AL KITAB
The Renaissance Project

Chapter 9

Breathe

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Oxygen and the Atmosphere

When I was a little boy, I was obsessed with Rocky. The soundtrack, the drama, the training always managed to light a fire within me. Watching him run up a mountain, lift heavy weights and put himself through the most audacious workouts provided me with my daily dose of adrenaline. Yet I always wondered why Rocky was training at such high altitudes. Was it a cinematic effect? Or was there a scientific reason?

The answer is that Rocky was carrying out high altitude training. This kind of training is common among athletes and helps improve an athlete's cardio. To understand why, we must once again examine the Earth's atmosphere and its chemical composition.

The Earth's atmosphere can be divided into 5 main layers as seen in Figure 9.1. We have seen the function of some of those layers in Chapter 8. For example, the ozone layer in the stratosphere is responsible for absorbing harmful rays while our Troposphere, the closest layer to the surface, is responsible for keeping the Earth warm.

Out of these 5 layers, only a portion of the Troposphere can sustain life (Figure 9.2). To explain why, let us return to the story of Bob, our brave astronaut who is keen to engage in a special kind of mission.

Bob has always felt uncomfortable wearing his astronaut suit. He decides (unwisely) to ascend upwards towards the heavens without using his protective gear. At first, Bob is breathing normally; the troposphere has enough oxygen and the right amount of pressure to provide his body with the oxygen needed to breathe and function normally.. However, as Bob reaches higher altitudes of 1500 to 3000 meters, he finds it harder to breathe. Though the composition of the atmosphere hasn't changed at these altitudes (20.95% of atmosphere is still made of oxygen), the density of the atmosphere begins to drop. This means that though oxygen still forms 20.95% of air at these altitudes, the amount of air available as one ascends upwards decreases. In other words, there is less air and thus less oxygen around him. This trend continues to hinder Bob's ability to breathe as he ascends further.

Figure 9.1

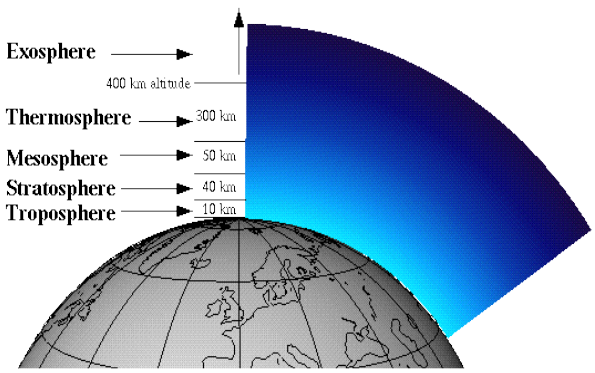
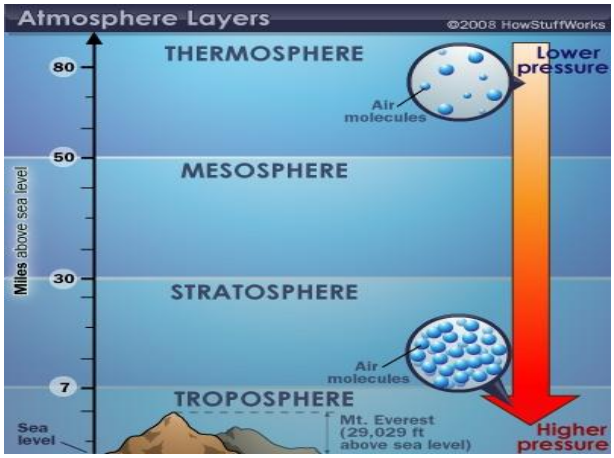


Figure 9.2



Did you know?

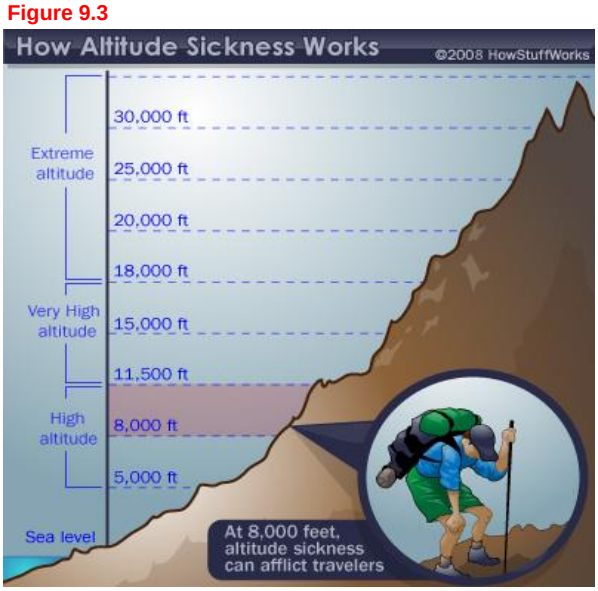
Over 80% of the atmosphere's total mass lays in the troposphere while 99% of the atmosphere's mass lies between the troposphere and mesosphere. Consequently, atmospheric pressure is very low at higher altitudes. The lack of air molecules, particularly oxygen, means that no life can develop past the troposphere.

Oxygen and the Atmosphere

At very high altitudes, Bob starts experiencing some adverse side effects due to the increasing lack of oxygen. Bob can barely breathe. He experiences headaches, exhaustion, sleepiness, anxiety and a narrowing chest feeling. In medical terms, he experiences Hypoxia and Dysbarism.

Worse, the gases trapped in Bob's body begin to escape outwards increasing the severity of the side effects mentioned above. Furthermore, his balance and vision become distraught. Eventually Bob will pass out or become paralyzed. Beyond this point, no human can survive for long. There is simply not enough oxygen in the atmosphere to sustain life for a respectable period of time. Bob learnt his lesson: an astronaut suit is necessary for survival at high altitudes!

Figure 9.3



Narrowing Chest

We have demonstrated how higher altitudes impact a human's ability to breathe. The more one ascends upwards, the more difficult it becomes to breathe. At very high altitudes, an individual will start experiencing shortness of breath, chest pain, and exhaustion. Of this the Quran mentions:

فَمَن يُرِدِ ٱللَّهُ أَن يَهْدِيَهُۥ يَشْرَحْ صَدْرَهُۥ لِلْإِسْلَٰمِ ۖ وَمَن يُرِدْ أَن يُضِلَّهُۥ يَجْعَلْ صَدْرَهُۥ ضَيِّقًا حَرَجًا كَأَنَّمَا يَصَّعَّدُ فِى ٱلسَّمَآءِ ۚ كَذَٰلِكَ يَجْعَلُ ٱللَّهُ ٱلرِّجْسَ عَلَى ٱلَّذِينَ لَا يُؤْمِنُونَ (6,125)

And Whomever Allah wills to guide towards the right path, he opens his breast to the message of Islam, and whomever he wills to send astray, he makes his breast closed, narrow and constricted as if he is ascending up the sky, thus does Allah heap the penalty on those who refuse to believe.

The verse above never fails to amaze me. This is the Quran at its best, combining great literature, analogy, and modern science into one sentence that exuberates the truth. As much as I attempt to write objectively by separating my own feelings from this study, I simply cannot contain them. It is a brilliant verse; an eye opener to anyone who truly seeks the truth.

Primary Sources

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Photo and Figure Sources

- Figure 9.1 Photo Credit: Cambridge University
- Figure 9.2 & 9.3 Photo Credit: HowStuffWorks.com