There are two favored theories of thermal characteristics. One is that thermals are continuous updrafts like a plume of smoke from a campfire rising up and sometimes twisting depending on the wind currents. This theory requires the glider pilot to locate the rising thermal current and estimate the amount of slant caused by the winds shifting the rising updraft downwind from the heat source. Just like a campfire, the winds may tend to twist and oscillate around the hotter origin.

The other theory is that thermals can be more like a hot water bubble rising in a pan on a stove. If you can stay in the bubble, you can climb. If you spill out of the bubble, there is no lift even just under where you were climbing because the lift is not a continuous vertical stream. The glider pilot must search for the next rising bubble to obtain lift.

In the practical world, the nature of thermals is probably a blend of these theories. The sun produces heat, and often that heating is unequal on the surface of the earth, so winds occur as natural forces that work to equalize the atmosphere. Some of these winds are vertical currents. We call them updrafts and downdrafts. Updrafts provide lift and downdrafts provide sink. Since the atmosphere always seeks equality, if there is an updraft, there must be a downdraft or drafts close to replace the upward flowing air. The goal of soaring pilots is to maximize time in lifting currents and minimize their time in sinking currents.

The contemporary models and experience seem to support the theory of a central updraft surrounded by compensating downdrafts. The skill involves staying in the lift as long as possible and exiting or passing through the sink as quickly as possible.

As a note, glider pilots refer to rising air as lift. This is not the lift generated by the wings as discussed in Chapter 3, Aerodynamics of Flight. The use of this term may confuse new pilots, but when used in the context of updrafts, the energy in a rising column of air is translated as lift. This chapter refers to lift as the rising air within an updraft and sink as the descending air in downdrafts.

Thermal Soaring

Locating Thermals

When locating and utilizing thermals for soaring flight, called thermaling, glider pilots must constantly be aware of any nearby lift indicators. Successful thermaling requires several steps: locating the thermal, entering the thermal, centering the thermal, and, finally, leaving the thermal. Keep in mind that every thermal is unique in terms of size, shape, and strength.

Cumulus Clouds

According to the last chapter, if the air is moist enough and thermals rise high enough, cumulus clouds, or Cu (pronounced like the word "cue") form. Glider pilots seek Cu in the developing stage, while the cloud is still being built by a thermal underneath it. The base of the Cu should be sharp and well defined. Clouds that have a fuzzy appearance are likely to be well past their prime and probably have little lift left or even sink as the cloud dissipates. *[Figure 10-1]*

Judging which clouds have the best chance for a good thermal takes practice. On any given day, the lifetime of an individual Cu can differ from previous days, so it becomes important to observe Cu lifecycle on a particular day. A good looking Cu may already be dissipating by the time it is reached. Soaring pilots refer to such Cu as rapid or quick cycling, which means the Cu forms, matures, and dissipates in a short time. The lifetime of Cu often varies during a given day as well; quick cycling Cu early in the day often become well formed and longer lived as the day develops.

Sometimes Cu cover enough of the sky that seeing the cloud tops becomes difficult. Hence, glider pilots should learn to read the bases of Cu. Generally, a dark area under the

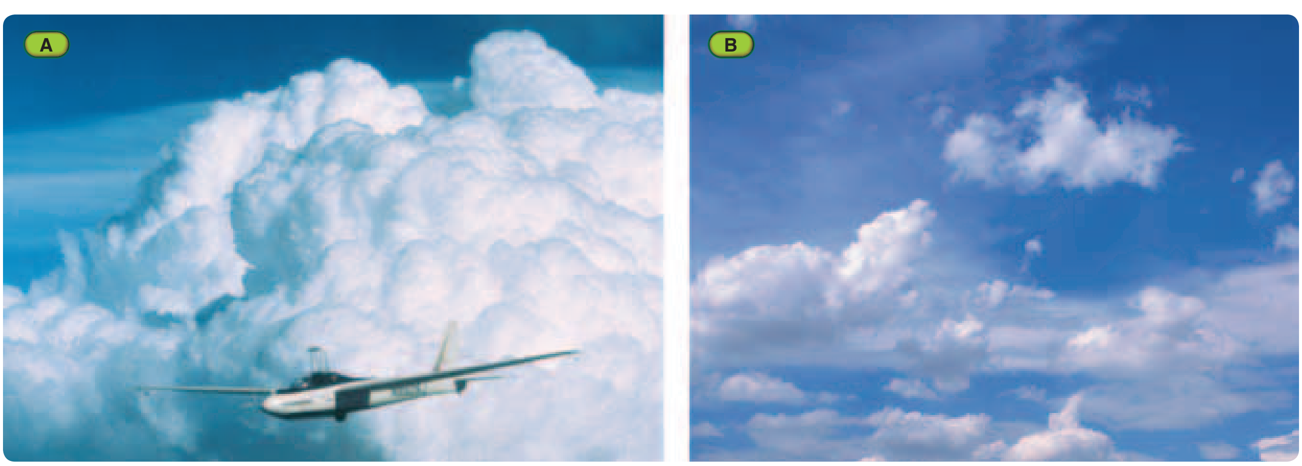

Figure 10-1. *Photographs of (A) mature cumulus probably producing good lift, and (B) dissipating cumulus.*