



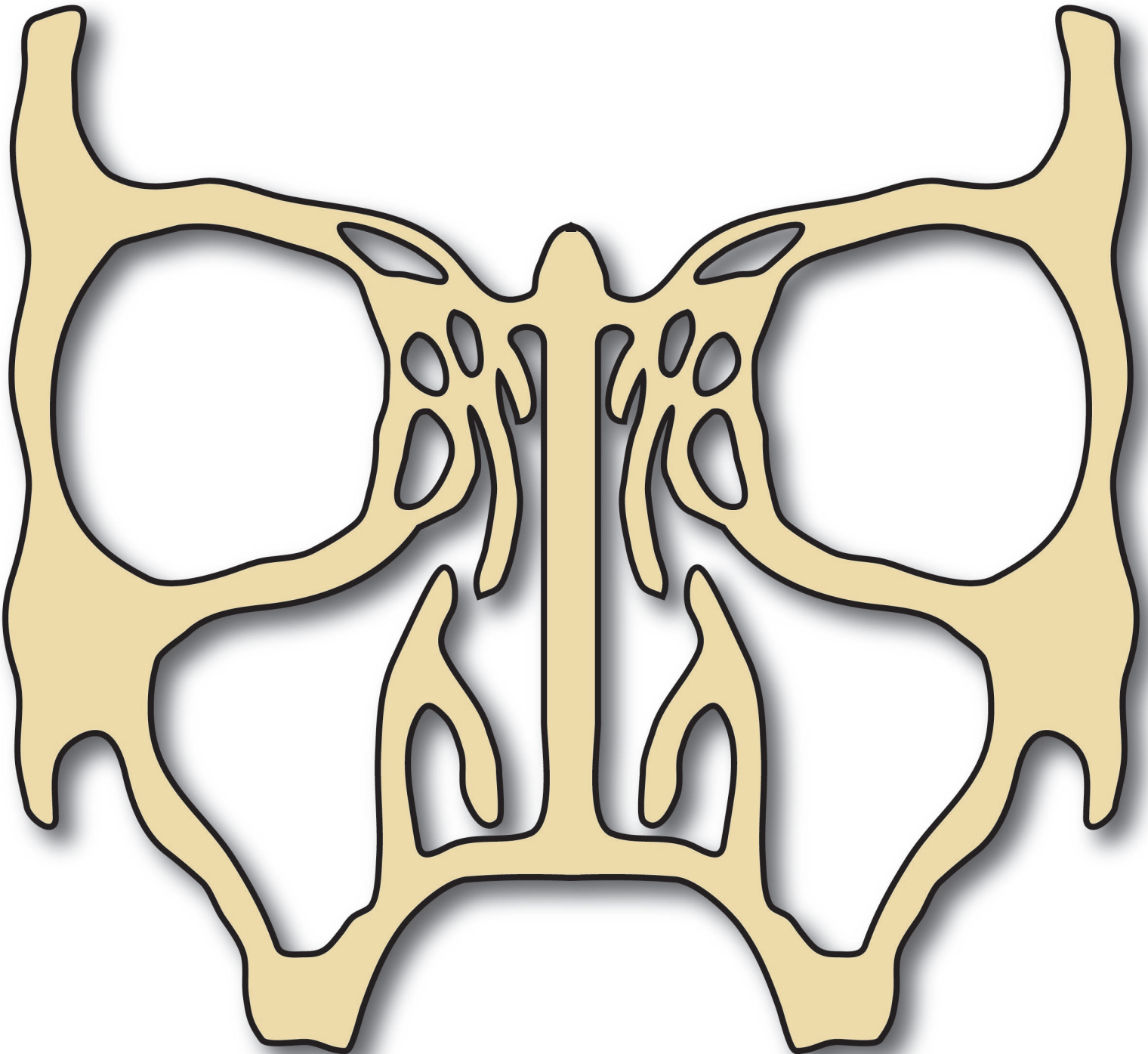
Peristence
& Creativity

Anatomy Comics, Objective 12.3



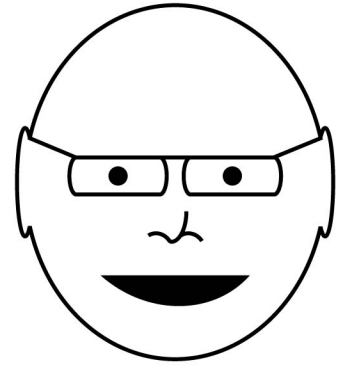
Simple
Comix

12.3 Trace the flow of air into each of the paranasal sinuses, note the communication with the nasal cavity and the relationships of each sinus to the oral, orbital and cranial cavities.



1. Which paranasal sinus is abnormal on this axial image?

- A. Frontal
- B. Maxillary
- C. Ethmoid
- D. Sphenoid

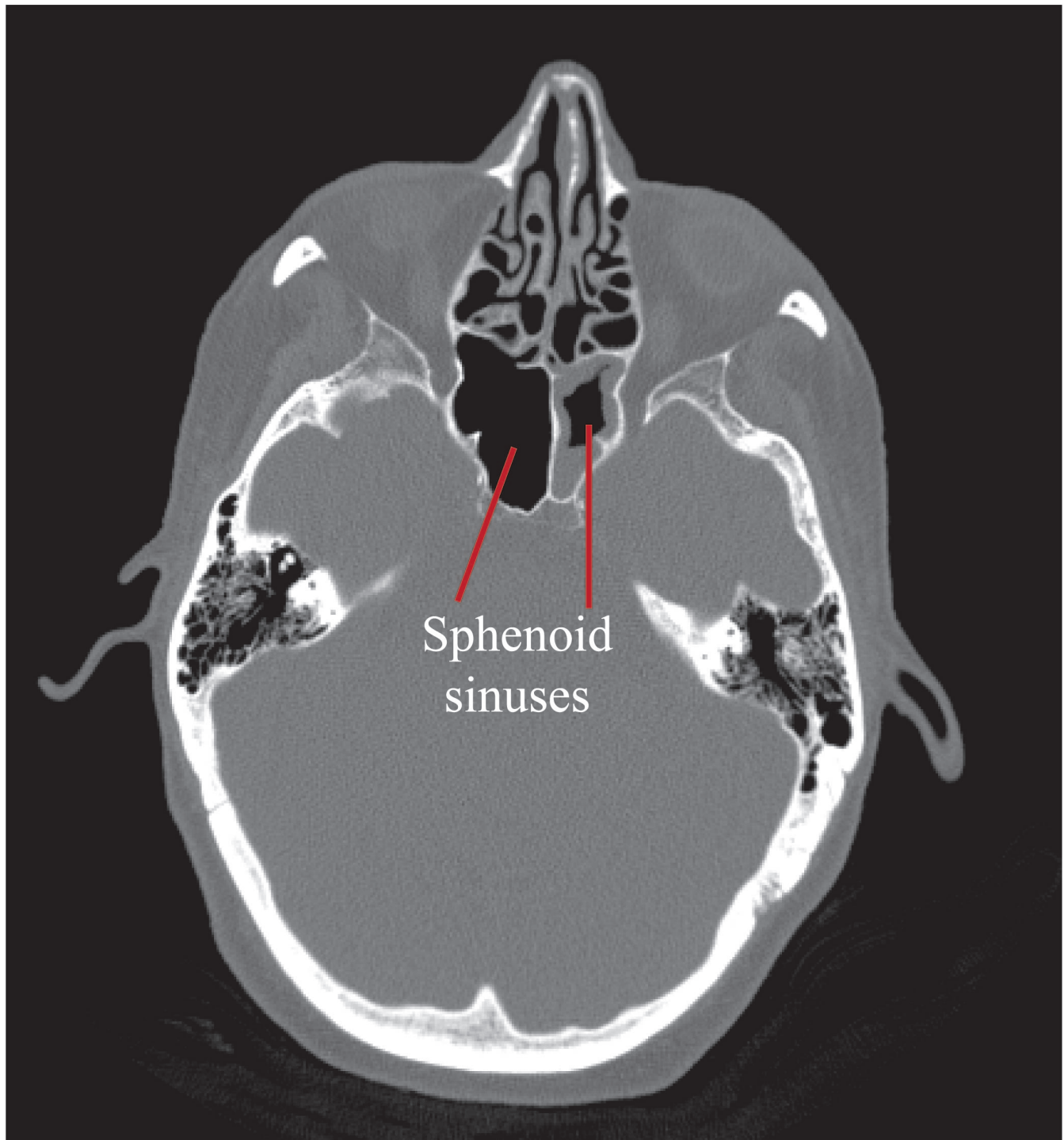
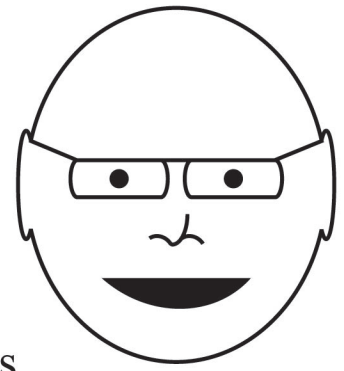


2. What are potential complications of sinus disease in this location?

- A. Intracranial spread
- B. Cavernous sinus thrombosis
- C. Intraorbital spread
- D. All of the above

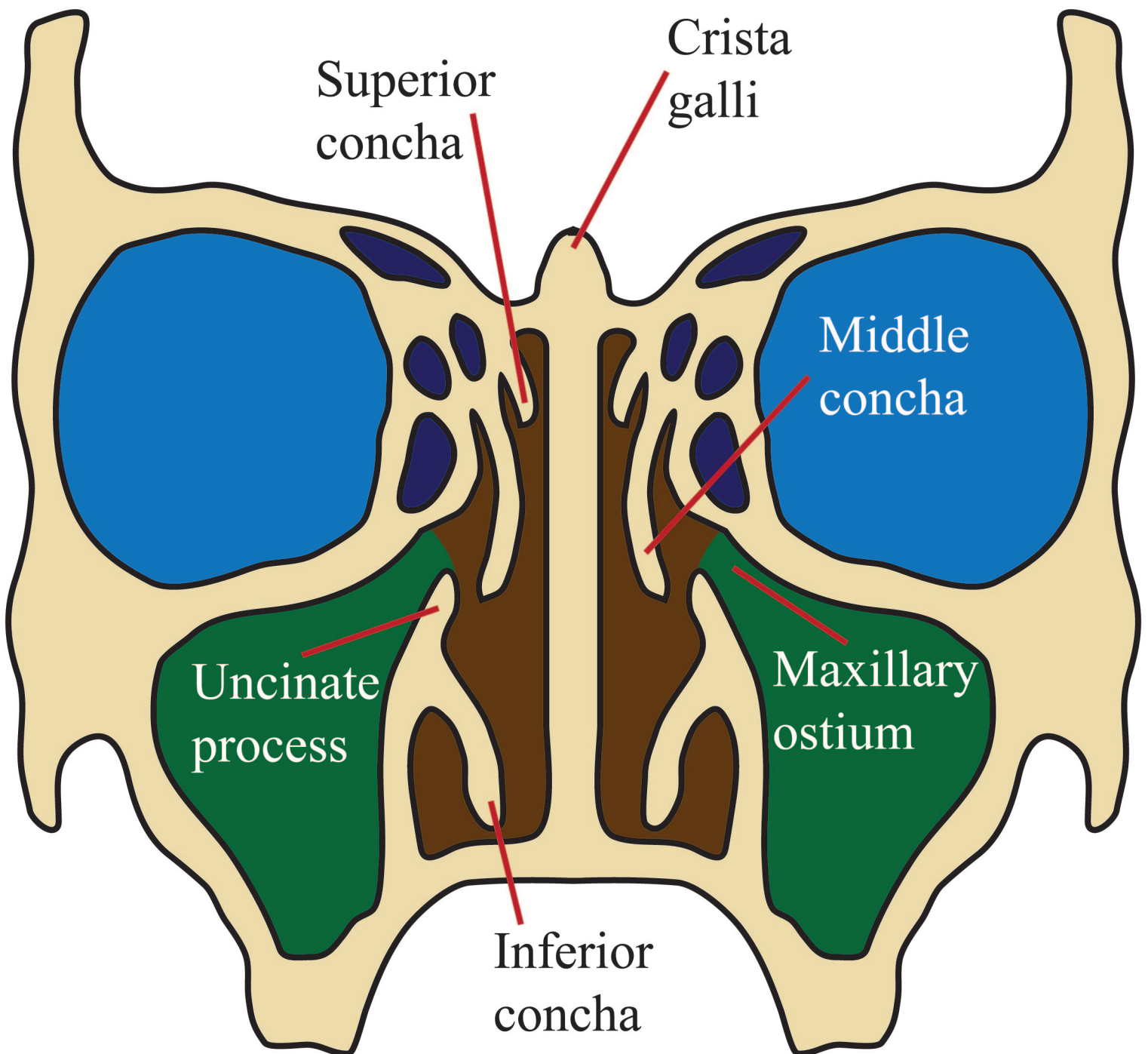


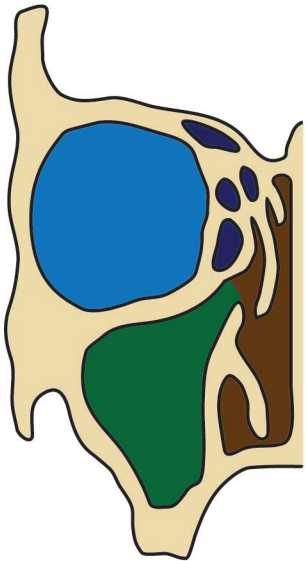
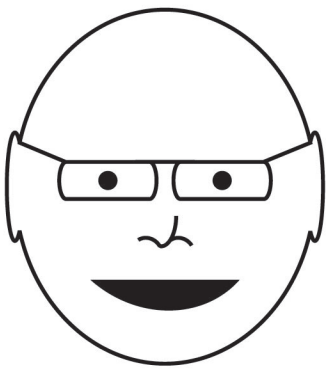
The answer to question 1 is D; the left sphenoid sinus is partially filled with soft tissue, compare to the normal air filled right sphenoid sinus. The normal ethmoid air cells are located anteriorly, the maxillary sinuses are located below the plane of this image, the frontal sinuses above. The answer to question 2 is also D, sphenoid sinusitis can result in all of these complications. We'll use line drawings and images from clinical cases and the visible human project to learn the relevant anatomy.



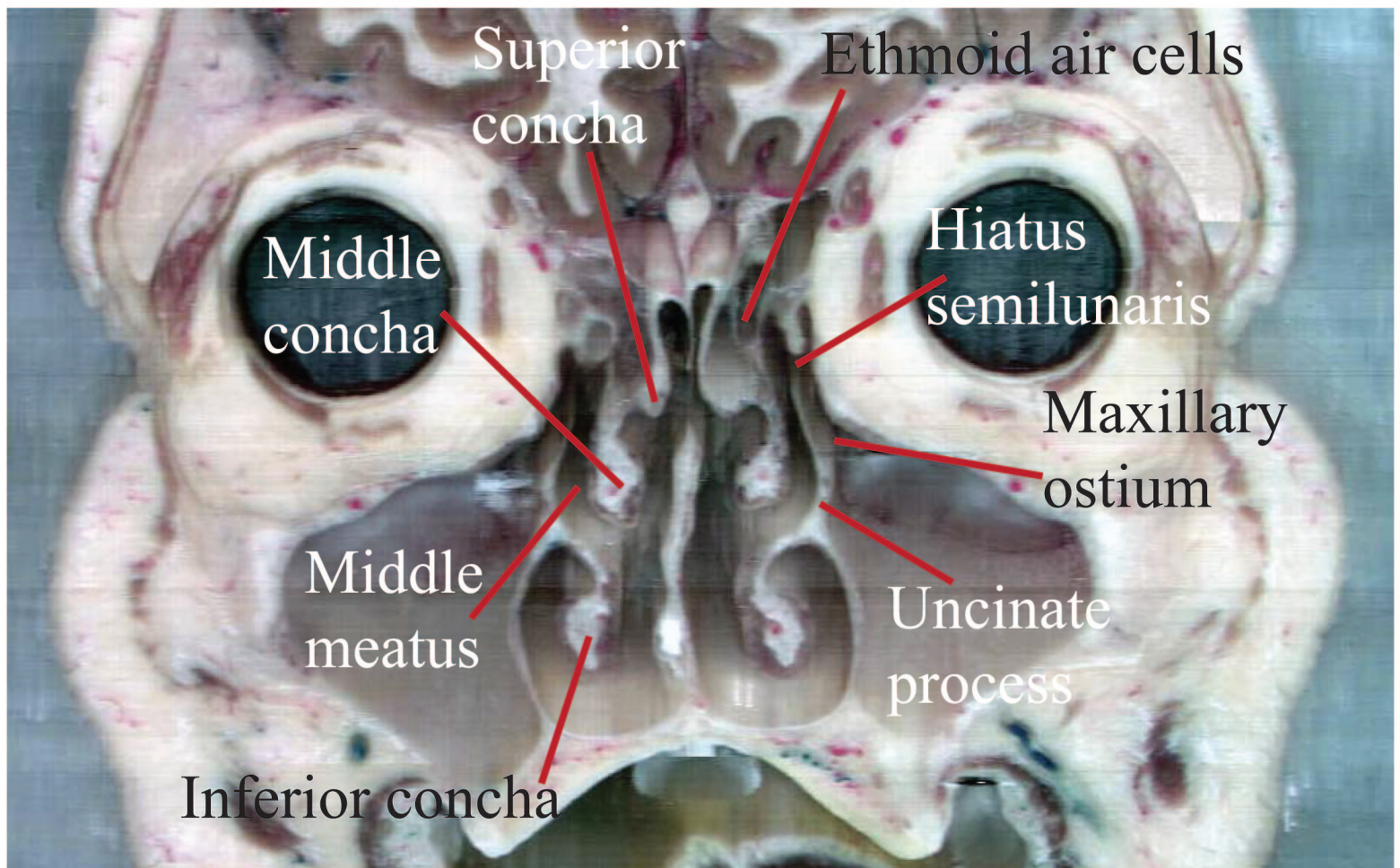


Let's start with this drawing in the coronal plane, showing the relationship between the orbit (blue), the maxillary sinus (green), the ethmoid air cells (purple) and the nasal cavity (brown). Ultimately, all of the paranasal sinuses drain into the nasal cavity. We'll look at the 2 other sinuses, the frontal and sphenoid sinuses later using the visible human project and CT scans. I have labelled some important structures that we'll discuss in greater detail next. If you cannot draw this image, try tracing it!





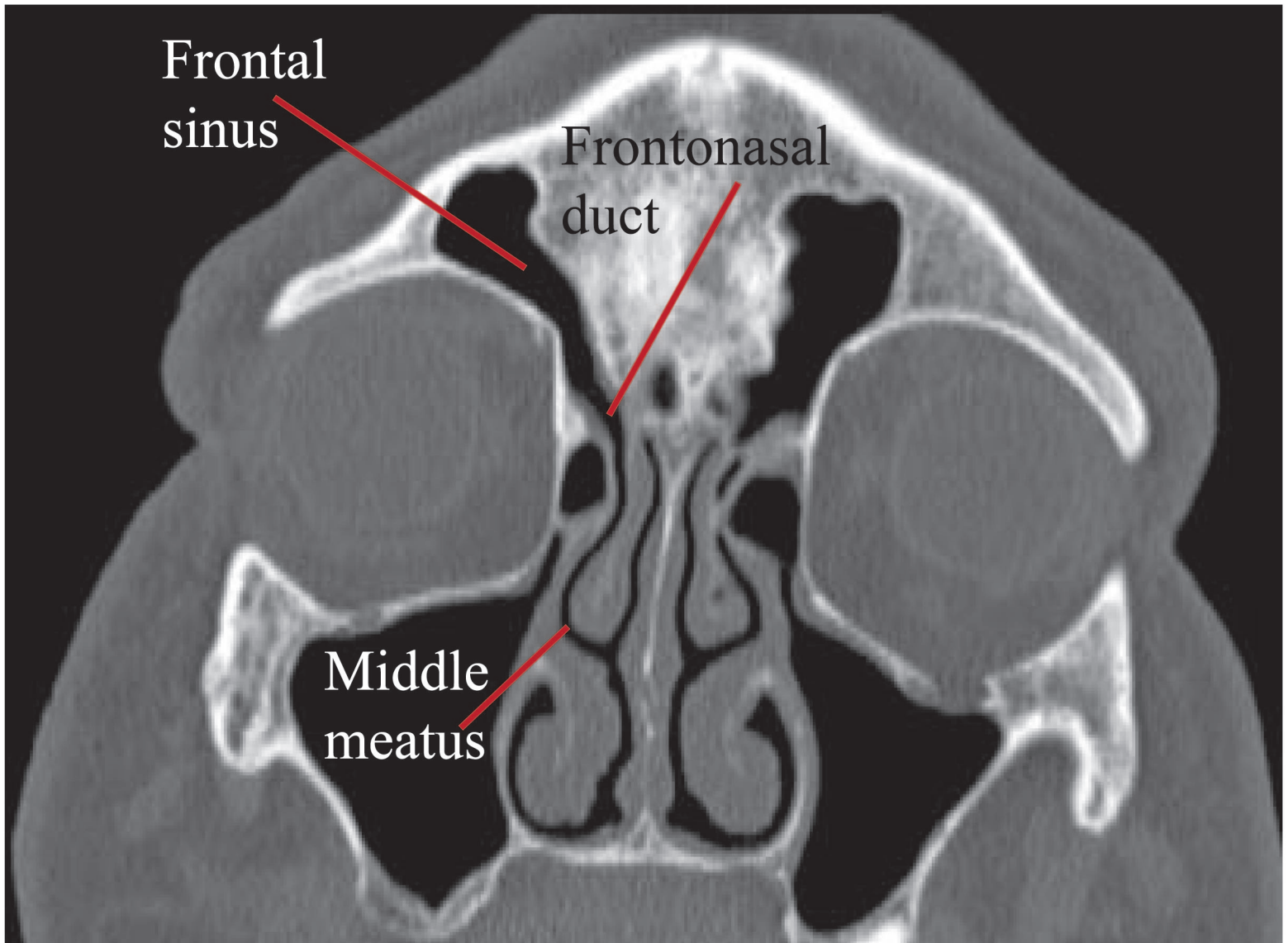
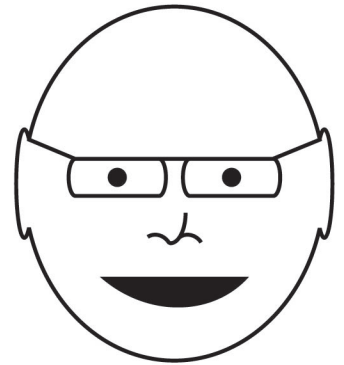
This is a coronal image from the visible human project that shows the same anatomy. We've added labels to show the components of the ostiomeatal unit (OMU), which consists of the superomedial maxillary sinus, the uncinate process, the hiatus semilunaris and the middle meatus. The OMU is important because the middle meatus of the nasal cavity receives drainage from the frontal and maxillary sinuses as well as the anterior and middle ethmoid air cells. You can see that the anatomy is not optimal. For example, fluid in the maxillary sinus has to get through the superiorly positioned maxillary hiatus, then drain through a narrow passage to get to the hiatus semilunaris before reaching the middle meatus. If the mucous membranes of the OMU are swollen or there is a congenital narrowing of parts of the unit, drainage will be impaired and sinusitis may result.

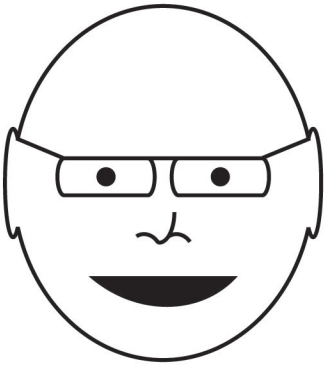


We'll start anteriorly and show the paranasal sinus drainage using primarily CT scans, because the anatomy is easier to recognize. This coronal CT image shows the frontonasal duct passing from the right frontal sinus to the middle meatus.



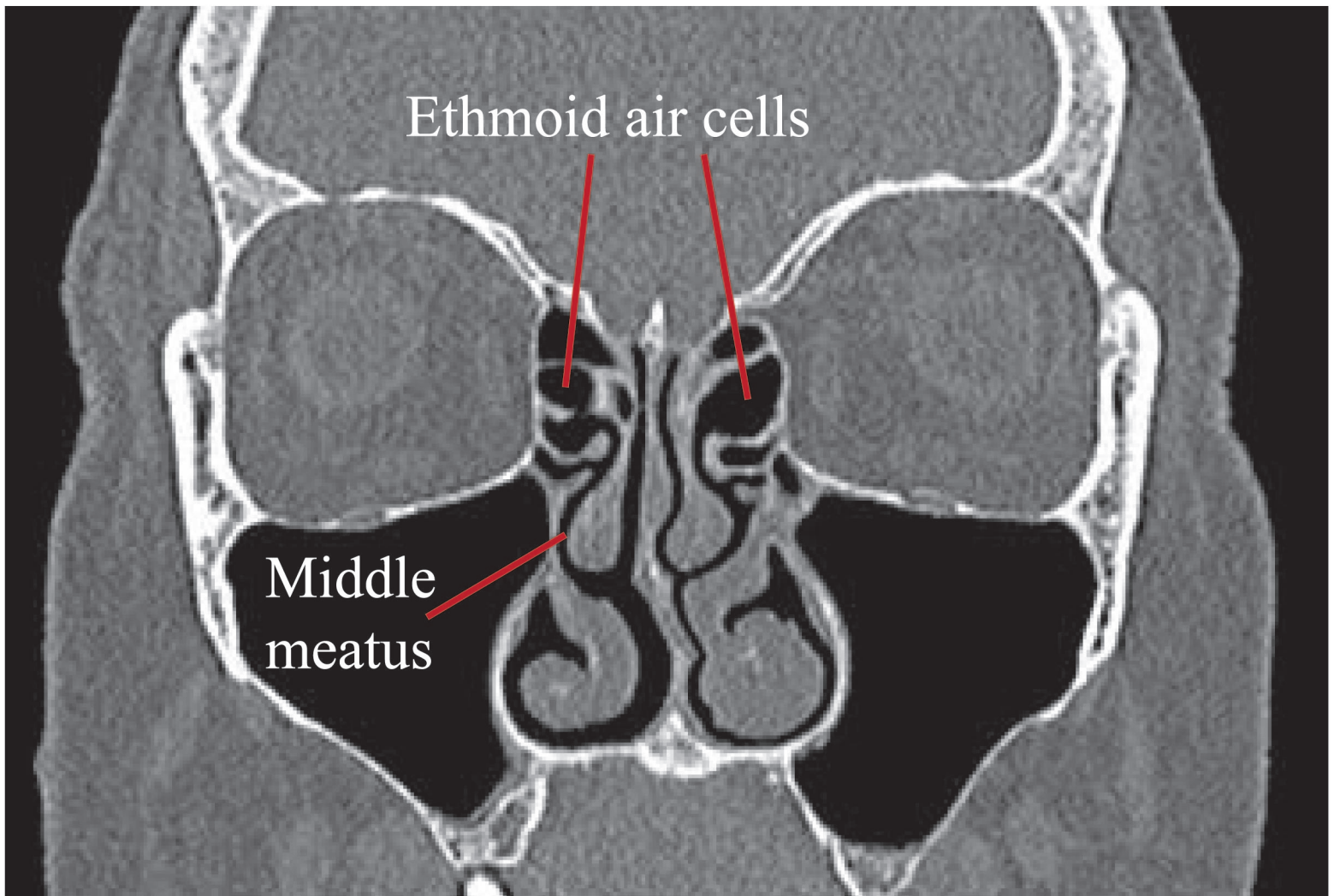
Indeed.





A more posterior coronal CT image shows drainage of multiple anterior ethmoid air cells into the middle meatus.

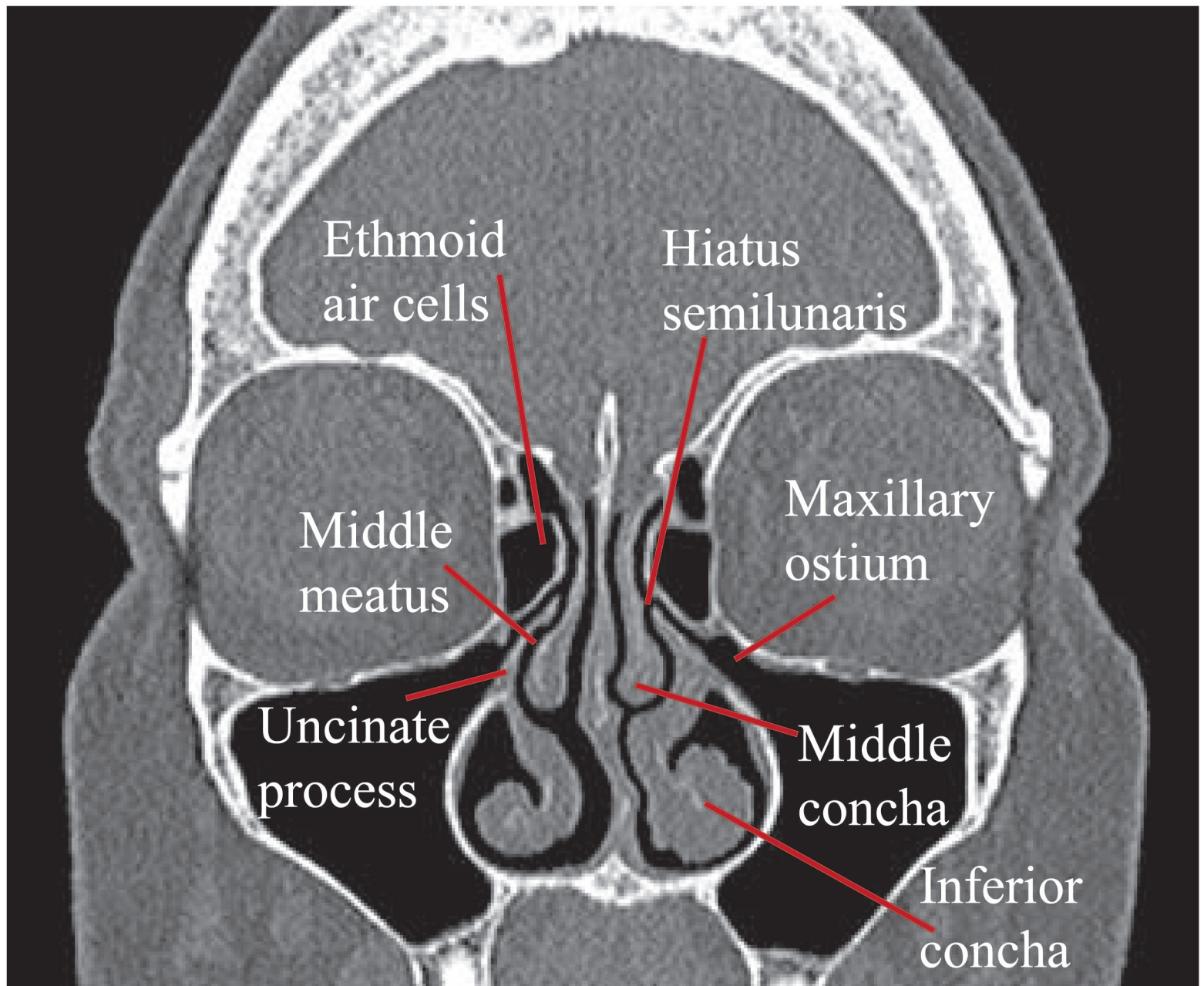
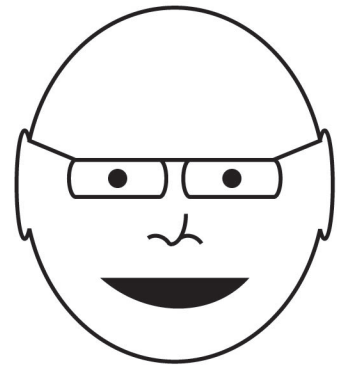
Again, it's easier to see than on the visible human images.

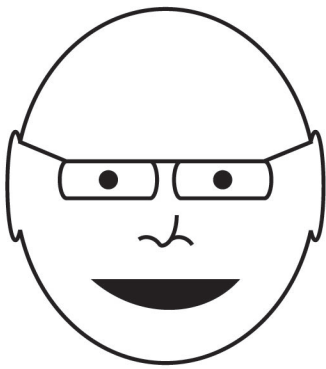




Going a little more posteriorly, we can recognize the components of the OMU and the drainage route of the maxillary sinus on this coronal CT image.

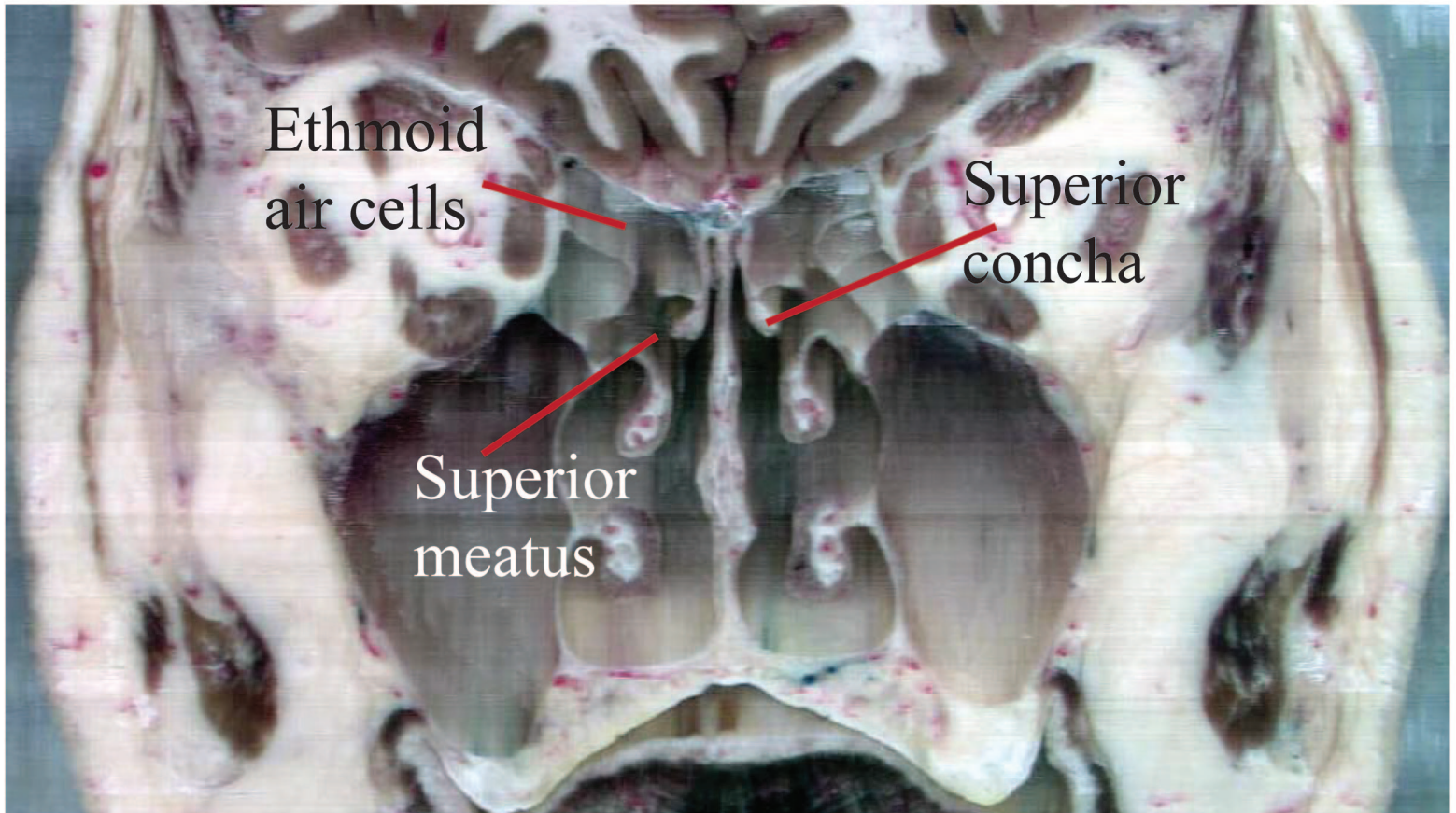
You can compare to the coronal visible human image from earlier in this comic.





Going back a little further, this coronal visible human image shows the posterior ethmoid air cells draining into the superior meatus.

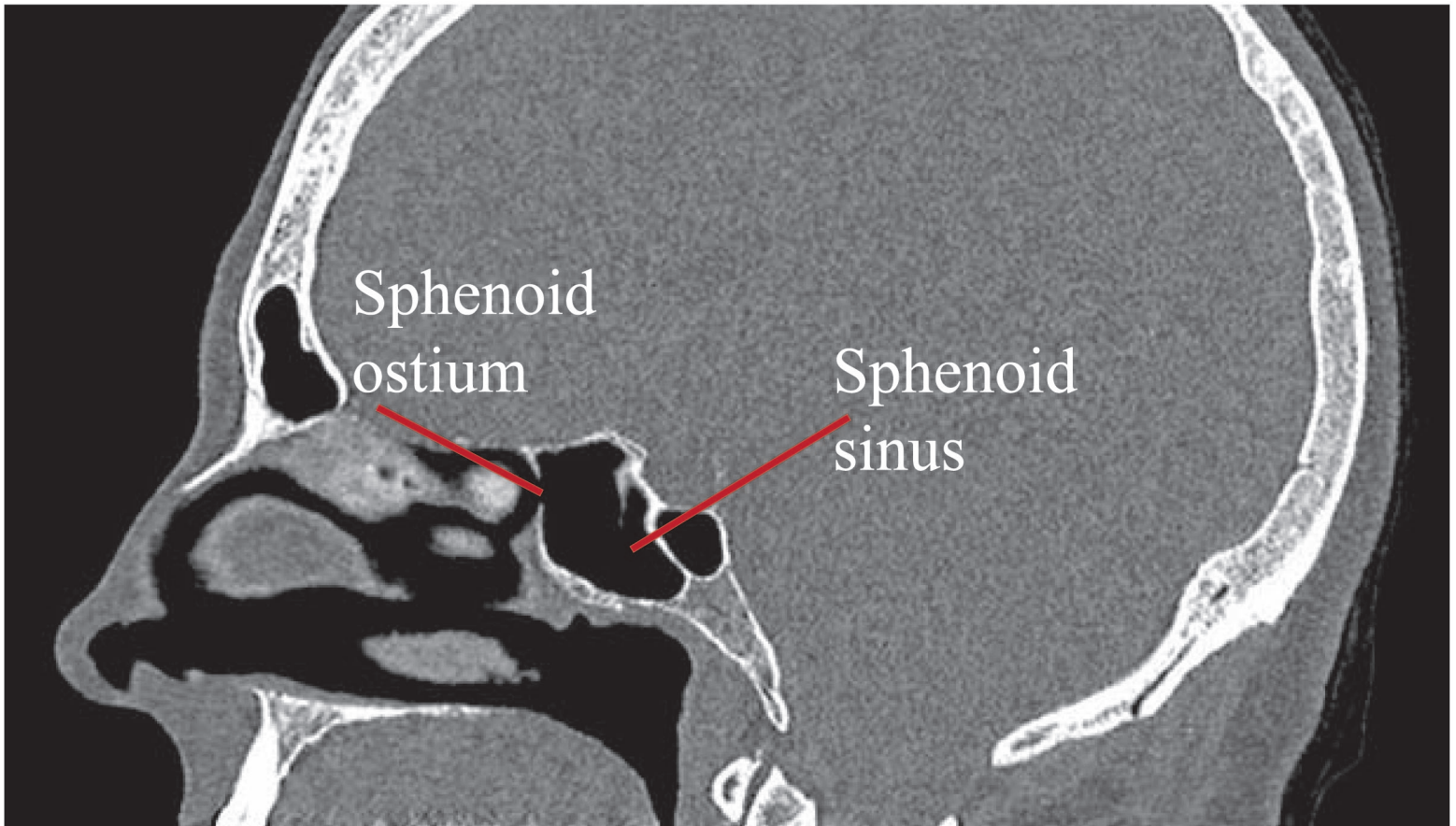
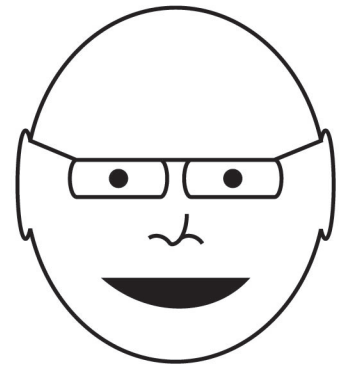
Yeah buddy.





The sphenoid sinus is the most posterior paranasal sinus and drains into the sphenoidal recess.

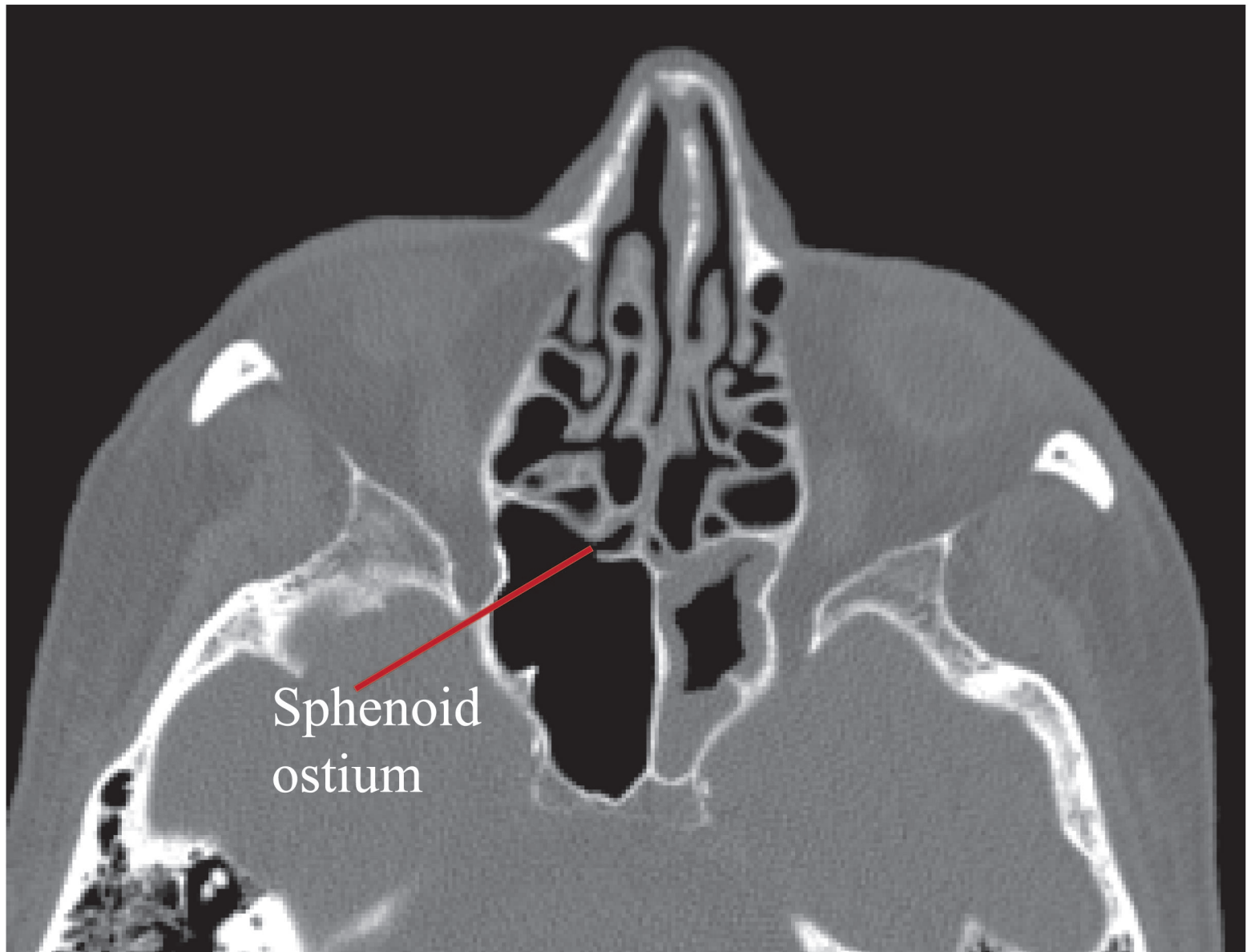
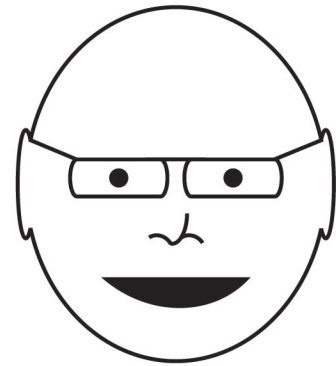
Just for completeness, we'll remind you that the nasolacrimal duct empties into the inferior meatus.



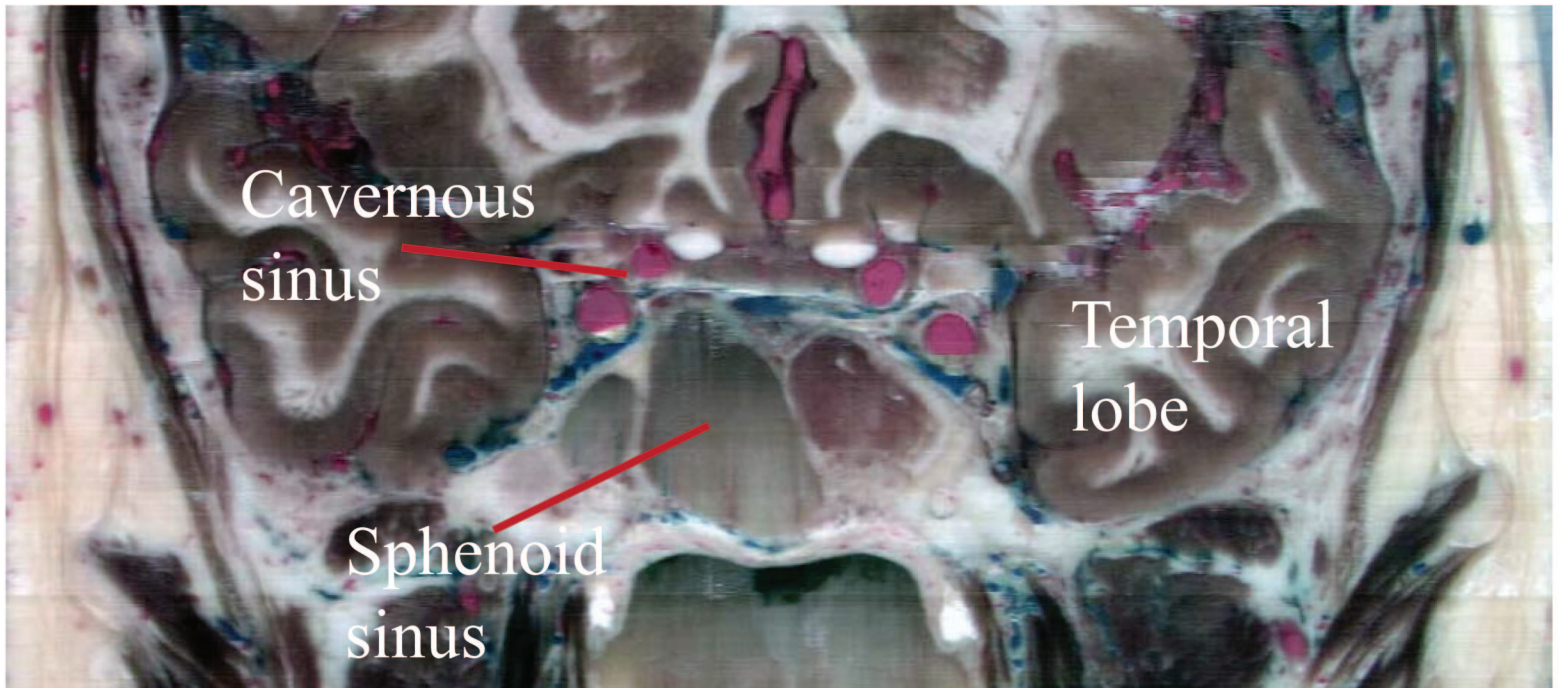
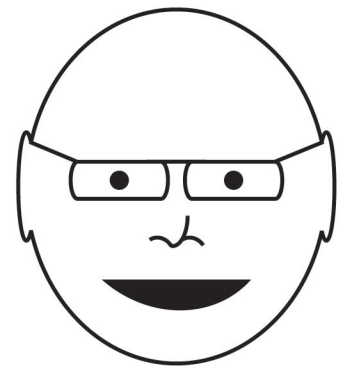


Here is a cropped axial image from our case, which shows the normal right sided sphenoid ostium draining into the right sphenoidal recess. Compare to the abnormal occluded left side.

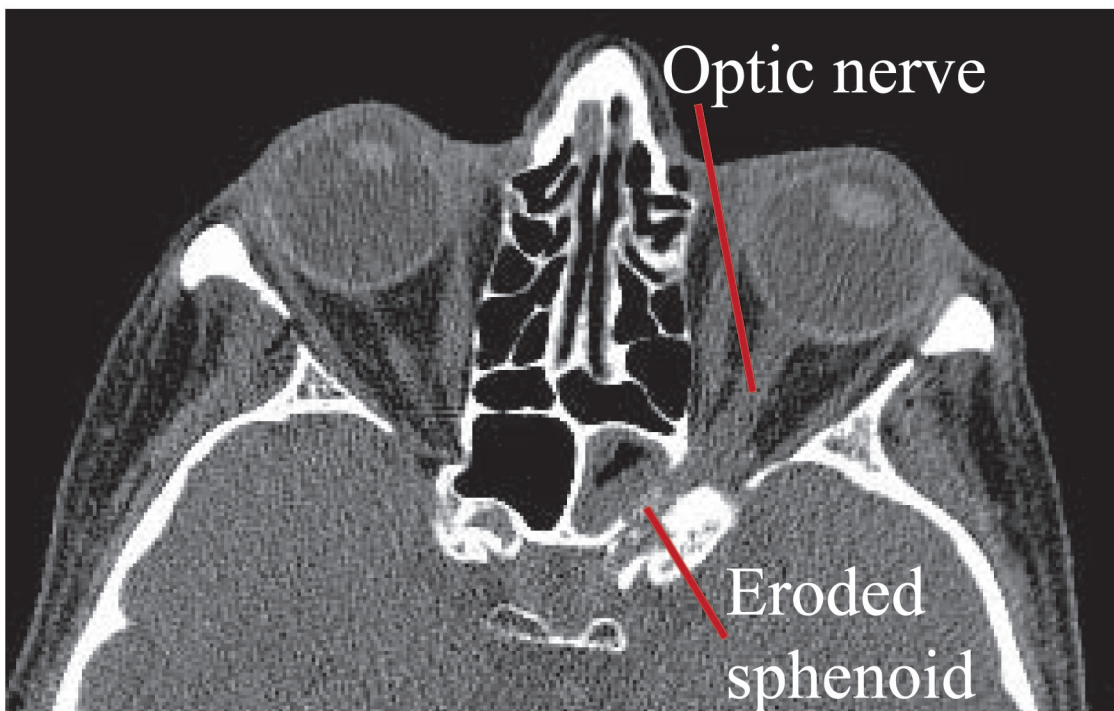
Note how tight the ostium is, that's just asking for trouble.

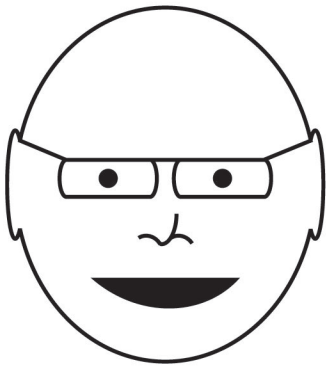


Which reminds me, let's take a closer look at those complications we mentioned. We've seen how close the paranasal sinuses are to the orbits, but sphenoid sinusitis can spread to the cavernous sinus and even intracranially.



In our case, the infection has eroded through the walls of the sphenoid sinus with intracranial spread. Look how close the optic nerve is to the infection!





It's always amazing to me how miserable infection of .0000001% of your body can make you, and it's even more annoying when you consider all of these design flaws that can turn a runny nose into a life threatening event.

On that cheery note, thanks for your attention and join us for the next thrilling episode of Anatomy Comics!

