

### 3. The Jaw and Related Structures

#### Overview and objectives of this dissection

The goal of this dissection is to observe the muscles of jaw raising. You will also have the opportunity to observe several nerves that run along the side of the face and the jaw. The position of the jaw is important in speech in that it considerably affects that of the tongue. It also plays a prominent role in consonant production, particularly that of labial consonants such as [p, b, m, f, v]. In addition, proper positioning of the upper and lower front teeth (the incisors) is required for the pronunciation of sibilants such as [s]. In this dissection we will study the muscles responsible for raising the jaw. Jaw lowering will be considered in Dissection 4.

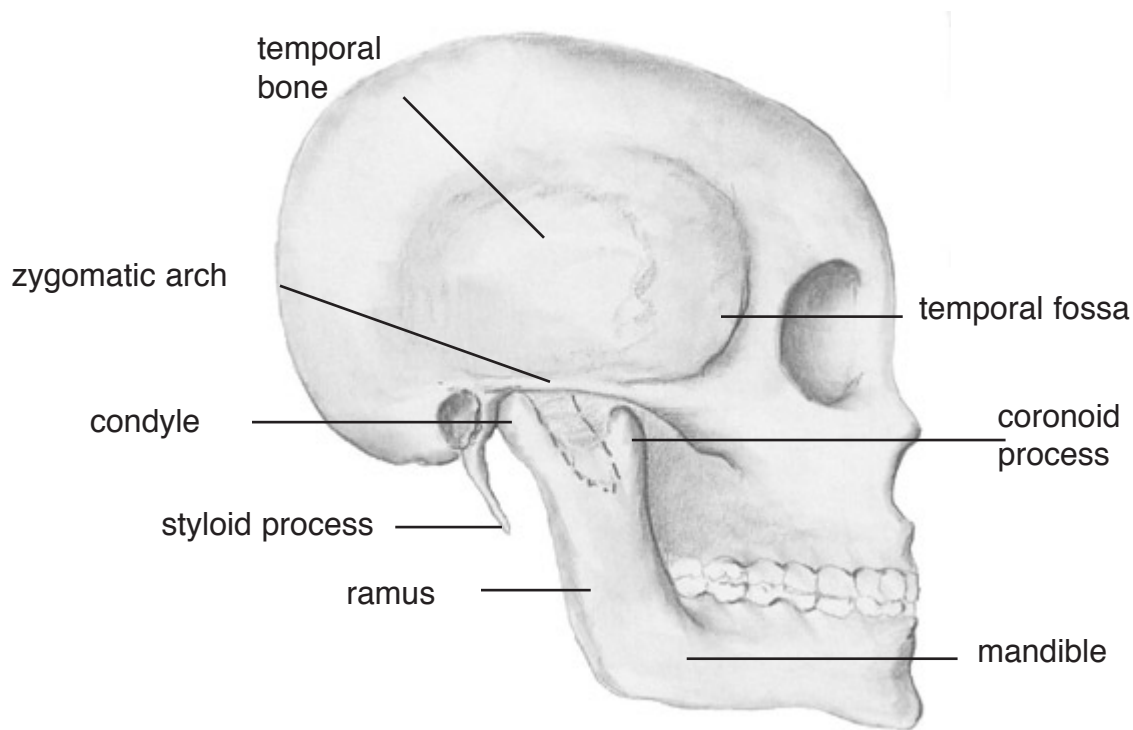


Figure 3.1 Landmarks of the skull, lateral view.

In approaching structures of the deep face, it will be helpful to note a number of reference points on the exterior portions of the skull. You should also feel these on your own face, as well as finding them on a real (or plastic) skull. The locations of many of the features named below maybe hard to find simply by reference to two-dimensional illustrations such as figures 3.1 and 3.2. The first useful landmark on the **mandible** (the jaw) is the **condyle**, which forms part of the temporo-mandibular joint, the hinge of the jaw. It is in front of your ear and below the cheekbone on the upper part of the jaw. Observe how the mandible moves. Next find the **coronoid** process, (in front of the condyle going towards your nose on the upper part of the jaw), the **ramus**, the back part of the jaw bone and the **angle**, basically the angular part of the jaw bone, all of which are indicated in Figure 3.1. Note the extent of the **temporal** bone, the major part of the skull above the eyes. Find the **styloid** process, a small spike of bone (which may have been broken off) near where the ear would be, but deeper. You should try to locate this process on both sides. Also locate the **zygomatic arch** (the cheek bone), the **lateral pterygoid**

**plate**, and the **maxilla** (the foundation for the upper teeth).

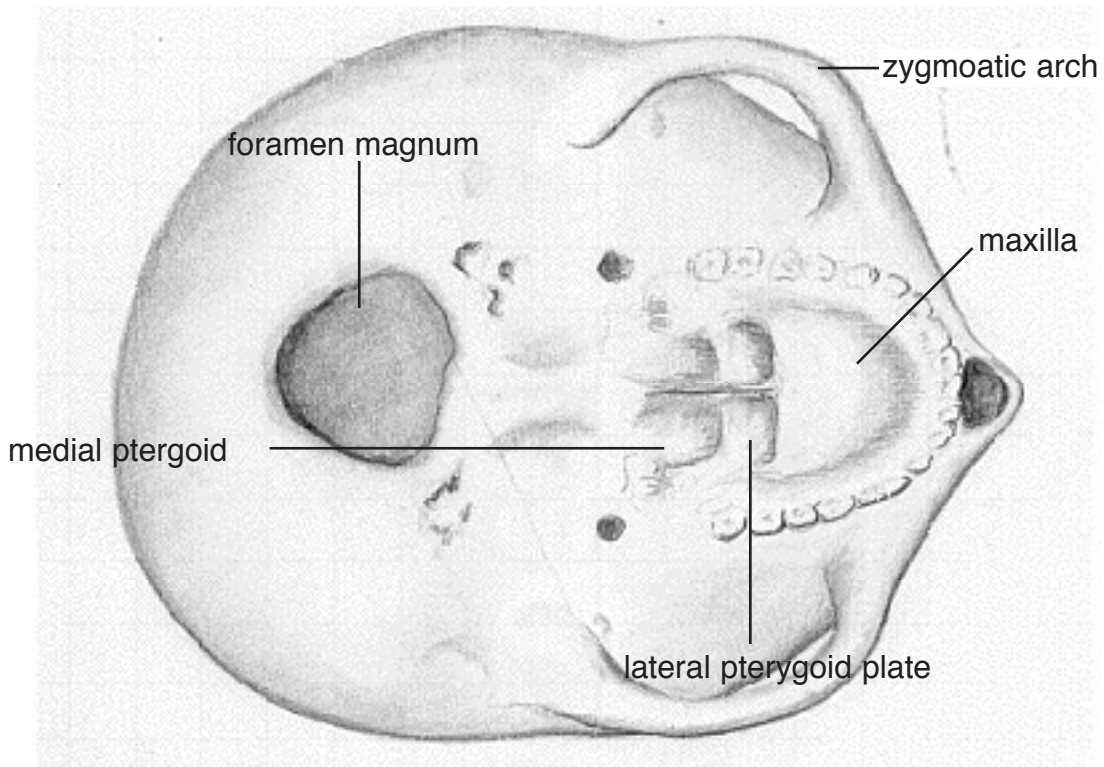


Figure 3.2. Landmarks of the skull, viewed from below

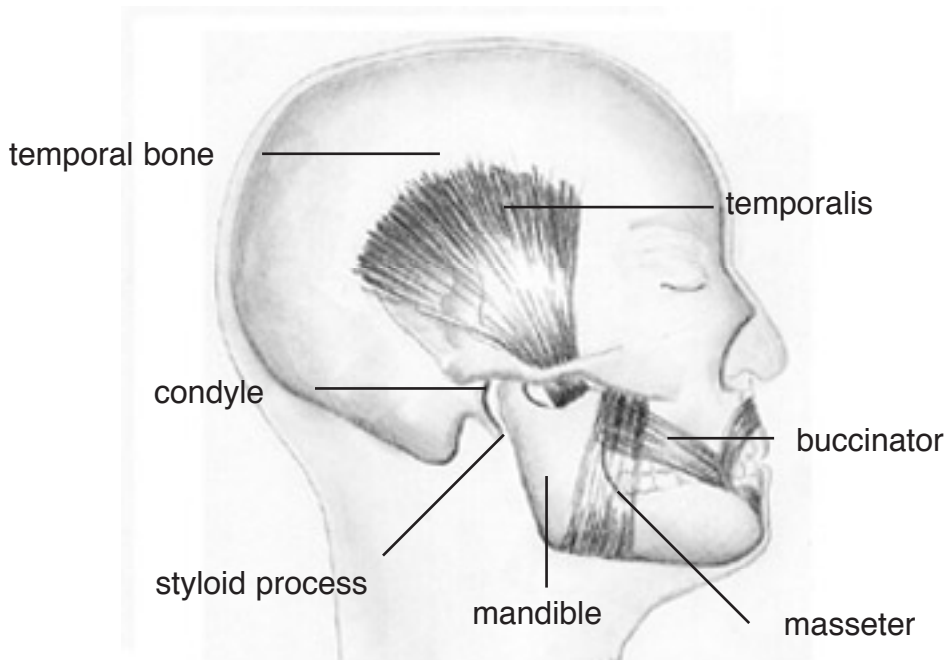


Figure 3.3. External muscles of jaw raising.

The muscles to be observed in this dissection are listed below along with their attachments and functions.

The **masseter** attaches to the zygomatic arch and to the ramus of the mandible (more colloquially, from the cheek bone to the back of the jaw). It closes the jaw by elevating and drawing forward the angle of the mandible. See Figure 3.3.

The **buccinator** lies deep to the masseter and is the muscle of the cheek-pouch. See Figure 3.3.

The **temporalis** arises from the temporal bone and attaches to the coronoid process of the mandible. The anterior two thirds of the temporalis muscle help to elevate the mandible. The posterior third retracts the mandible. This is the only muscle that retracts the mandible. See Figure 3.3.

The **lateral pterygoid** muscle (figure 3.4) arises from two heads, one from the surface of the lateral pterygoid plate and one from the lateral portion of the greater wing of the sphenoid bone. It inserts into the pterygoid pit beneath the mandibular condyle (the head of the mandible). The lateral pterygoid muscle draws the mandible forward by drawing on the condyle.

The **medial pterygoid** muscle (Figure 3.4), which arises from the medial surface of the lateral pterygoid plate (see Figure 3.1) and attaches to the medial side of the angle of the mandible. By pulling the angle of the mandible towards the lateral pterygoid, that is, superiorly, anteriorly and medially, it closes the mouth.

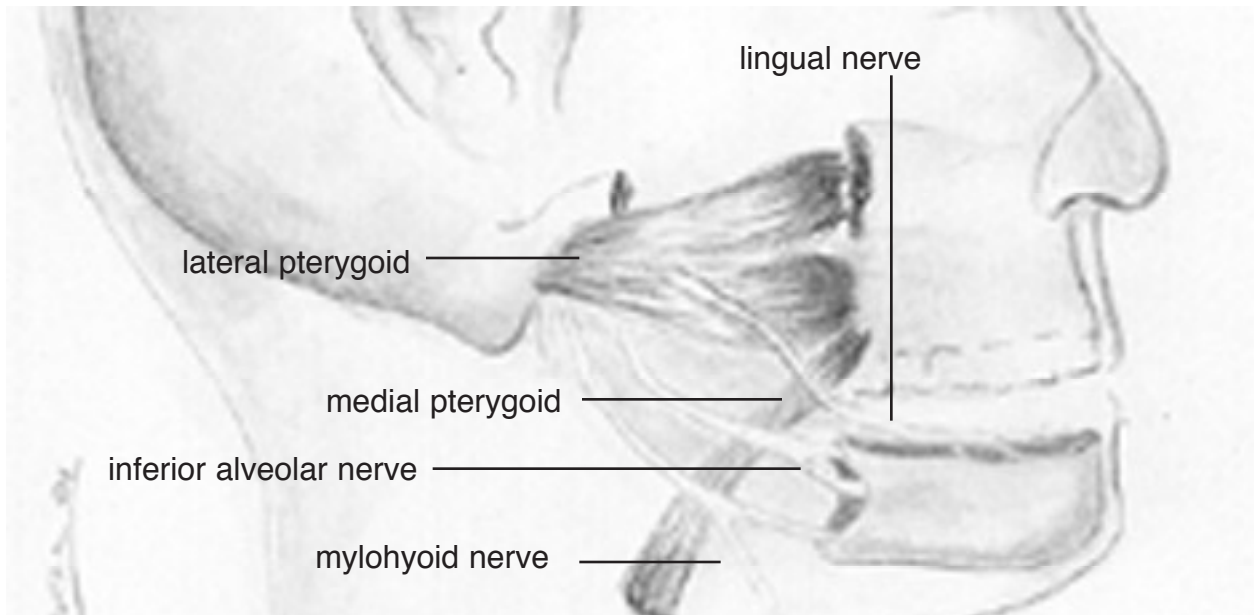


Figure 3.4. Other structures of the deep face.

The dissection also provides an opportunity to locate some of the nerves involved in speech production, shown in figure 3.4.

The **inferior alveolar nerve** which is a branch of the posterior mandibular division of the trigeminal nerve. It innervates the teeth and also provides sensory innervation for the lower

lip. This nerve runs down the side of the face and goes through the mandible.

The **lingual nerve**, which is another branch of the posterior division of the mandibular branch of the fifth cranial nerve. It runs in front of the inferior alveolar nerve and supplies (among other things) the mucous membrane of the anterior two-thirds of the tongue.

The **mylohyoid nerve**, which is a branch of the inferior alveolar nerve. It innervates the mylohyoid muscle, and the anterior belly of the digastric muscle, which will be dissected later.

The features of the skull discussed above are shown in Kahane and Folkins (1984) in figures such as 1-5, 1-6 and 1-9. Some of the muscles in this dissection are shown in their figures 10-9 and 10-10, though the views illustrated there differ from those described below because they followed different dissections.

### Dissecting the muscles that raise the jaw

Before beginning the dissection note whether or not your cadaver has or had dentures (the dentures may have been removed). This will affect the size and thickness of the mandible.

1. Make an incision along the brow towards the previously cut edge of the skin next to the eye. Pull back the cut edge of the skin, towards the ear, as far as the forehead. Underneath the skin lies the temporalis muscle covered by a very thick fascia. Clean up the area around the zygomatic arch and the temporalis muscle without removing the fascia overlying the temporalis muscle. Using chisel and mallet, crack the mandible horizontally.

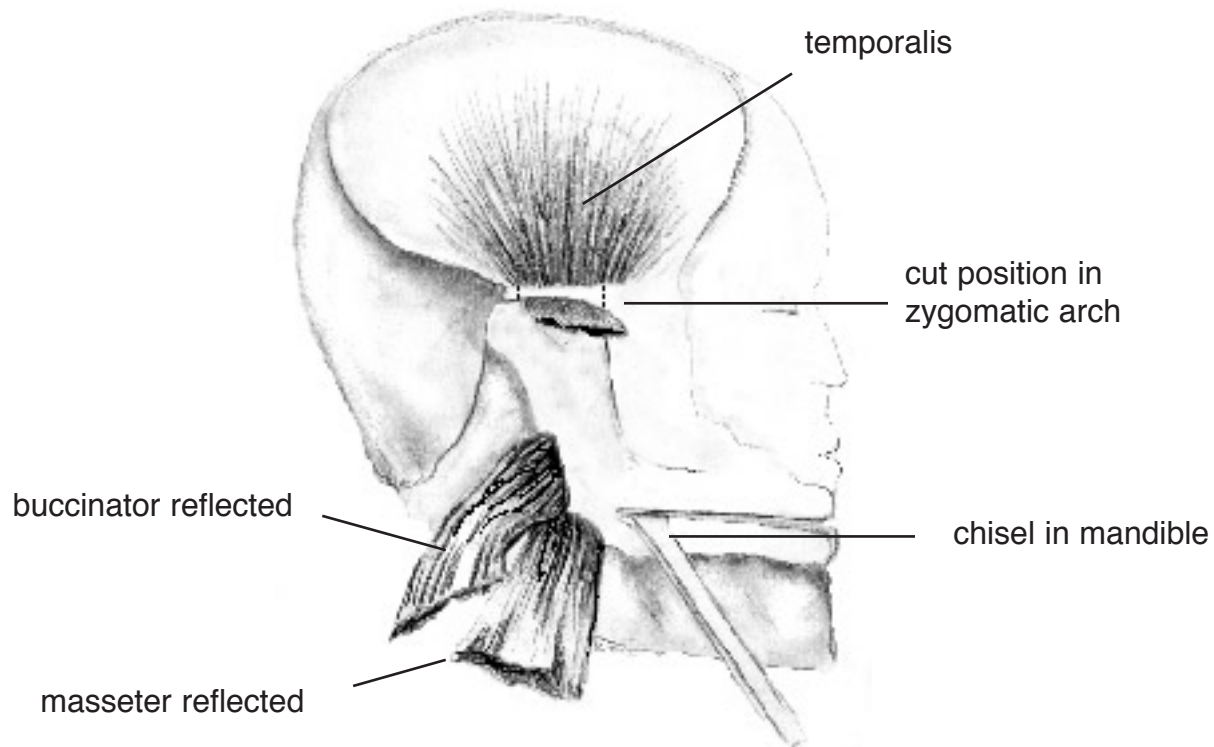


Figure 3.5. Dissection of the deep face. Cuts in zygomatic bone as indicated by dotted lines. Masseter reflected, exposing buccinator.

2. Locate the masseter muscle which connects the zygomatic arch to the mandible. Reflect the masseter down by cutting the muscle along the inferior border of the zygomatic arch.

Examine the underside of the muscle and observe the masseteric nerve. The masseteric nerve runs superior to the mandibular notch, the recessed area between the condyle and the coronoid process of the mandible (along the top of the jaw). Look for the masseteric artery which runs between the intermediate and superficial tendons of the masseter.

3. Remove a piece of the zygomatic arch, as indicated in figure 3.5. Section the zygomatic arch, using a bone saw or heavy scissors, along the vertical axis just anterior to (in front of) the condyle of the mandible. Then, make another cut about 3 cm anterior to the first.

Remove the cut piece of the zygomatic arch and observe the temporal fascia beneath it. Notice the attachment of this tissue in the temporal fossa, the middle portion of the skull.

4. Section and reflect the temporal fascia. The temporalis muscle is deep to the fascia and originates in the temporal fossa and inserts into the anterior border of the coronoid process and the anterior border of the ramus of the mandible. See figure 3.1.
5. Section the temporalis muscle where it is attached to the coronoid process of the mandible and pull it away from the mandible.
6. Crack and remove a small piece of the mandible (from the coronoid process to the teeth), in the following steps.

Crack the mandible horizontally using a chisel to just anterior to the angle of the mandible. Have another person keep the head steady by pushing against the opposite side of the jaw. (This person should be careful not to be cut by jagged bone.)

Pull away cracked pieces of bone to reveal the inferior alveolar nerve that runs inside the horizontal portion of the mandible.

7. Locate the medial pterygoid muscle deep to where the mandible was. Continue chiseling away the mandible bone along the break to reveal this muscle, taking care not to cut the inferior alveolar nerve. Remove excess fat and fascia, as needed, to reveal the nerve.
8. Locate the following nerves:

The inferior alveolar nerve runs along the lateral aspect of the medial pterygoid muscle, and enters the mandibular foramen (a circular opening on the ramus of the mandible). The inferior alveolar nerve gives sensation to the teeth and skin of the gums.

The mylohyoid nerve branches off from the inferior alveolar nerve before the inferior alveolar nerve enters the mandible. The mylohyoid nerve runs along the mylohyoid groove on the medial surface of the mandible.

The lingual nerve can be found by following the mylohyoid nerve medially from the mandibular foramen. The inferior alveolar nerve and the lingual nerves come from the third branch of the Trigeminal (Fifth Cranial) nerve. The lingual nerve innervates the tongue and inside of the mouth.

The buccal nerve, a fairly thick nerve, is medial to the lingual nerve.

9. Locate the lateral pterygoid muscle which is approximately parallel to the location of the previously removed zygomatic arch. Note how the lateral pterygoid muscle pulls the jaw forward by pulling on the condyle of the mandible.
10. Section the lateral pterygoid muscle near its insertion at the condyle of the mandible, and then near its origin on the outer side of the lateral pterygoid plate on the skull. Remove the lateral pterygoid muscle.
11. Expose the condyle of the jaw from the surrounding tissue. Attempt to preserve the inferior alveolar and lingual nerves located within these muscles, and trace these nerves up to their exit through the foramen ovale on the underside of the skull.