

Aeolus, The Larynx, and Voice Production  
or  
Falsetto Is My Friend

The Greek gods were not known for their fidelity. Poseidon had many goddess friends and, although he begat many children, just one of his sons, Aeolus, is important for our purposes. Aeolus was a wild sort of kid but after he had had his fling, he settled down to a life of piety and justice (boring!). He was so pious and just (and boring) that Zeus appointed him guardian of the winds. When Odysseus landed on his island, they became such good friends that Aeolus gave him all the winds that would impede his homeward-journey tied up in a wineskin. Odysseus should have been home in a very short time. His curious crew, however, untied the bag and let the contrary winds escape. From then on, as Homer tells us in the Odyssey, it was a very bad hair day for Odysseus. While Odysseus became famous for his trials and tribulations, Aeolus also achieved a certain lasting place in Greek mythology. In later years a harp was named after him. This harp was so designed that the wind, blowing over its strings would give off a musical sound.

Fast forward to 1958. Before this time, the vocal cords were thought to vibrate in response to nerve impulses firing off rapid and repetitive impulses causing the muscles to contract. This in turn supposedly made the cords vibrate. In 1958, you will be pleased to know, this “Neurochronaxic Theory” of voice production” was replaced by the “Myoelastic Aerodynamic Theory”. This theory stated that the vocal cords were actuated by the stream of air delivered over them by the lungs and trachea, not unlike the music of the Aeolian Harp (Davis 12). Aren’t ya glad? I knew you had been worrying about this.

But while the strings on the harp are multiple and fixed, we have but two vocal cords. How is it that they can produce all various pitches including falsetto? I am so happy that you asked.

The larynx is one very complicated piece of equipment. There is no single really good manual to tell how to run it, but there is a plethora of theories of what actually happens, all with slight variations. Such is science.

Let’s give it a shot.

The larynx is made up of four cartilaginous bodies, the thyroid cartilage, the cricoid cartilage and two arytenoids (see below). These in turn are controlled by several intrinsic muscles (muscles that begin and end within the larynx as opposed to extrinsic muscles that start some where else and end up attaching to the larynx.). These are the thyroarytenoids (internal (vocalis) and external), the arytenoids (transverse and obliques), cricothyroids (posterior and anterior) and cricoarytenoids (posterior and lateral).

To simplify a very complex mechanism that I am barely able to understand, the scenario goes something like this:

The vocalis muscle (a.k.a. thyroarytenoid muscle) is attached to the thyroid cartilage at the front of the larynx and to the two arytenoid cartilages at the back. On its surface is the membrane that we think of as the vocal cord. The two arytenoid cartilages with which the vocalis muscles connect, sit on the cricoid cartilage which hovers just beneath the thyroid cartilage and is attached to it by various ligaments. The arytenoids move from side to side, back and forth, and rotate while the cricoid move up and down ever so slightly in relation to the thyroid cartilage. All of these movements change the length and the thickness of the vocalis muscle and the character of its overlying membrane, the vocal cord.

It is mostly the vocalis which closes the gap and thickens and rounds the edge of the vocal cord and the cricothyroid muscle which elongates and thins the vocal cords. The cricothyroid muscle may either open or close the cords depending on the other musculature.

In the lower register, the vocalis does most of the work. The glottis (the gap between the vocal cords) is narrowed, the chord is shortened and thickened and its edge is rounded. Sort of like two 2X4's banging together in a high wind. As we sing higher and higher notes, the cricothyroid exerts more and more influence and the vocalis less and less. The cricothyroid, with some help from the other muscles (they have to do something to justify their existence), keeps the cords tightly opposed, but they become longer, thinner, and the edges lose their roundness. It is somewhat like blowing on two blades of grass. (If you city-bred guys don't know how to do this, I will be happy to show you. I learned it in Hoosier 101.)

In falsetto\*\*, the vocalis gives up and relinquishes control to the cricothyroid, which is tightly contracted. The break or passagio, in the untrained voice, seems to occur at this moment of surrender, when the one muscle group, vocalis, finally gives in to the other, the cricothyroids (David 95). There are other theories, but I can sort of imagine how this one works so I will stick with it.

Now the vocal ligaments are thinned and fully stretched, the glottal area (opening between the cords) is reduced, and the subglottal pressure is diminished. The vocal cord has a thin tight edge and the membrane covering the cord is stiffened. The cords barely touch as they vibrate and the airflow is less interrupted than at lower tones. Because of this less interrupted airflow, fewer overtones are created and we are singing falsetto where the voice has a flute-like character.

So now we are singing falsetto, so what? We have it so we should use it. You know the old story use it or lose it. Here is what we can gain:

1. Singing in falsetto puts muscles to work that you barely use in the lower register. It will also relax your other laryngeal muscles, particularly the vocalis (thyroarytenoid). Perhaps this relaxation is the explanation for the lowering in my range that I have noticed after singing falsetto a few minutes. It's only a couple of notes, but, hey, I'll take anything I can get
2. Sliding back and forth across the break (passagio) and trying to eliminate it (teaching the muscles to work together, instead of one or the other) will give you an increased range to the high side as you develop a head voice. In the head voice, the vocalis (thyroarytenoids) and the cricothyroids learn to work together.
3. Singing in your head voice gives you a much mellower in the upper register tone than just pushing your chest voice up until it cracks. (Unfortunately, I have found head voice to be rather elusive.)
4. Singing falsetto as low as you can will help to relax a tight throat and improve your chest voice.

Strengthening seldom-used muscles, increasing your range to both the high and low side, mellowing your tone, and relaxing your larynx. What more could you ask?

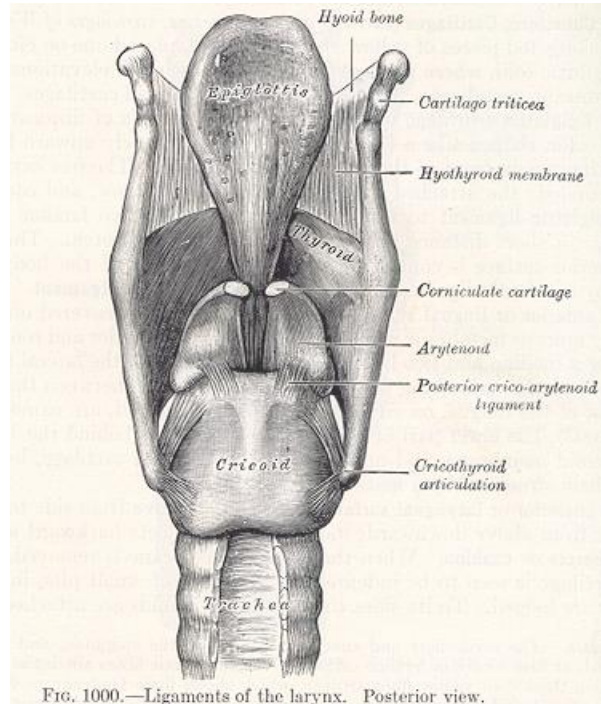
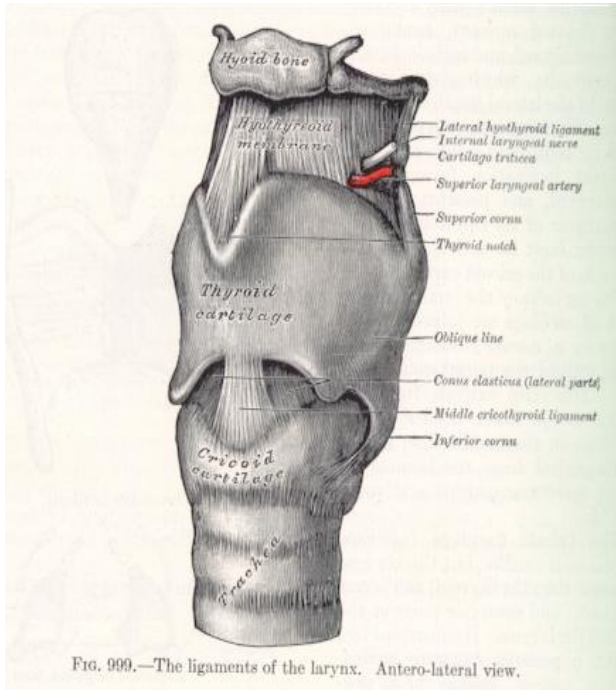
Repeat after me, falsetto is my friend, falsetto is my friend....

(If you are of a scientific turn of mind, try this little test. Put your finger on your Adams apple then slide it down to the first ring below. This is the cricoid cartilage. Hum a low note and slide up to a high note. Feel the ring move up ever so slightly? This is your cricothyroid muscle at work, tilting the cricoid cartilage back which takes the arytenoids with it thus lengthens and thins the vocal cords for the higher notes. Your Adams apple, in contrast, should elevate very slightly or not at all as you slide from low to high notes. See next month's article on the extrinsic muscles of the larynx.)

\*\*It is not my intent to lead anyone astray nor do I want to pass myself off as an authority. This is my understanding. Recently “my understanding” has become a little muddled. However, I still believe that singing in falsetto is beneficial for the above reasons. Hopefully I will learn more as time goes on. Stay tuned... (5/22/07)

Works Cited

David, Marilee. The New Voice Pedagogy. Lanham, Md., and London: The Scarecrow Press, 1995.



Cartilages of the Larynx

The vocal cords cover the vocalis muscle. The vocalis muscle runs from the thyroid cartilage in front to the bases of the arytenoid cartilages in back. (Muscles are not shown on these two views)

Gray, Henry. Gray’s Anatomy 26<sup>th</sup> Edition. Philadelphia: Lea & Febiger, 1954.

Summary of muscle utilized and the results of their actions:

Register	Muscles used	Part of folds in vibration	Quality produced	Pitch
Pulse	Only TA, no CT	Most	Vocal fry; pulsating	Lowest; below singing pitch
Chest	Mostly TA, some CT	Most, both cover and body	Heavier, fuller tone	Lower part of singing range
Head	Some TA, mostly CT	Cover only	Lighter, thinner tone	Upper part of singing range
Falsetto	No TA, it is lax, all CT	Very little, only outer cover layers	Lightest possible	Highest pitches; above normal range.

TA: thyroarytenoid; CT: cricothyroid (vocalis)

National Center for Voice and Speech/Tutorials/Voice production/Voluntary register changes