i.e.*, from the maxillary side (*m. m.*, *i. m.*). It also displays the outer surface of the inferior and middle turbinals (*i. t.*, *m. t.*), and the opening of the frontal sinus (*f. s.*) into the middle meatus (*m. m.*).

Plate VI. affords a view of the course of the nasal duct (*n. d.*) with its opening in the inferior meatus (*i. m.*); also of the outer surfaces and posterior extremities of the three turbinals (*i. t.*, *m. t.*, *s. t.*).

Plate VII. gives the course of the nasal duct (*n. d.*) and its relation to the middle and inferior turbinals (*m. t.*, *i. t.*). A part of the maxillary sinus (*m. s.*) is shown extending in front of it.

Of the accessory sinuses the antrum of Highmore (maxillary sinus) is the largest; it is contained in the



superior maxilla. The roof of the maxillary sinus forms at the same time the inferior wall of the orbit; the floor of the cavity corresponds to the hard palate and the alveolar process of the superior maxilla; the posterior wall is formed by the body of the superior maxilla and is hollowed outwards; the anterior wall of the cavity corresponds to the facial surface of the superior maxilla, and as a rule is very much thinner in the situation of the canine fossa; the internal wall is convex, is formed by the outer wall of the nasal cavity, and is defective in certain parts where it is closed in by mucous membrane. The upper wall is weaker than the inner, through which the cavity opens by an orifice which varies in size (*ostium maxillare*). The mucous membrane lining the antrum may form several pouches.

Plate I. shows in a skull the topographical relations of the maxillary sinus (*m. s.*) It has been opened by removal of a part of the anterior and posterior walls. The inner wall with the *ostium maxillare* is shown, as well as the relations of the thin roof to the cavity of the orbit. Plate XIV. shows in a horizontal section the inner, anterior, and posterior walls of the maxillary sinus (*m. s.*), and gives a surface view of the floor of the cavity. In the horizontal section of Plate XIII. the anterior, posterior, and inner walls of the sinus (*m. s.*) can be studied, and also the relation of the inner wall to the nasal duct (*n. d.*), the middle meatus, and the middle turbinal (*m. t.*) This plate shows in addition the various recesses formed by the lining of the maxillary sinus (*m. s.*), and on the right side the opening of the cavity into the middle meatus (*o. m. s.*) The horizontal section of Plate XV. shows the roof of the maxillary sinus (*m. s.*), its anterior, posterior, and inner walls, and the relation of the latter to the inferior



turbinal (*i. t.*) and the nasal duct (*n. d.*) In the coronal section of Plate X. a portion of the maxillary sinus (*m. s.*) is met with on the left side; while Plates VIII. and IX. (both coronal sections) display the walls of the cavity (*m. s.*), and especially the relation of the inner wall to the inferior and middle turbinals (*i. t.*, *m. t.*), and to the inferior and middle meatuses (*i. m.*, *m. m.*) On the left side in Plate VIII. and both sides of Plate IX. (*o. m. s.*) the maxillary sinus is seen communicating with the middle meatus. In Plate VII. part of the maxillary antrum is shown lying anterior to the nasal duct.

The frontal sinus, the situation of which corresponds as a rule to the superciliary arch, varies greatly in its dimensions. It may extend in the frontal bone both upwards, laterally and backwards. In the latter direction it may reach so far that the superior wall of the orbit is divided by the frontal sinus into two lamellæ. On the other hand the cavity may be very small, or even completely absent; very often the two sides are unsymmetrical. The frontal sinus becomes narrow as it passes downwards between the ethmoidal cells; it opens into the middle meatus at the anterior part of the *hiatus semilunaris*, as already described.

Plate I. shows in the skull the frontal sinuses opened anteriorly (*f. s.*). The coronal section of Plate VIII. shows the two frontal sinuses (*f. s.*) lying between the lamellæ of the upper wall of the orbit as well as their relation to the orbit itself (*e.*) and to the ethmoidal cells (*e. c.*). The frontal sinus is seen on the right side of Plate X. (*f. s.*) in its situation between the plates of the upper wall of the orbit.

Plate III. represents, in sagittal section, the relations of the frontal sinus (*f. s.*) to the cranial cavity and the middle meatus.



Plates VI. and VII. show, also in sagittal section, the connection of the frontal sinus (*f. s.*) with the anterior ethmoidal cells (*a. e. c.*). In the sagittal section of Plate IV. the frontal sinus has been opened laterally so that we can study its topography, its relation to the anterior ethmoidal cells (*e. c.*), its course and opening into the middle meatus (*m. m.*)

The sphenoidal sinus is situated in the body of the sphenoid bone, with its orifice in the thin anterior wall. This opening may vary in size; it is generally situated on the upper half of the anterior wall, a few millimetres below the roof of the nasal cavity. The two sphenoidal sinuses frequently do not correspond in shape and size.

Plate XIII. shows, in horizontal section, the sphenoidal sinuses (*s. s.*), their relation to the nasal cavity, to the carotid within the skull (*c.*), and to the cranial cavity and brain. The sagittal section of Plate III. shows the sphenoidal sinus (*s. s.*) *in situ*. Plates V. and VI., in sagittal section, display the sphenoidal cavity (*s. s.*), and at the same time show how the posterior sloping portion of the roof of the nose is formed by the anterior wall of the sphenoidal antrum.

The ethmoidal cells, or system of cavities in the ethmoid, are lodged between the nasal cavity and the orbit. The greater part of the inner wall of the orbit is formed by the thin plate of bone which closes in the ethmoidal cells on their outer side (*lamina papyracea* or *os planum*). On the inner side the ethmoidal cells are shut off from the nasal cavity by a lamella of bone with which the middle and superior turbinals are connected. The cells increase in size from before backwards and from above downwards. The anterior ethmoidal cells open into the middle meatus by several orifices, one of which is found in the anterior segment

of the *hiatus semilunaris*; the posterior cells open into the superior meatus.

Plate I. shows in the skull the relations of the ethmoidal cells (*e. c.*) to the inner wall of the orbit. Plate IV. shows, in sagittal section, the ethmoidal cells (*e. c.*) and their relation to the frontal sinus (*f. s.*). The sagittal sections of Plates V., VI., and VII. represent the connections of the ethmoidal cells (*e. c.*) with the middle and superior turbinals (*m. t.*, *s. t.*). In the sagittal section of Plate III. are seen the openings of the anterior and posterior ethmoidal cells (*a. e. c.*, *p. e. c.*) into the middle and superior meatuses. Plates VIII. and IX. show, in coronal section, the relation of the ethmoidal cells (*e. c.*) to the eye (*e.*), the nasal cavity, and the middle turbinal (*m. t.*).

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The various anatomical points are indicated by their initial letters.

In the explanation of each plate the references commence from the lower left hand corner of the figure.



PLATE I.

## PLATE I.

### PREPARATION OF A SKULL.

*Viewed from the Right Side.*

The drawing illustrates the relation of the orbit to the nasal cavity and the accessory sinuses. Portions of the upper and outer orbital walls have been removed in order to expose the greater part of the ethmoidal cells, which chiefly form the inner wall of the orbit. The cells are opened, but their dividing septa have been preserved. The maxillary sinus (antrum of Highmore) and the cavities in the frontal bone have been opened. The situation of the mouth of the maxillary sinus is well shown at the upper part of the cavity.

- m. s. Maxillary sinus.
- e. c. Ethmoidal cells.
- f. s. Frontal sinus.
- l. Lachrymal groove.
- n. c. Nasal cavity.

PLATE I.

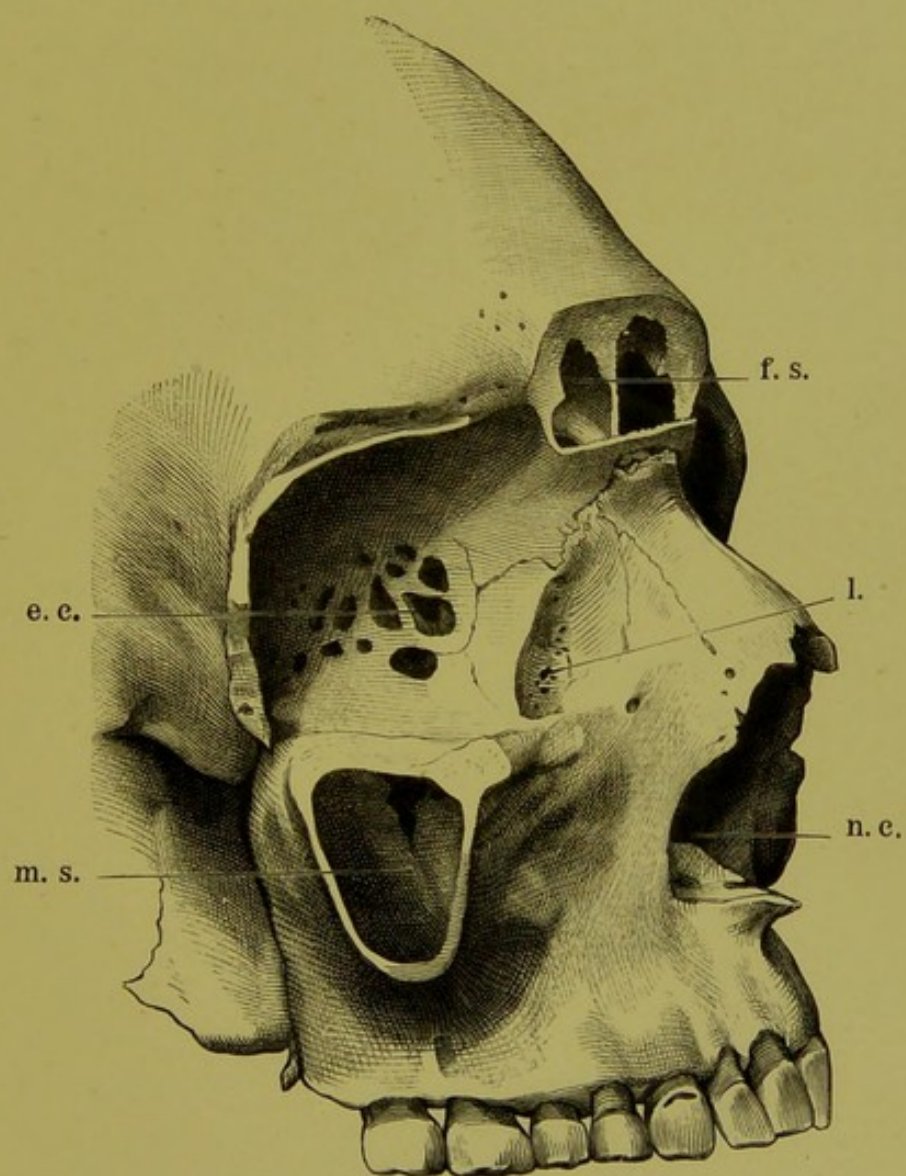






PLATE II.



## PLATE II.

### SAGITTAL SECTION.

*Anterior.*

*Posterior.*

A sagittal section passing to the right of the septum. The outer wall of the right nasal cavity is therefore represented as viewed from the inside. The surface relations of the three turbinals, their relative position to the nares and choanæ, the situation of the mouth of the Eustachian tube, and the form of the roof of the nose are all well seen.

- m. m. Middle meatus.
- m. t. Middle turbinal.
- s. m. Superior meatus.
- s. t. Superior turbinal.
- e. t. Orifice of Eustachian tube.
- s. p. Soft palate.
- i. t. Inferior turbinal.
- h. p. Hard palate.
- i. m. Inferior meatus.

## PLATE II.

Anterior.

Posterior.

Right Side.

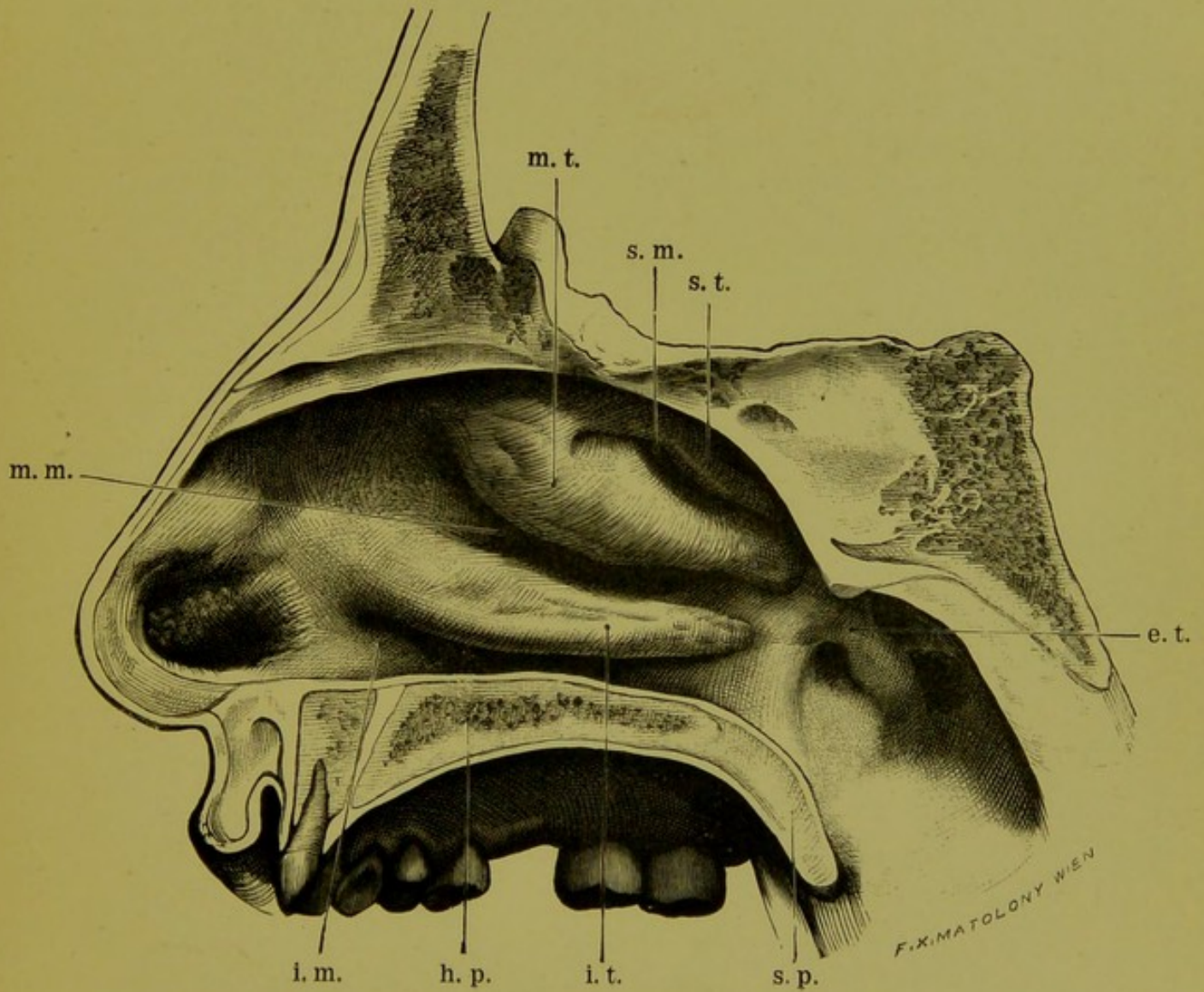






PLATE III.



## PLATE III.

### SAGITTAL SECTION.

*Anterior.*

*Posterior.*

*Viewed from the Inside.*

A deeper view is here given of the structures on the outer wall of the right nasal cavity. The middle turbinal has been entirely removed (*m. t.* indicates its point of separation from the rest of the ethmoid), so as to show the anatomy of that part of the outer wall which it covers. The section passes through the accessory sinuses in the frontal bone, the ethmoid, and the sphenoid, and shows the proximity of these cavities to the brain. The openings of all the accessory cavities can be easily studied; particularly well brought out are the relations of the *hiatus semilunaris*, with the infundibulum opening into its anterior part, the orifice of the maxillary sinus at its posterior extremity, and the opening of the anterior ethmoidal cells separated from it by the swelling of the *bulla ethmoidealis*. This plate shows how the posterior ethmoidal cells and the sphenoidal sinus open into the superior meatus, the former being below and the latter above the superior turbinal.

- t. Tongue.
- h. p. Hard palate.
- i. m. Inferior meatus.
- i. t. Inferior turbinal.
- o. m. s. Opening of maxillary sinus.
- h. Hiatus semilunaris.
- b. Bulla ethmoidealis.
- a. e. c. Anterior ethmoidal cells.
- f. s. Frontal sinus.
- p. e. c. Posterior ethmoidal cells.
- b. Brain.
- s. s. Sphenoidal sinus.
- s. t. Superior turbinal.
- s. m. Superior meatus.
- m. t. Margin to which middle turbinal was attached.
- e. t. Opening of Eustachian tube.
- n. p. Naso-pharynx.
- u. Uvula.

# PLATE III.

Anterior.

Posterior.

Right Side.

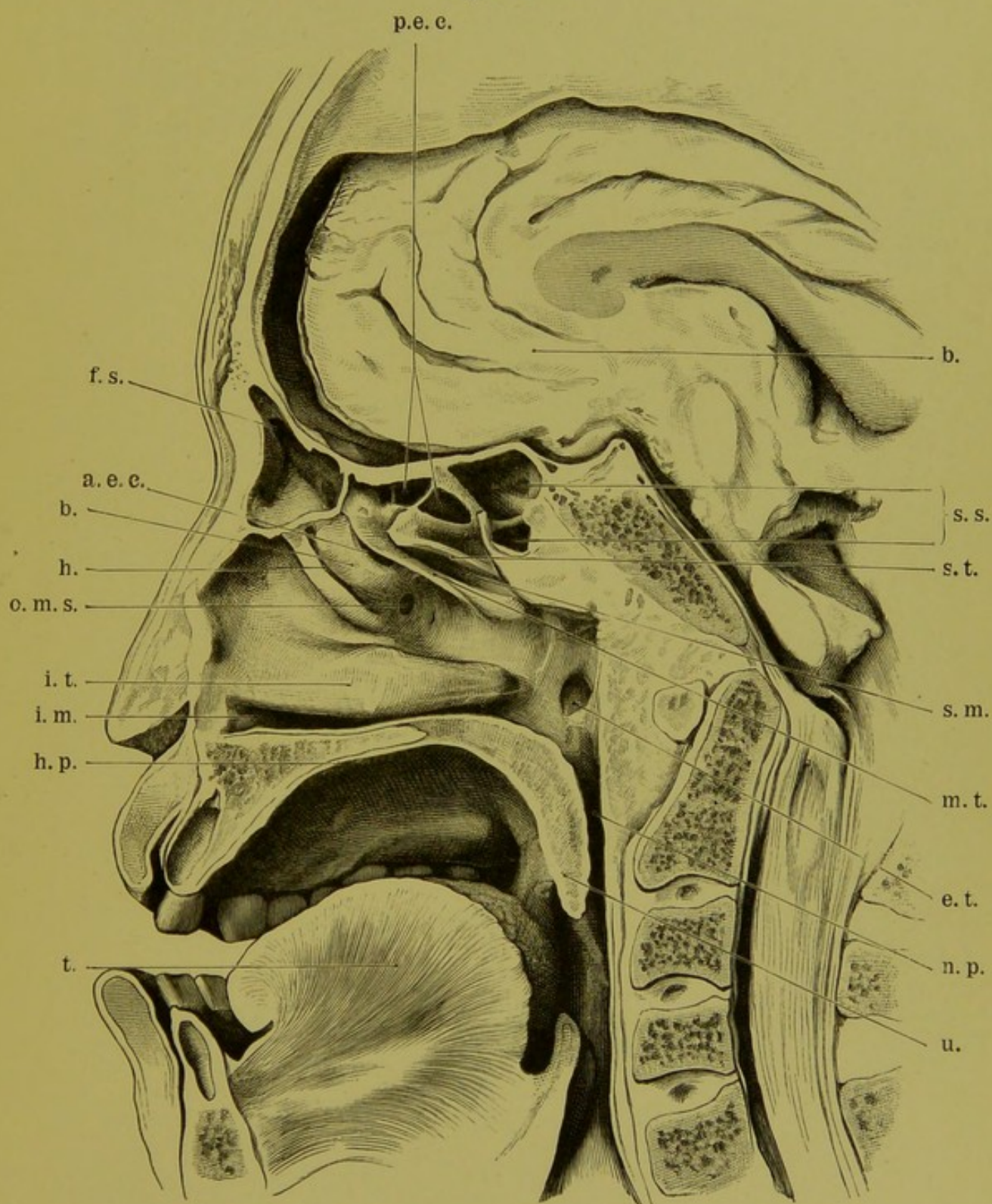






PLATE IV.



## PLATE IV.

### SAGITTAL SECTION.

*Posterior.*

*Anterior.*

*Viewed from the Outside.*

The section passes through the right side of the nose external to the plane of the middle and inferior turbinals. The outer wall of the right side of the nose has been removed, thus exposing that surface of the turbinals which is entirely invisible to examination from the interior of the nasal cavity. The meatuses, the ethmoidal cells, and the frontal sinus have been opened laterally. The whole extent of the frontal sinus is well shown, with its infundibulum opening into the middle meatus.

- h. p. Hard palate.
- i. m. Inferior meatus.
- i. t. Inferior turbinal.
- m. t. Middle turbinal.
- m. m. Middle meatus.
- e. c. Ethmoidal cells.
- f. s. Frontal sinus.

# PLATE IV.

Posterior.

Anterior.

Right Side.

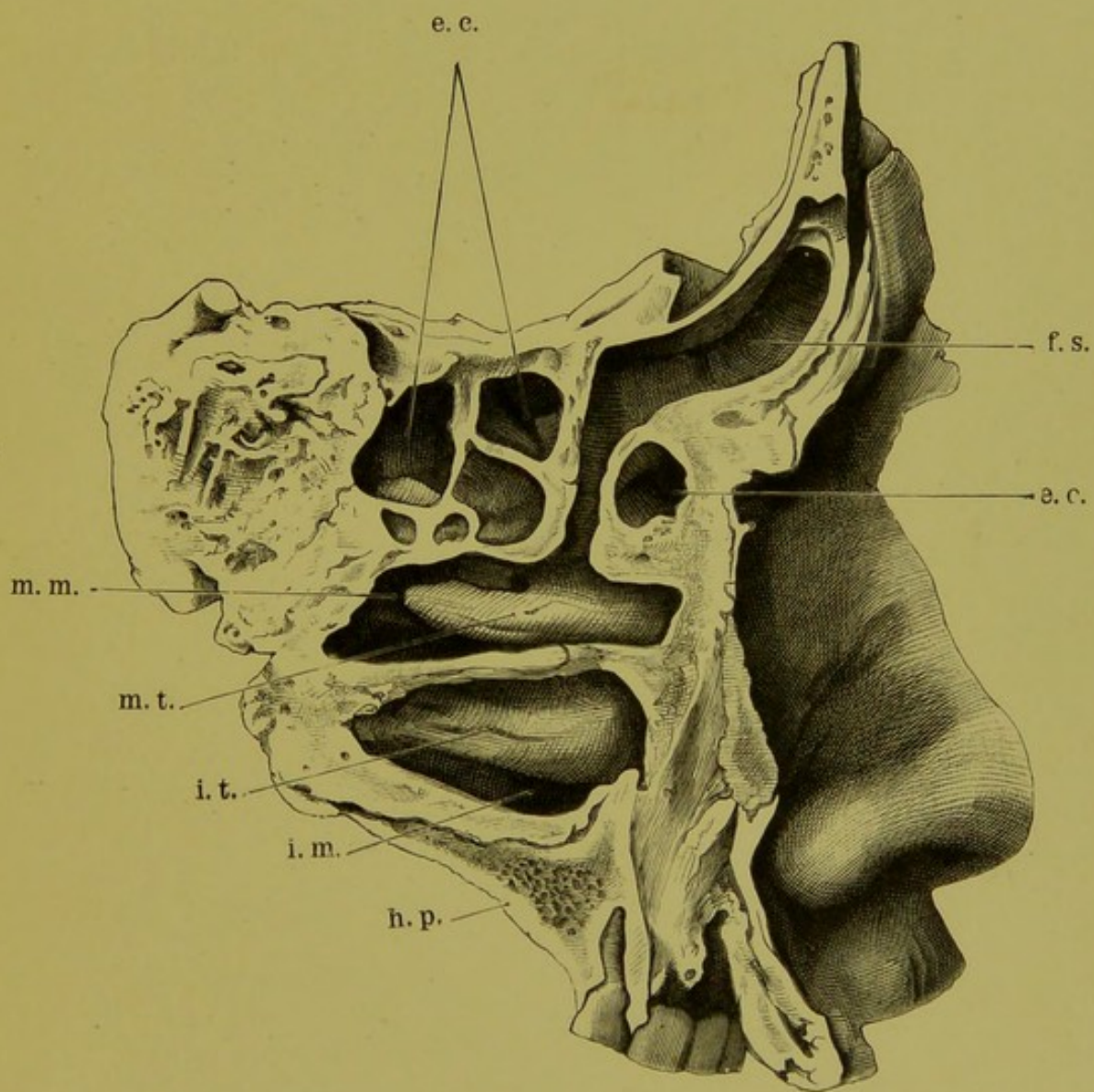






PLATE V.

## PLATE V.

### SAGITTAL SECTION.

*Posterior.*

*Anterior.*

*Viewed from the Outside.*

This section has been made similarly to the preceding one, but passes nearer to the septum. The outer wall of the nasal cavity on the right side has been removed, and the frontal, ethmoidal, and sphenoidal sinuses have been opened laterally.

- h. p. Hard palate.
- i. m. Inferior meatus.
- i. t. Inferior turbinal.
- s. Septum.
- m. m. Middle meatus.
- i. t. Inferior turbinal.
- m. t. Middle turbinal.
- s. m. Superior meatus.
- s. s. Sphenoidal sinus.
- s. t. Superior turbinal.
- e. c. Ethmoidal cells.
- f. s. Frontal sinus.

# PLATE V.

Posterior.

Anterior.

Right Side.

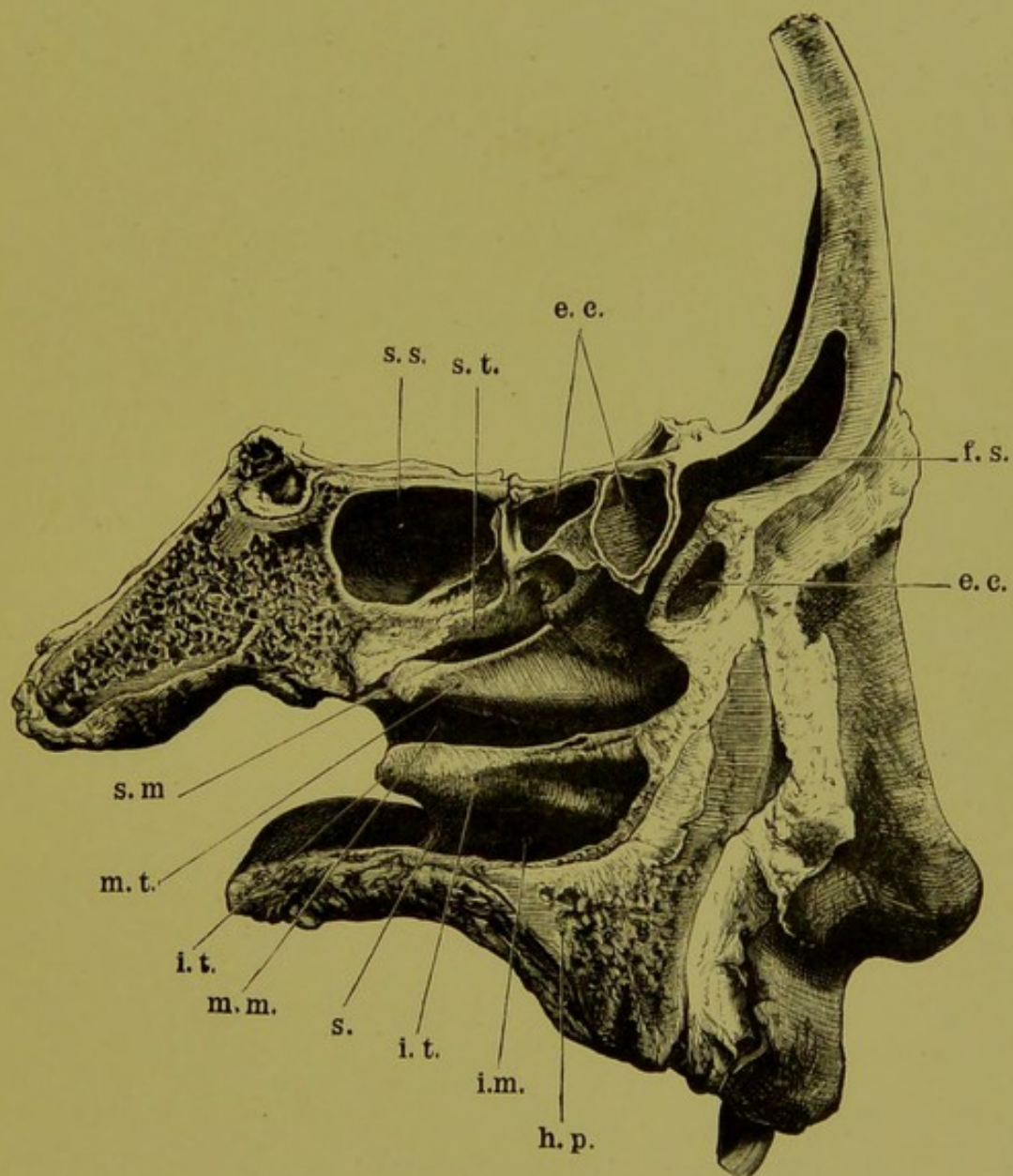






PLATE VI.

## PLATE VI.

### SAGITTAL SECTION.

*Anterior.*

*Posterior.*

*Viewed from the Outside.*

The outer wall of the left nasal fossa has been removed; the section passes nearer to the middle line than in Plates IV. and V. The figure shows the concavities and points of attachment of the three turbinals; part of the left side of the septum is exposed. The nasal duct has been opened throughout its entire length down to its termination in the concavity of the inferior turbinal. The relations of the anterior ethmoidal cells to the frontal sinus and middle meatus, and of the posterior ethmoidal cells and sphenoidal sinus to the superior meatus, are very well brought out.

- n. d. Nasal duct.
- f. s. Frontal sinus.
- a. e. c. Anterior ethmoidal cells.
- p. e. c. Posterior ethmoidal cells.
- s. s. Sphenoidal sinus.
- s. t. Superior turbinal.
- s. m. Superior meatus.
- m. t. Middle turbinal.
- s. Septum.
- m. m. Middle meatus.
- i. t. Inferior turbinal.
- h. p. Hard palate.
- i. m. Inferior meatus.

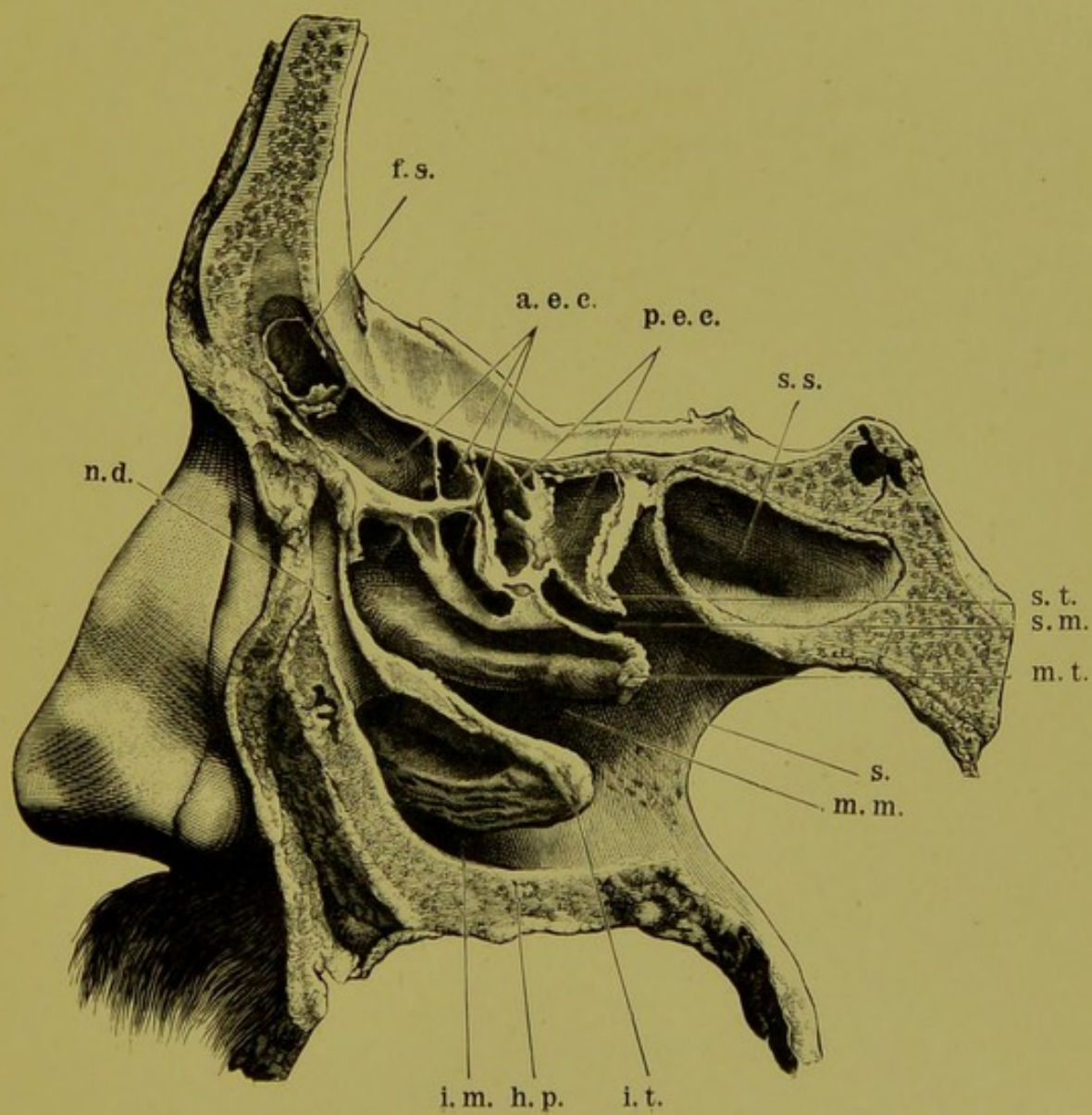


# PLATE VI.

Anterior.

Posterior.

Left Side.



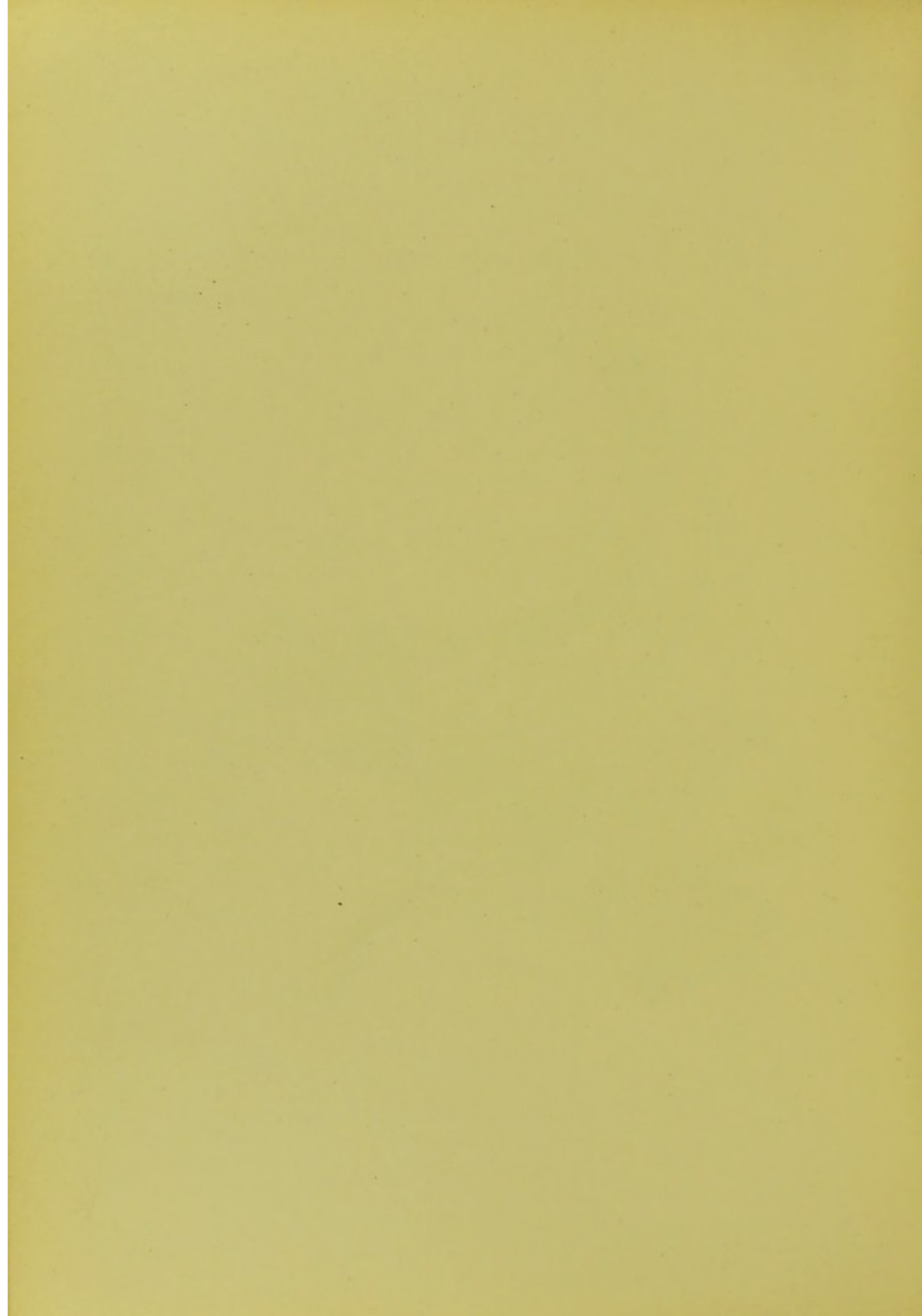


PLATE VII.



## PLATE VII.

### SAGITTAL SECTION.

*Posterior.*

*Anterior.*

*Viewed from the Outside.*

The section passes through the cranial cavity, the frontal and sphenoidal sinuses, and the ethmoidal cells. Part of the maxillary sinus is shown lying anteriorly to the nasal duct, which has been opened longitudinally.

- h. p. Hard palate.
- i. m. Inferior meatus.
- i. t. Inferior turbinal.
- s. Septum.
- m. m. Middle meatus.
- m. t. Middle turbinal.
- s. s. Sphenoidal sinus.
- p. e. c. Posterior ethmoidal cells.
- a. e. c. Anterior ethmoidal cells.
- f. s. Frontal sinus.
- n. d. Nasal duct.
- m. s. Maxillary sinus.

# PLATE VII.

Posterior.

Anterior.

Right Side.

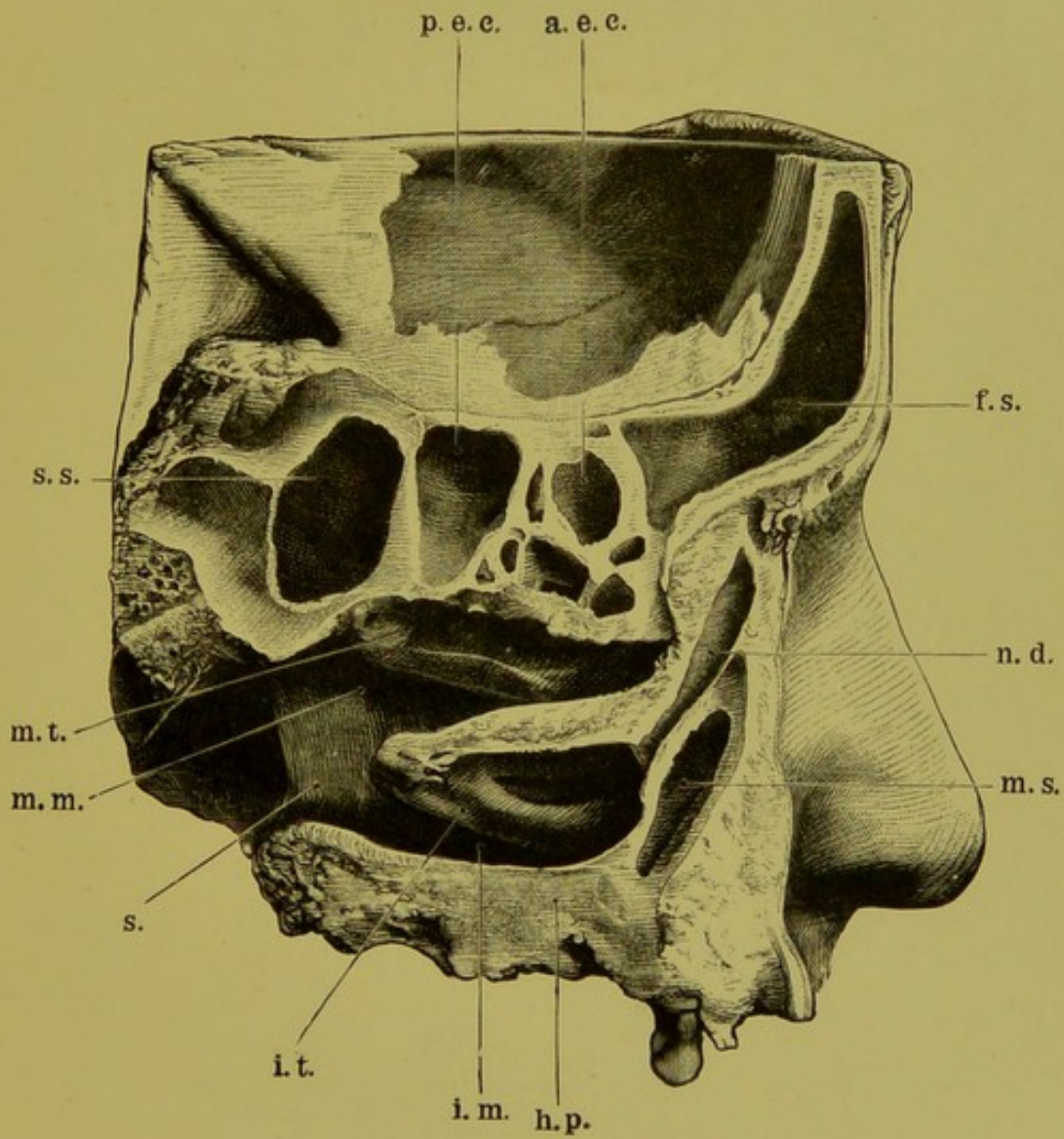






PLATE VIII.

PLATE VIII.  
CORONAL SECTION.

*Right.*

*Left.*

*Viewed from the Front.*

A transverse section has been made vertically to the floor of the nose and in its posterior third. The extension of the nasal cavity in this situation, the space in the concavities of the turbinals, the narrowness of the superior meatus, the thinness of the roof, and the proximity of the ethmoidal cells to the orbit and cranial cavity are all well seen. The relations of the hiatus semilunaris and the opening of the maxillary sinus can be studied on the left side. The preparation shows the prolongation of the frontal cavity into the base of the skull, the walls of the sinus forming a double roof to the orbit.

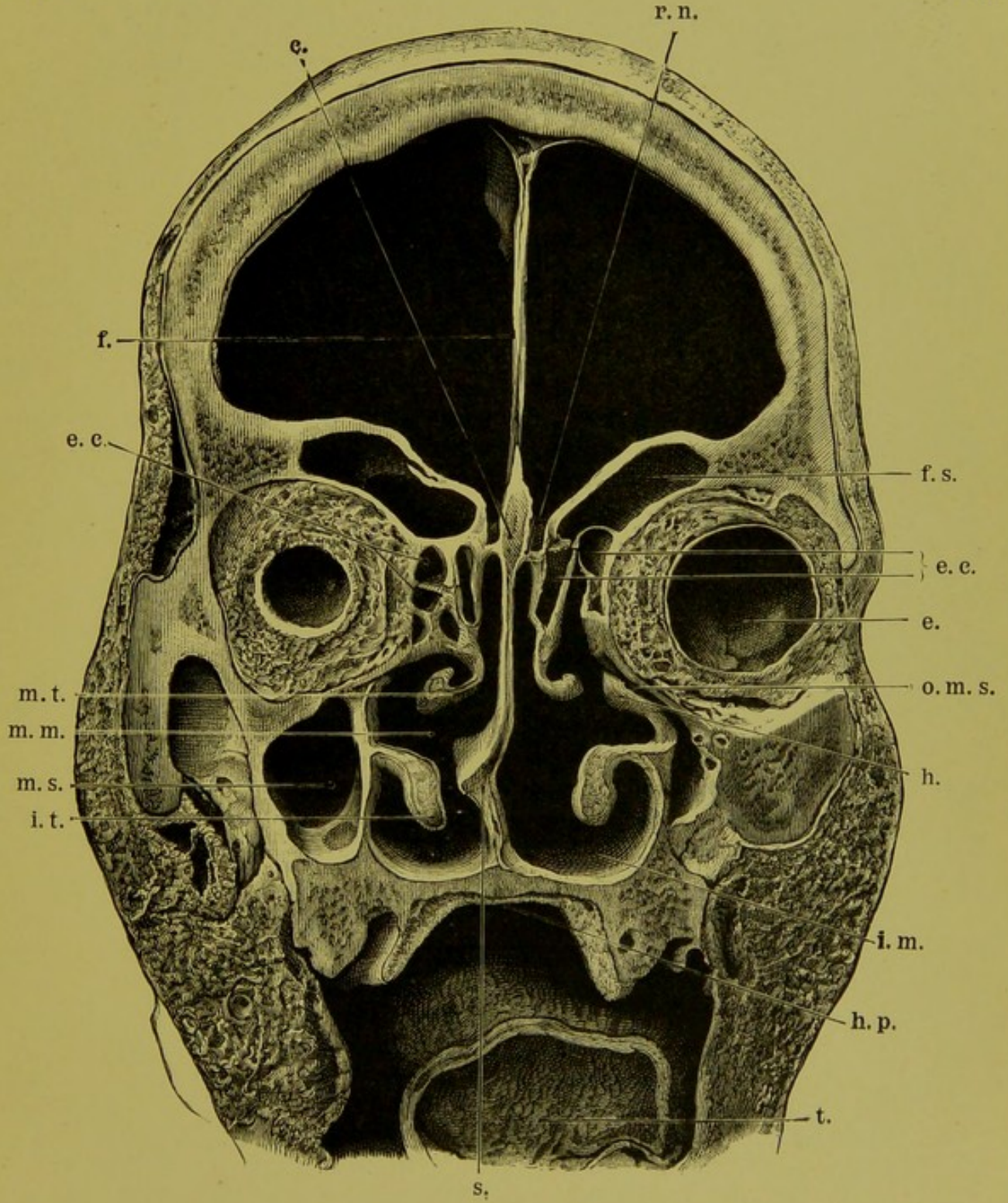
- i. t. Inferior turbinal.
- m. s. Maxillary sinus.
- m. m. Middle meatus.
- m. t. Middle turbinal.
- e. c. Ethmoidal cells.
- f. Falx cerebri.
- c. Crista galli.
- r. n. Roof of nose.
- f. s. Frontal sinus.
- e. c. Ethmoidal cells.
- e. The eye.
- o. m. s. Opening of maxillary sinus.
- h. Hiatus semilunaris, lower margin.
- i. m. Inferior meatus.
- h. p. Hard palate.
- t. Tongue.
- s. Septum.



# PLATE VIII.

Right.

Left.





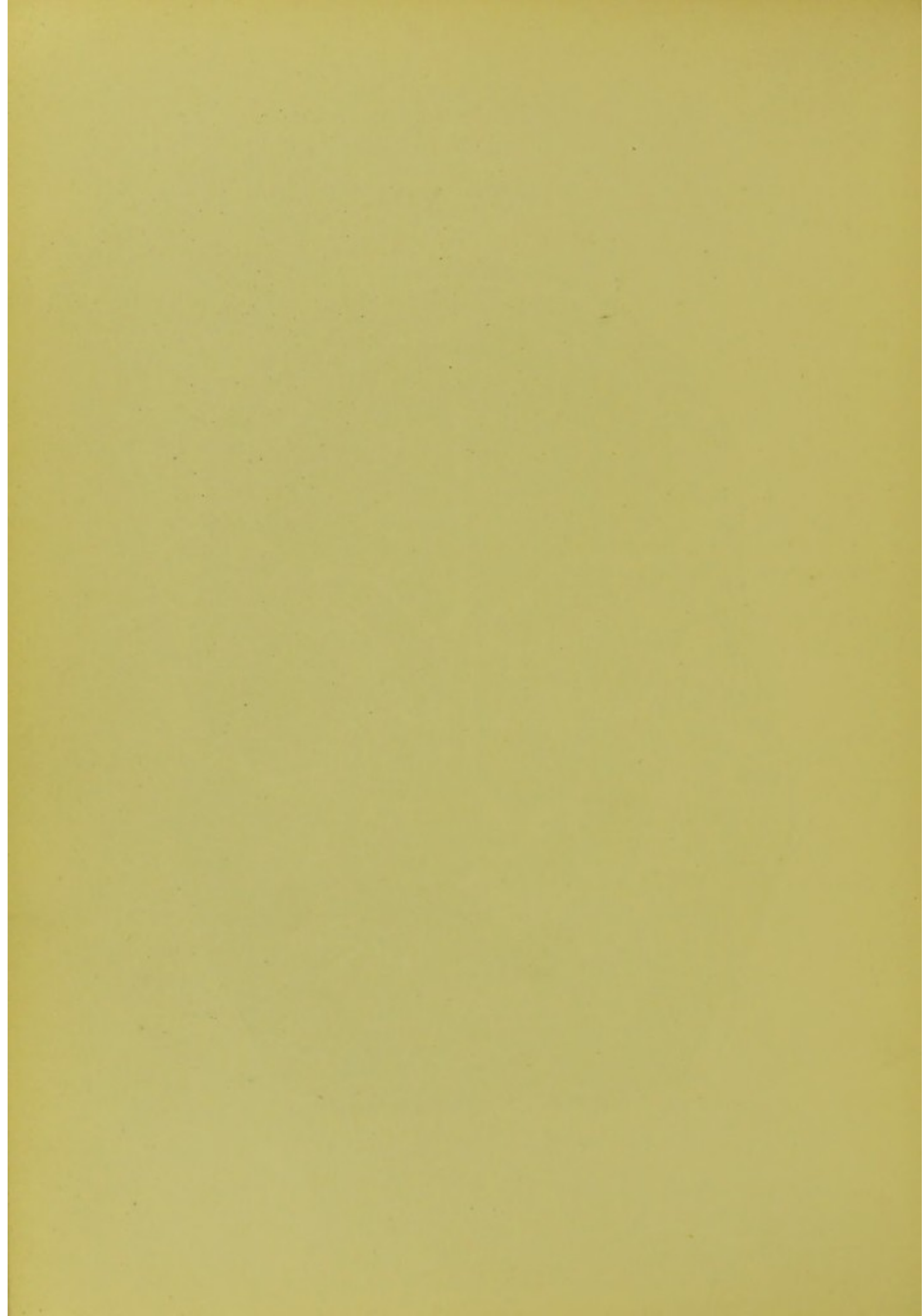


PLATE IX.

## PLATE IX.

### CORONAL SECTION.

*Right.*

*Left.*

*Viewed from the Front.*

The section passes through the orbit, the maxillary sinus, and the ethmoidal cells. The relations of the latter to the orbit and the base of the skull are clearly shown. The situation and direction of the orifice of the maxillary sinus can be easily studied on both sides.

- m. s. Maxillary sinus.
- m. m. Middle meatus.
- m. t. Middle turbinal.
- e. c. Ethmoidal cells.
- o. Orbit.
- s. t. Superior turbinal.
- s. m. Superior meatus.
- o. m. s. Opening of maxillary sinus.
- i. t. Inferior turbinal.
- i. m. Inferior meatus.
- s. Septum.



PLATE IX.

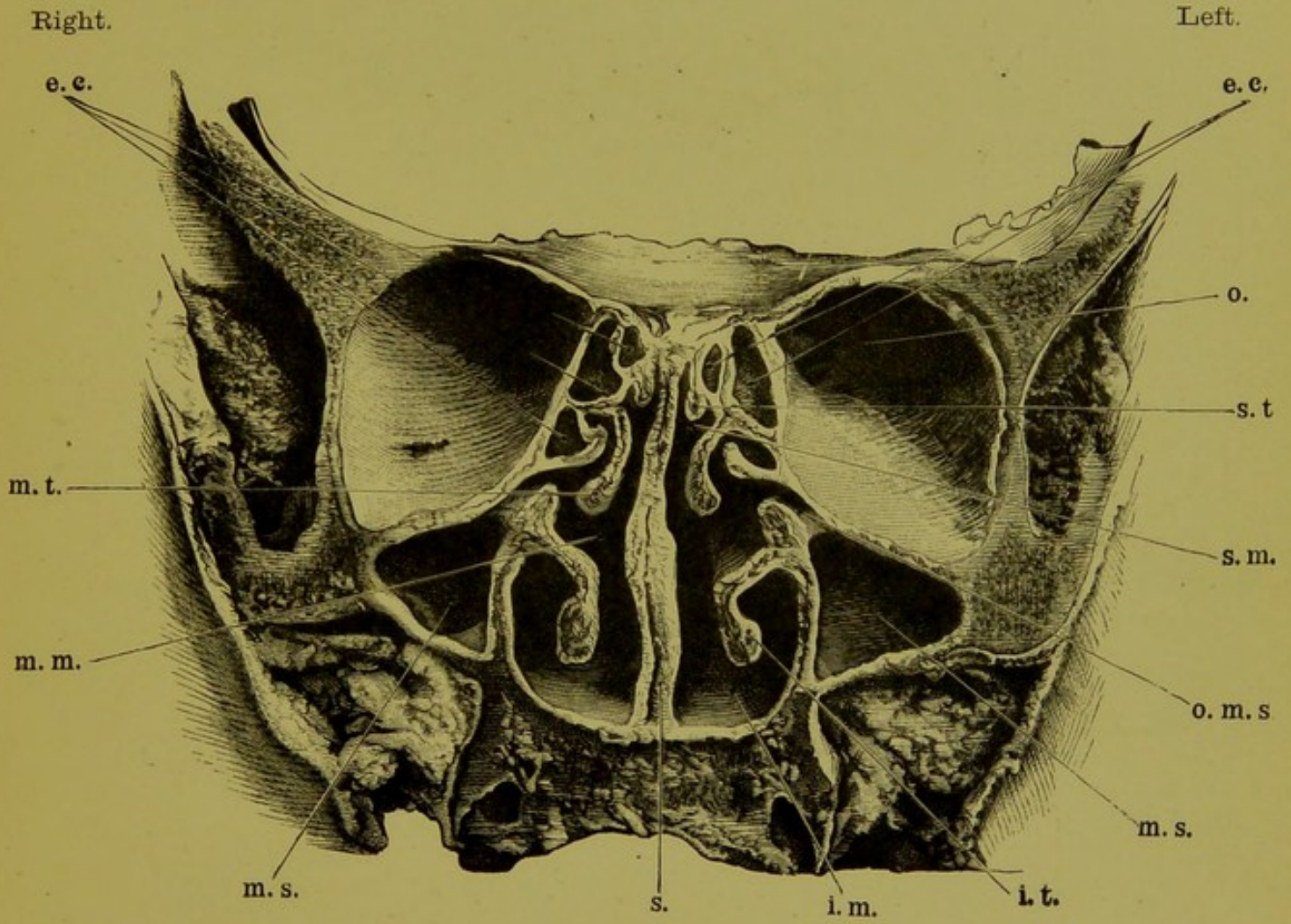




PLATE X.



## PLATE X.

### CORONAL SECTION.

*Right.*

*Left.*

*Viewed from the Front.*

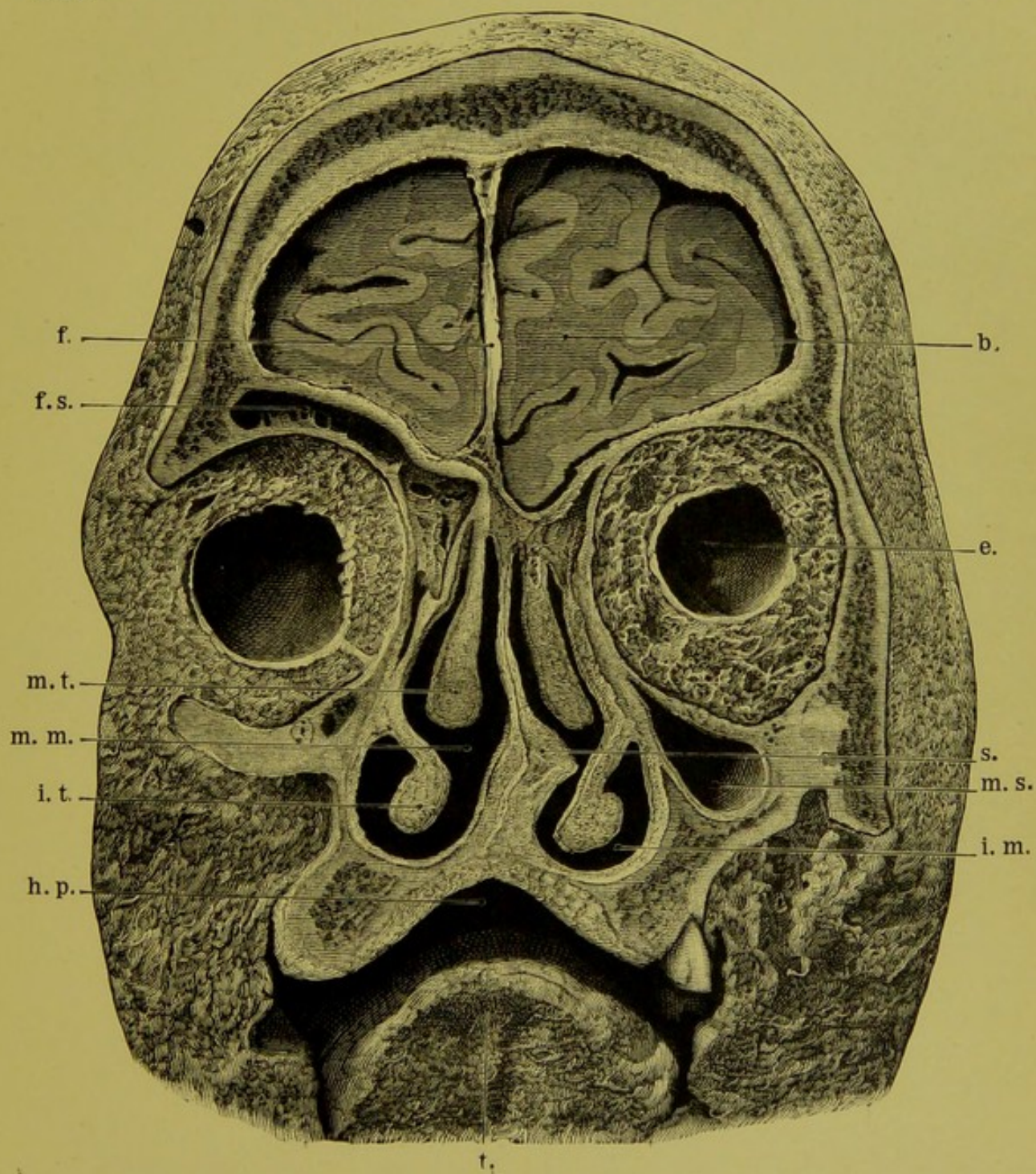
A coronal section passing through the eyes, middle and inferior turbinals, the frontal sinus on the right side, and the maxillary sinus on the left. The cut has been made through the anterior third of the nose, and shows the smaller capacity of the nasal cavity in this situation as well as the larger size of the turbinals. The want of symmetry between the two sides should be noted.

- h. p. Hard palate.
- i. t. Inferior turbinal.
- m. m. Middle meatus.
- m. t. Middle turbinal.
- f. s. Frontal sinus.
- f. Falx cerebri.
- b. Brain.
- e. Eye.
- s. Septum, deviated and with marked spur.
- m. s. Maxillary sinus (antrum of Highmore).
- i. m. Inferior meatus.
- t. Tongue.

# PLATE X.

Right.

Left.





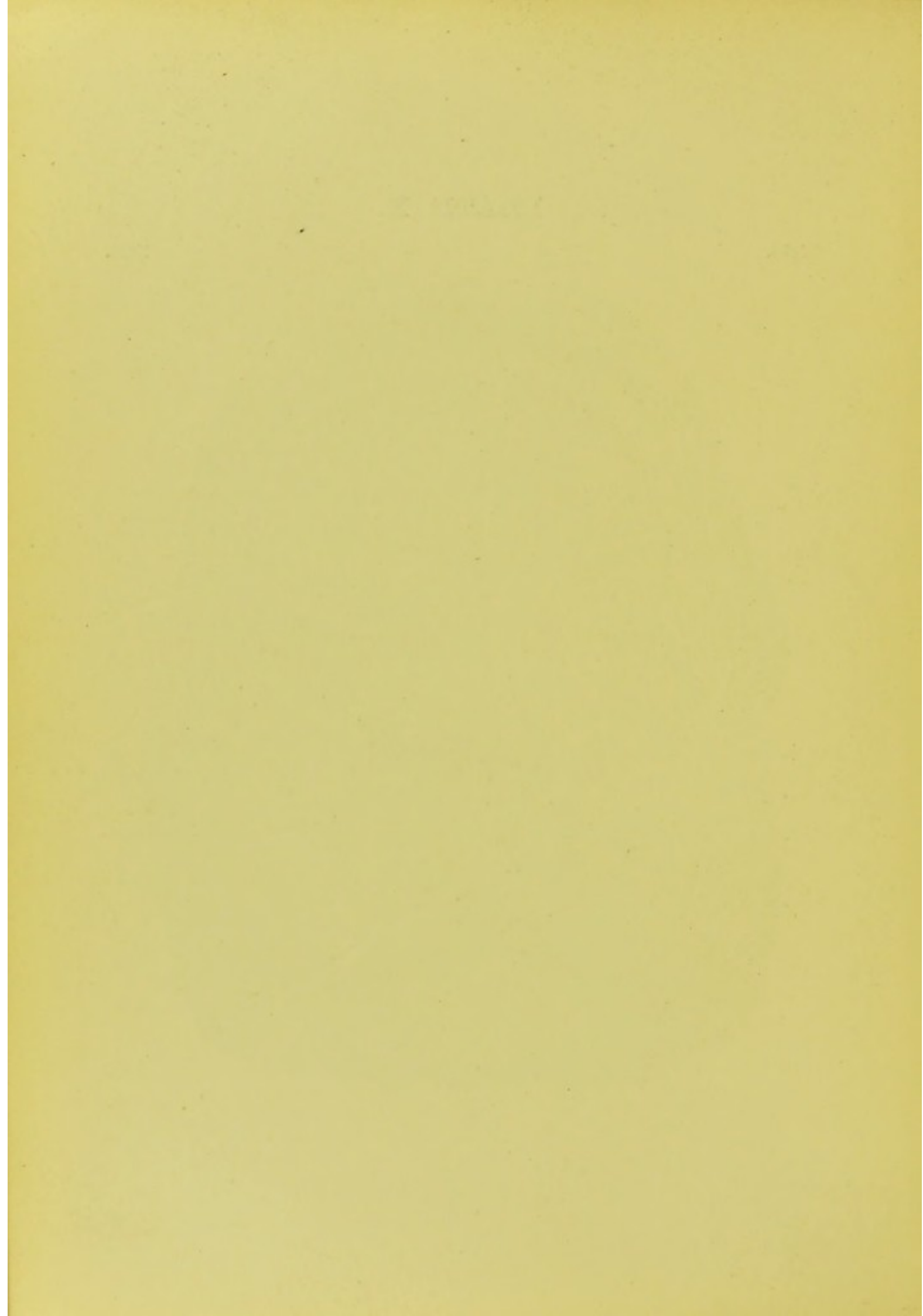




PLATE XI.

## PLATE XI.

### CORONAL SECTION.

*Right.*

*Left.*

*Viewed from the Front.*

Coronal section in an infant, made about the middle third of the nose. The elementary state of the ethmoidal cells, the relatively large capacity of the orbit, the small size of the maxillary sinus, and the shape of the three turbinals are all well seen. It is interesting to notice at this early age the deviation of the septum and commencing spur on the left side.

- m. t. Middle turbinal.
- s. m. Superior meatus.
- o. Orbit.
- e. c. Ethmoidal cells.
- s. t. Superior turbinal.
- m. t. Middle turbinal.
- i. m. Inferior meatus.
- s. Septum.
- i. t. Inferior turbinal.

# PLATE XI.

Right.

Left.

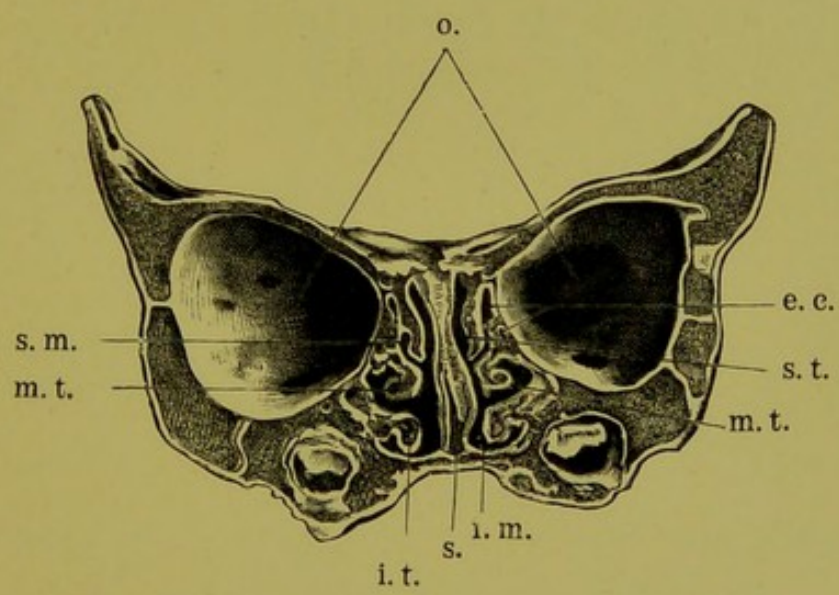






PLATE XII.

## PLATE XII.

### CORONAL SECTION.

*Right.*

*Left.*

*Viewed from the Front.*

Preparation made from a child 5 years of age. The section passes through the orbits, the ethmoidal cells, the maxillary sinuses, and the nasal fossæ. The relatively large capacity of the orbits, and undeveloped condition of the maxillary sinuses and ethmoidal cells should be observed. The deviation of the septum in so young a subject is noteworthy. The figure gives a good illustration of a fourth turbinal, or *concha suprema*.

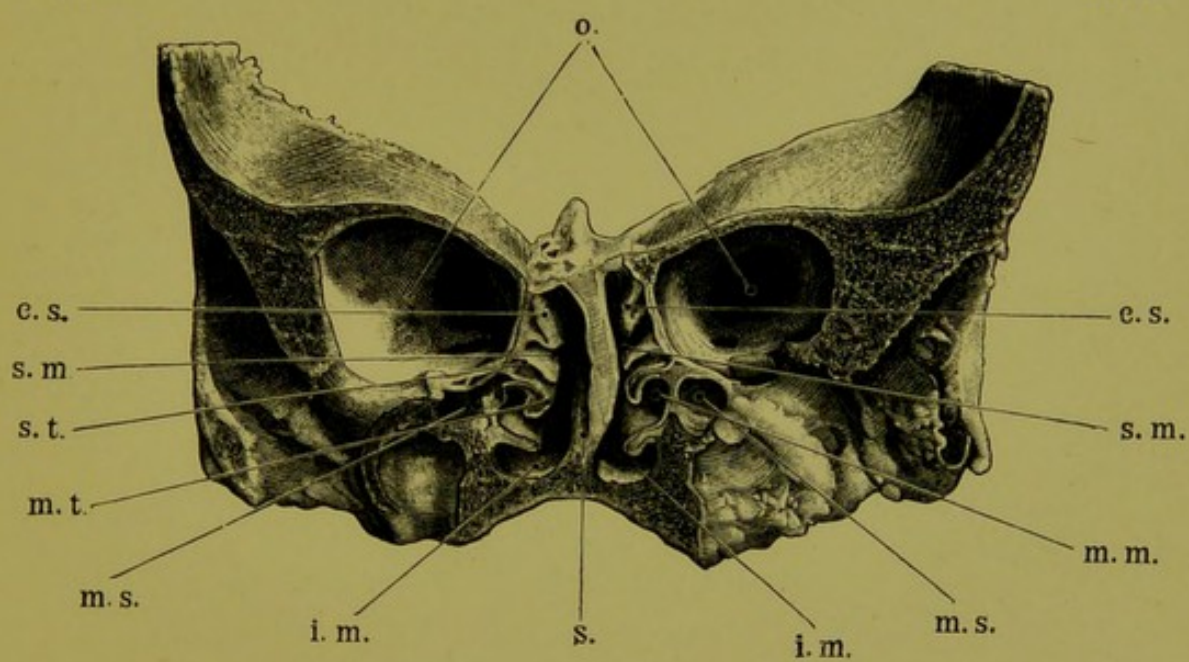
- i. m. Inferior meatus.
- m. s. Maxillary sinus.
- m. t. Middle turbinal.
- s. t. Superior turbinal.
- s. m. Superior meatus.
- c. s. *Concha suprema*, or 4th turbinal.
- o. Orbit.
- m. m. Middle meatus.
- s. Septum.



## PLATE XII.

Right.

Left.



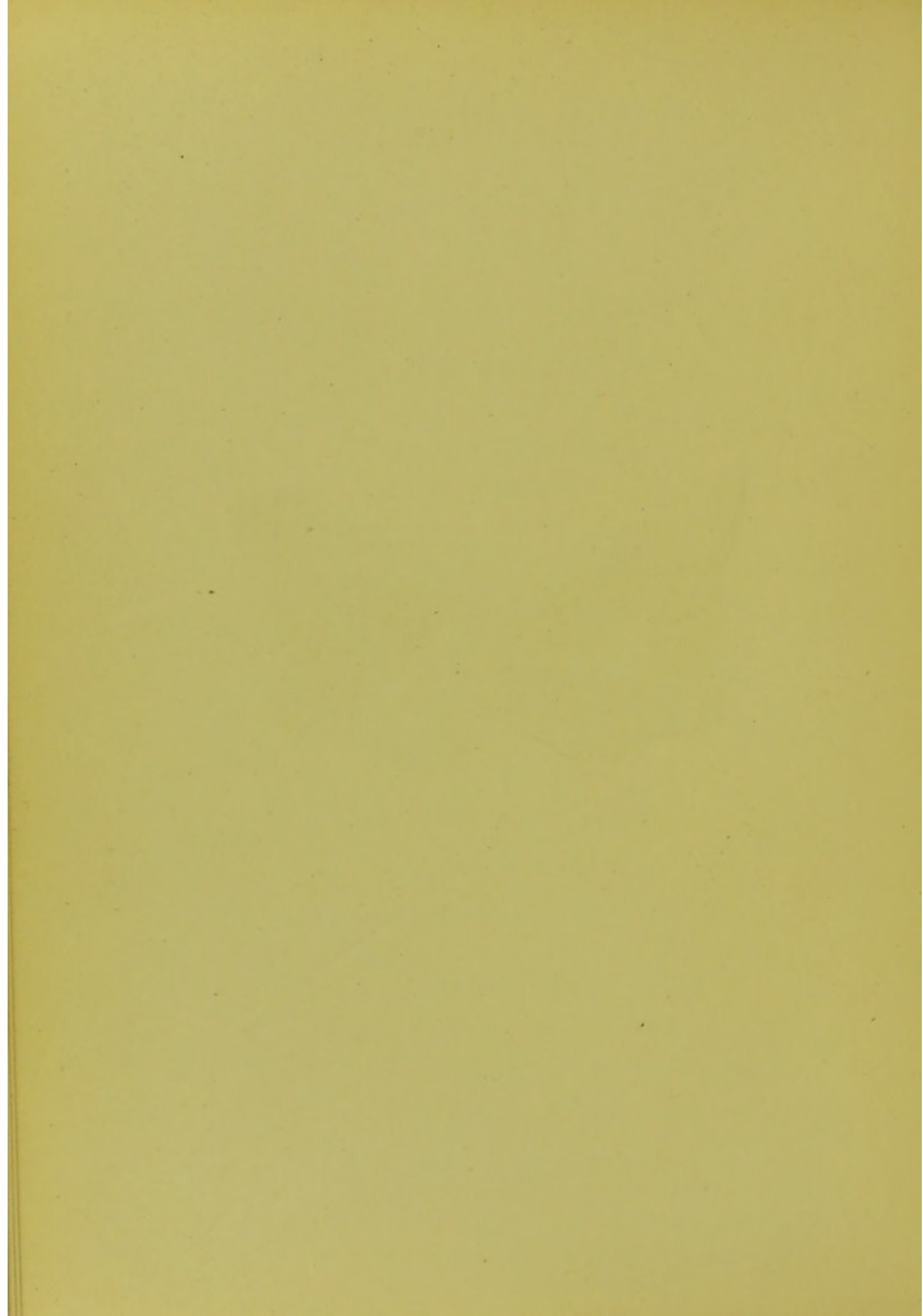


PLATE XIII.



## PLATE XIII.

### HORIZONTAL SECTION.

*Right.*

*Left.*

*Viewed from Above.*

A horizontal section at the level of the middle turbinal, passing through the sphenoidal sinus and the maxillary antrum. It is viewed from above and displays the important relations of the sphenoidal sinus, the connections of the maxillary sinus, the situation of the nasal duct, and a bladder-like cavity in the anterior extremity of the middle turbinal on the right side. The section on the right side passes through the opening of the maxillary sinus; in Plates VIII. and IX. this opening is cut through vertically, so that a comparison of the three figures helps to explain its topography.

- m. t. Middle turbinal.
- n. d. Nasal duct.
- m. s. Maxillary sinus.
- o. m. s. Opening of maxillary sinus.
- s. t. Superior turbinal.
- s. s. Sphenoidal sinus.
- c. Carotid artery, intracranial portion.
- s. Septum, somewhat bent.



PLATE XIII.

Right.

Left.

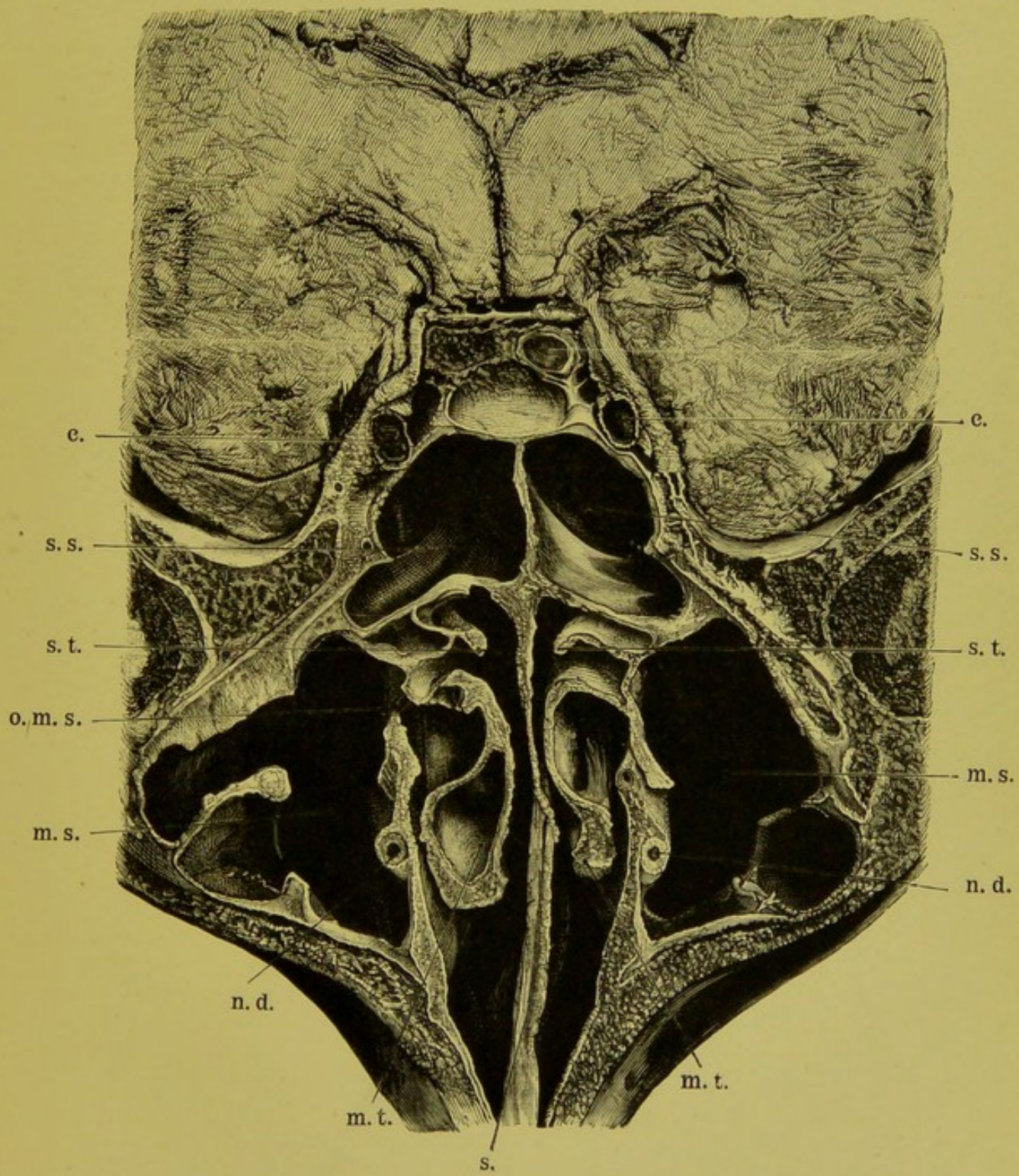






PLATE XIV.

## PLATE XIV.

### HORIZONTAL SECTION.

*Left.*

*Right.*

*Viewed from Above.*

The section is made at a short distance above the floor of the nose. The inferior turbinal has been completely removed, so as to expose the entire width of the inferior meatus. The floor of the maxillary sinus and the configuration of its wall can be easily studied.

- f. n. Floor of the nose.
- f. m. s. Floor of maxillary sinus.
- i. c. Incisor canal.
- s. Septum.

PLATE XIV.

Left.

Right.

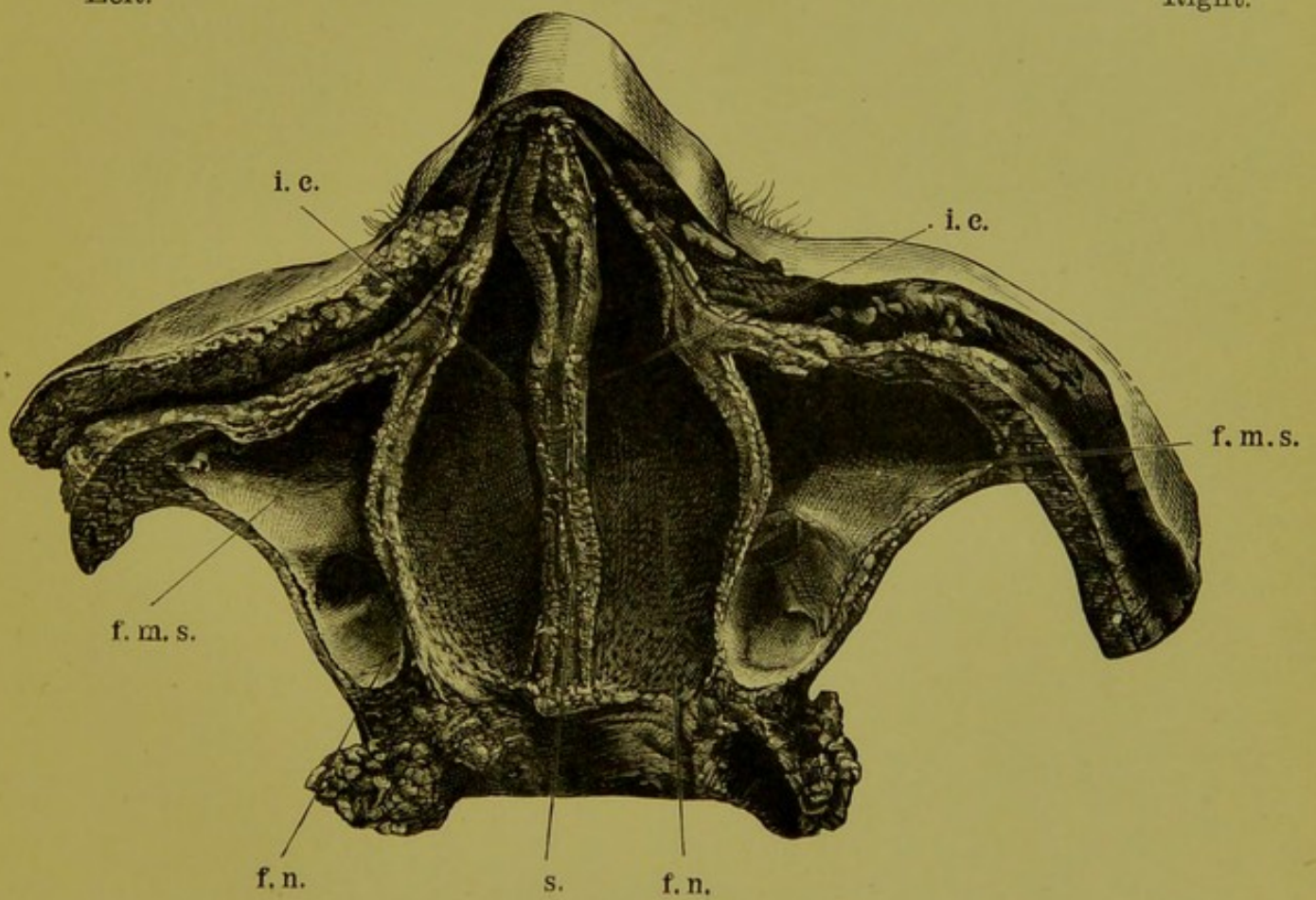






PLATE XV.

PLATE XV.

HORIZONTAL SECTION.

*Right.*

*Left.*

*Viewed from Below.*

The section is made at the level of the inferior turbinal, and passes across the maxillary sinus. It shows the roof of the maxillary sinus, part of the roof of the nose, the posterior part of the middle turbinal, and the termination of the nasal duct in the concavity of the inferior turbinal. The figure is a good illustration of deviation of the septum, with a spur on one side.

- i. t. Inferior turbinal.
- m. s. Maxillary sinus.
- n. d. Nasal duct.
- s. Septum.
- m. t. Middle turbinal.
- m. m. Middle meatus.



PLATE XV.

Right.

Left.

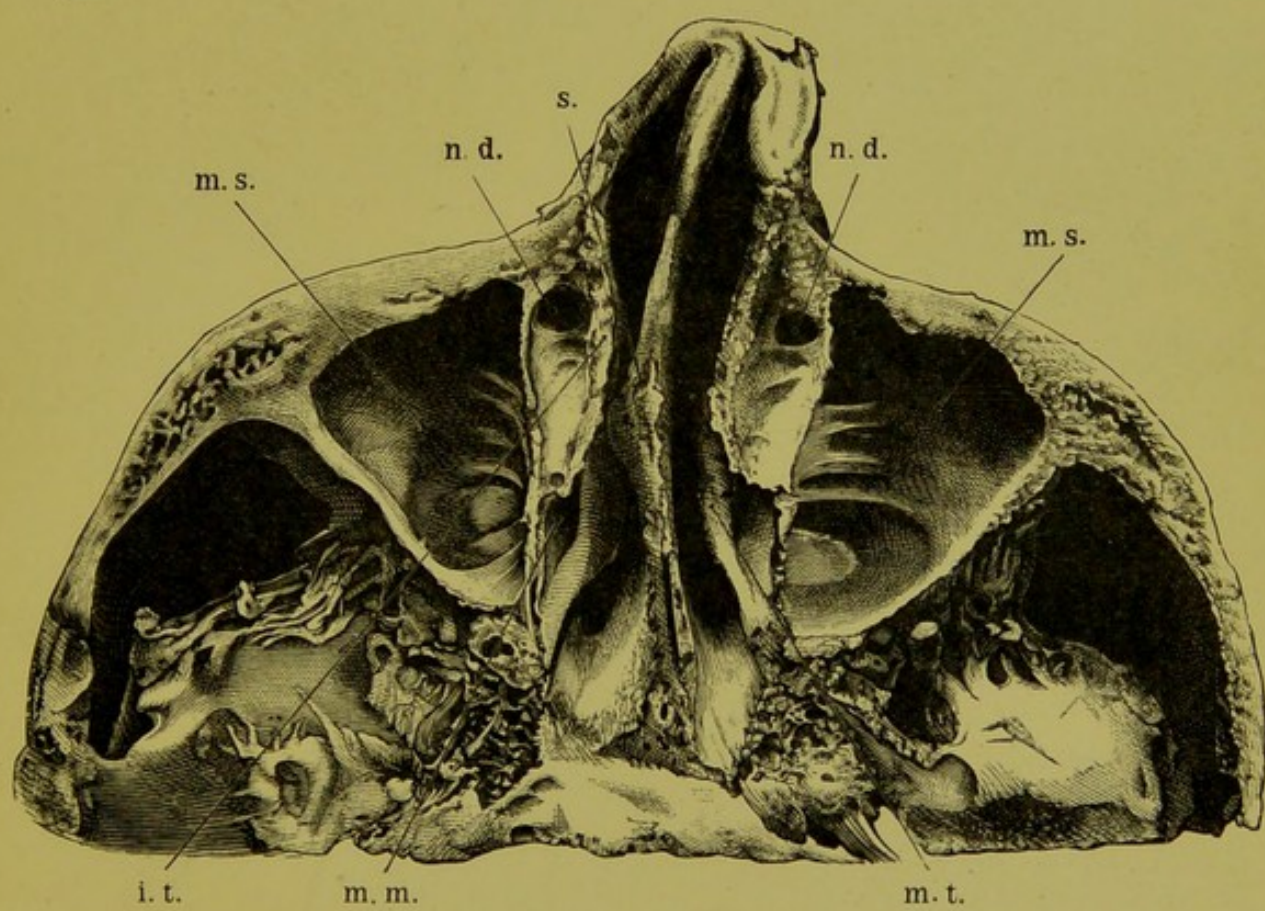




PLATE XVI.



## PLATE XVI.

### NASO-PHARYNX AND PHARYNX.

*Left.*

*Viewed from Behind.*

*Right.*

This preparation has been made by a coronal section, carried downwards from the base of the skull. It shows, as viewed from behind, the structures from the roof of the naso-pharynx down to the commencement of the œsophagus.

- u. Uvula.
- s. Septum.
- m. t. Middle turbinal.
- e. t. Eustachian tube.
- n. p. Roof of naso-pharynx.
- m. m. Middle meatus.
- s. p. Soft palate.
- t. Tongue.

# PLATE XVI.

Left.

Right.

