The Wonders of Clouds
By Linda Butler

Clouds are simple. They’re just a collection of water droplets or ice crystals up in the sky. Everybody can see them. Yet clouds are also complex. They change from day to day, sometimes from minute to minute. Many cloudscapes are spectacularly beautiful shows—and they are free to all. Enjoying them is simple—just look up!

Today’s article is a long one. Here’s a short version: Get your kids and go outside, or to a window. Look up. What do you see? Talk about it—what colors are the clouds? What is their texture? Thin and wispy, lumpy, thick and dark? A brief “cloud break” can be a rejuvenating diversion and stress-reducer during your children’s school day. That’s the short story.

Clouds can also be complex. They are one of the most intriguing phenomena of nature. Their fluffy whiteness looks solid. Clouds look as if they’d be wonderful to touch. Yet you can’t touch a cloud, and, seen up close, a cloud is merely fog—made of countless droplets of water. On a cold day you can breathe out and make a miniature cloud. The tiny cloud you breathe—exhaling warm air filled with water vapor, comes in contact with the cold outside air and condenses it into water droplets. On cold winter days my used to laugh and said they were “smoke-breathing dragons.” Only their “smoke” was really water vapor.

All clouds are in some form and it takes relatively little water to make a cloud. A cloud the size of a large house has less water than could fill a bathtub.

Clouds form when sunlight heats the ground and the ground heats the air above it. This warm air rises. Air only needs to be a degree or two higher than the surrounding air to slowly and silently rise. The air at the earth’s surface heats and rises unevenly. Air over dark soil heats and rises more quickly than does air over snow or trees or water. Air at ground level is denser than the air higher up. As these patches and pockets of air rises, it becomes less dense and expands. Expansion cools the air. As the air cools, the water that is present in the warmer air condenses into miniscule droplets that are too small to be seen. This is just like what happened in the above example of children breathing “smoke.” It’s all about the warm air cooling and condensing into tiny water droplets.

These water droplets in the air form around tiny particles, such as dust or pollen. These particles are called condensation nuclei. These small droplets attract more droplets and eventually become a fine, high-altitude mist that we see as a cloud.

Most of these water droplets are so tiny that they stay high in the atmosphere as clouds. If you watch carefully, you can see these clouds be slowly blown about by high-altitude winds. An enjoyable activity is to lie back on the grass and watch clouds move overhead. Sometimes they seem to form different shapes, and it’s fun to identify and even make up short stories about these shapes in the sky.

There are many kinds of clouds. Some look pale and wispy. Some are puffy, like giant cotton balls. Some are huge and cover the entire sky, others are small specks and blobs in the blue sky. Some seem to grow larger, others seem to shrink and eventually disappear. Some are heavy and gray, and often come with rain. And what makes rain? When those tiny water droplets become too big and heavy to stay suspended in the sky they fall to earth as rain. When it’s very cold in the clouds the droplets freeze and fall to earth as hail. On below-freezing days, the droplets in the clouds crystalize into flakes that fall to earth as snow.

Over 200 years ago, clouds were just clouds, they didn’t have names. In 1803, Luke Howard, a British chemist took a keen interest in clouds. For over 40 years, Howard recorded detailed notes on the weather in the London, England area. He closely studied the various types of clouds and the weather that accompanied them. He gave names to four principal categories of clouds—stratus, cumulus, cirrus, and nimbus—based on the color and texture of the clouds.

Stratus comes from the Latin meaning layer, bed or straddling. Stratus clouds are the lowest of clouds. They often cover the entire sky like a low layered blanket. When stratus clouds are touching the ground we call it fog. Cumulus is a Latin word for accumulation, or to heap or pile up. Cumulus clouds are the puffy white clouds. They often seem like many clouds coming together or accumulating, and are seen at a relatively low level, about a half mile above the earth. Cirrus
comes from the Latin word, *cirru*, meaning “to curl” as in a curled lock of hair. Cirrus clouds are usually thin and wispy and are at a very high elevation, about five miles above the earth. A fourth type of cloud is *nimbus*—the thick dark heavy rainclouds. *Nimbus* is the Latin word for rain.

These four basic types of clouds, along with the prefix “alto” meaning “high” and combining some of the basic cloud types, became a classification system based on 10 cloud types, that is still in use today. Identifying clouds can be challenging and fun, and children enjoy learning and using clouds’ names.

This cloud chart shows a basic overview of the 10 basic cloud types.

The 10 basic cloud names are easy if you know they’re combination of these essential words:

- **Cumulus**—Latin for heaps, piles. Rounded heaps rising upward from a horizontal base.
- **Stratus**—Latin for layer. Wide, extending horizontal sheets
- **Cirrus**—Latin for curl or hair. Thin wispy fibers that extend in any or all directions.
- **Nimbus**—Latin for rain. Cloud systems from which precipitation falls.
- **Alto**—Latin for high. A prefix that indicates the cloud is at a higher level in the atmosphere.

*Cumulus* clouds are white and puffy, like cotton. They generally form throughout the day as the sun warms the ground and the air and water vapor rise and condenses into well-defined lumpy parcels. There are three sub-classes of cumulus clouds, depending on their size. Cumulus Humilis (humilis means humble in Latin) are small clouds with flat bases and small rounded tops. They are longer than they are tall. Cumulus mediocris (mediocris is Latin for moderate) clouds have gathered more condensation and grown to be as tall as they are wide. They are not large enough to produce precipitation. If more water vapor condenses in the Cumulus mediocris clouds, strong updrafts may cause the cloud to
grow even higher. These clouds may rise to 15,000 feet or more. Cumulus congestus clouds are capable of producing widespread and prolonged showers of rain or snow.

*Cumulonimbus* clouds are tall, huge, storm clouds that can produce violent weather, including thunderstorms, hailstorms, and tornados. Although the base of Cumulonimbus clouds can be close to the ground, these clouds often extend a mile or two high. These clouds are not just stormy on the ground, they can produce a lot of turbulence and aircraft are usually detoured around them.

*Altocumulus* clouds usually create interesting and varied skies. Often thousands of small altocumulus clouds will be strung together in spectacular formations—puffs, streaks, and ripples. “Mackerel Sky” is a spectacular altocumulus formation that looks like silvery fish scales.

Another rare altocumulus sight that we are lucky enough to see along the Wasatch Front are altocumulus lenticularis or Lenticular clouds. Lenticular means lens or lentil shaped, like that little legume or a flying saucer. Lenticular clouds are formed when wind blows across a mountain range. When moisture is present at the top of the mountain, and if the wind is blowing at a steady rate at a 90 degree angle to the mountain, these plate-shaped clouds can form. Sometimes multiple clouds will form and stack. Occasionally lenticular clouds have actually been mistaken for UFOs!

*Stratus* are dull grey clouds that blanket the whole sky and often completely block the sun. These are the lowest level of clouds, from ground level to about a half mile high. Stratus clouds are especially common on the coast and can begin as fog that slowly rises into a bleak cloudy day.

*Stratocumulus* clouds cover the sky and are thick and textured with bumps and rolls. They are indicative of moisture in the lower levels of the atmosphere. These are some of the most commonly seen clouds. The sun rarely shines through stratocumulus clouds, causing shadows to appear, then disappear, when they come in front of the sun.

*Cirrus* are beautiful, feathery, clouds at the highest elevation, above 16,500 feet. Because of the cold high (3+ mile elevation) the moisture in the air condenses into tiny ice crystals rather than water droplets. The streaky, wispy nature of these clouds comes from them being blown about by upper-level winds. Sometimes these clouds are known as “Mares' Tails" because they often do look like the tale of a running horse.

*Cirrostratus* is another high-level layer of clouds that extend over part or much of the sky. They indicate a significant amount of moisture. Again, because of their height, the moisture is in the form of ice rather than water. The sun is visible through cirrostratus clouds. These clouds are common in Winter and can bring a light snowfall.

*Cirrocumulus* are found at a similar high elevation to cirrostratus clouds but are more thickly textured due to atmospheric instability. Cirrocumulus clouds are very beautiful, often forming ripple patterns across most or all of the sky.

*Altostratus* are flat and featureless clouds that are lower and thicker than cirrostratus clouds. These often cover large amounts of the sky and can be thin enough for the sun to shine through or dense enough to block the sun entirely. Altostratus clouds generally don’t bring rain or storms, but can be dangerous to aviation if they contain ice crystals, which can build up on aircraft.

*Nimbostratus* are a dark gray layer of clouds that usually mean a dull day and possible rain or snow. Nimbostratus clouds cover a large area and the precipitation can last for several days, until the clouds slowly move on, or they have dumped their load of moisture.

*Contrails* are actually human-caused clouds. “Contrail” is short for condensation trail, that comes from the water droplets that come from jet engine exhaust. Because of the high flight elevation, these water exhaust droplets immediately freeze into crystals, forming an artificial cloud. These “clouds” generally last just a few minutes.
Game—Name the clouds

Practice naming these clouds. Think about what features cause you to choose that name. Sometimes clouds are combinations of forms. Sometimes there are more than one type of cloud in the sky.
1. Altostratus—note it’s a blanket/sheet layer and it’s high.
2. Nimbus—definitely a storm cloud!
3. Cumulus—probably a cumulus mediocris developing into a cumulus congestus. Do you think it will rain?
4. Stratus—note how low and blankety it is. It’s touching the ground in places and would be considered fog.
5. Cirrocumulus—they’re fluffy like cumulus, a little wispy like cirrus, but becoming layered like stratus.
6. Cirrostratus—they’re wispy like cirrus and layered like stratus.
7. Cumulus and Lenticular
8. Contrails
9. Altocumulus—not how high yet fluffy they are
10. Cirrus
11. Stratocumulus—very high and puffy
12 Altostratus—a very high, thin layer of clouds
And the cover photo—Stratocumulus—blankety, yet puffy. Note how the winds are blowing them into curves.

These are some identifications and reasons. Looking at clouds can be more than, “Oh, it’s a cloud.” Be scientific and try to identify it and give your reasons why. Be creative—identify a shape and tell a story or write a poem. Be a weather forecaster—look at the clouds, feel the moisture in the air and the wind with your skin. Be observant—you will see some interesting, beautiful, and even strange clouds! Be connected—observing clouds can connect you with nature. “Our” clouds may soon be sailing over someone else’s neighborhood, state, or maybe even country.

For more learning:
These books can be found at the Pleasant Grove Library: “Clouds” by tomie De Paola
For silly cloud fun, share “Cloudy with a Chance of Meatballs” by Judith Barrett