# The Cloudspotter's Guide

So what exactly is a Cumulus cloud? It may feel rather unsatisfying to hear that it is just water. And yet, like all clouds, that is all it is. The curious cloudspotter might therefore wonder why it looks so different from a glass of the stuff down here on the ground. The cloud's white, opaque appearance is because the water is in the form of countless tiny droplets (well, around 10,000,000,000 per cubic metre in actual fact), each only a few thousandths of a millimetre across. And this array of innumerable tiny surfaces scatters the light in all directions, giving the cloud its diffuse, milky appearance as compared with the single surface of a container of water. It is like the rough face of etched glass compared with a smooth pane: all the minute angled surfaces of the roughened glass make it look white as they scatter the light every which way.

According to ancient Hindu and Buddhist beliefs Cumulus clouds are the spiritual cousins of elephants, which is why the animals are worshipped, with a view to bringing rain after India's scorching summer heat. 'Megha', meaning cloud in classical Hindi, is the name used to address elephants in these prayers. The Sanskrit creation myths describe how elephants created at the beginning of time were white, had wings to fly, could change their shape at will and had the power to bring rain. Although they have now lost these magical powers, the present-day descendants of those early Uber-elephants are still believed to have an affinity with the clouds – especially the albino ones.

It is somewhat alarming to learn that eighty elephants weigh about as much as the water droplets in a medium-sized Cumulus – a Cumulus mediocris – would if you added them all together.* For, though the droplets in a Cumulus cloud are extremely small, there are one hell of a lot of them. Given that elephants don't tend to fly these days, how exactly does the water equivalent of eighty of them rise to form a Cumulus?

There's a clue in the cloud's tendency to appear on a sunny day. For when the Sun is shining, currents of air known as thermals, or convection currents, start to form as it warms the ground. These rising plumes of air are the light turbulence you feel as you pass through Cumulus in an aeroplane. They are the reason why hang gliders and eagles will head towards this type of cloud, knowing that it is a celestial signpost for the updraughts that give them lift. Thermals are the invisible spirits that give life to the Cumulus. They bring it into being, flowing through it, animating it.

To understand the formation of thermal convection currents is to glimpse the soul of a Cumulus cloud. They are what get the moisture up there in the first place and also what help the cloud's droplets to stay airborne for the ten minutes or so of a typical Cumulus's life.

It's a lot like the movement of the blobs of oil in a lava lamp. The mixture of oil and coloured water inside the lamp moves upwards by the same process of convection as air on a sunny day. Although the lamp contains liquids rather than gases, the principle is the same.

The oil in the lamp is normally just a bit denser than the water, and so sits at the bottom, but when the bulb in the base warms it up, the oil expands, becomes a little less dense, and begins to float up lazily through the water. The air outside behaves in a similar way. A ploughed field that has been warmed by the Sun can act like the bulb in the lamp, warming the air above – making it expand, become less dense and float upwards through the surrounding cooler air. The invisible moisture carried in the rising thermal is what can end up as Cumulus, or, in the words of the American poet Maria White Lowell, 'little tender sheep, pastured in fields of blue … with new-shorn fleeces white'.

Remember that Cumulus are individual clouds, quite different from the large layers you see in an overcast sky. For it so happens that some surfaces absorb and give off the Sun's heat better than others, and thus a pocket of air will rise by convection more readily over here than one over there. Tarmac, for instance, will heat the air more efficiently than a grass field. A hillside facing the Sun will do so faster than one in shadow. Cloudspotters will be pleased to see this most clearly demonstrated when sailing around a small island on a sunny day. The surface of the island is warmed by the Sun's radiation more readily than the sea around it, and a puffy, white Cumulus cloud can often be poised above it, fed by the thermal coming off the ground. South Sea Islanders would use Cumulus clouds as beacons, navigating towards an atoll well before the land itself became visible.

Since they form on top of these independent convection currents, Cumulus are separate, individual clouds. This is one of the main ways in which they differ in appearance from other cloud types. Each is the visible summit of a towering transparent column of air – like a bright white toupee on a huge invisible man. And the Cumulus can soon drift off from its thermal host – the wig plucked from his head, swirling and folding in on itself in slow motion as it is swept along in the breeze.

*This is assuming the cloud occupies one cubic kilometre (about 0.24 cubic miles), which is not particularly large for a Cumulus. The droplets will commonly have a combined weight of 2,000,000 kg. The average Asian elephant weighs 2,500 kg.

*The Cloudspotter's Guide* by Gavin Pretor-Pinney

# Questions

1. Find and copy **one** word in paragraph four that means **both** 'positioned in the sky' **and** 'belonging to heaven'. [*1 mark*]

2. How many elephants have the equivalent weight of a Cumulus mediocris? [*1 mark*]

3. In which types of weather do Cumulus clouds tend to form? [*1 mark*]

4. Why do Cumulus clouds tend to form over small islands? [*1 mark*]

5. Copy the paragraph headings into your book and match to the correct paragraph number.

[*1 mark*]

| Heading | Paragraph number |
|---|---|
| The creation mythology of Cumulus clouds | 4 |
| Why eagles and hang gliders head for the clouds | 1 |
| Oil, air and water | 6 |
| What is a Cumulus cloud? | 8 |
| How Cumulus clouds act like signposts over islands | 2 |

6. Explain why albino elephants are believed to have *'an affinity with the clouds'*.

[*2 marks*]

7. What do these phrases suggest about the author's beliefs about clouds?
   - *invisible spirits that give life…*
   - *bring it into being…*
   - *glimpse the soul…* [*3 marks*]

8. Explain how *'little tender sheep, pastured in fields of blue … with new-shorn fleeces white'* relates to the image of Cumulus clouds. [*3 marks*]

9. What is the similarity between *'toupee'* and *'summit'*? How does this help the reader understand Cumulus clouds? [*3 marks*]