

CHAPTER 2

THE SKY APPEARS

Business was proceeding as usual on the morning of August 24 in the year AD 79 when Mt. Vesuvius erupted explosively, sending a tremendous cloud into the clear summer sky. Years later, Pliny the Younger recalled that scene.

A cloud was ascending, the form of which ...[resembled] a pine tree, for it shot up to a great height in the form of a very tall trunk which spread itself out at the top into a sort of branches.

This is an accurate description of the classic pino cloud produced by large eruptions or explosions. Pliny also observed that lightning flashed from the cloud and that

It appeared sometimes bright and sometimes dark and spotted according as it was more or less impregnated with earth and cinders.

For two days the nearby towns of Pompeii, Herculaneum and Stabiae were continuously bombarded with stones and ash from this impregnated cloud, while choking gases filled the air. At the height of the eruption, a glowing cloud of gas and incandescent dust hurtled down the mountain, instantly asphyxiating all who had remained behind.

Summer is the dry season in southern Italy but the volcanic cloud also produced heavy rain. This rain saturated the unconsolidated ash deposits, creating mudslides that overwhelmed the towns. By the time the volcano settled back to sleep and the skies cleared on the third day, everything but a few of Pompeii's rooftops had been buried. Within a few decades even these traces were obliterated.

Some of Pompeii's survivors returned shortly afterwards and tried to recover

unclaimed valuables, but as with Santorini some 1700 years earlier, a great treasure of art was left on the walls. The towns were soon forgotten and left undisturbed until the 18th century. Much of what we know of Roman painting comes from these three towns - over 3000 murals have been uncovered.

One hundred and thirty miles to the northwest, in Rome, life was barely affected by the tragedy around Vesuvius. Rome itself has never been touched by a volcanic eruption, but humbler catastrophes buried a few of its palaces, estates or villas while leaving some murals intact. A few of these paintings predate the eruption of Vesuvius by at least a century.

Roman murals include examples of almost every form of art - still-life scenes, genre scenes, portraits, architectural vistas, pornography, and landscapes with sky. The murals were executed using techniques that were apparently well established. From the point of view of naturalism, later Roman works seldom approached and never surpassed the quality of these early masterpieces. Shading gave a feeling of solidity while recession into distance was handled quite effectively although with some inconsistencies because the concept of linear perspective had not been enunciated formally. Thus we have caught an art form midstream, at the height of its development. It is often assumed that these Roman murals are based on Hellenistic originals, none of which has survived.

Roman murals are thus the earliest known paintings in which the sky appears in all its glory. Although Roman artists did not create any painted clouds that can match Pliny's vivid written description, they knew that the sky is a milky blue that is whiter near the horizon than at the zenith. They also knew that distant features of the landscape become indistinct and assume a gray or blue tinge. Thus they were the

first to represent the phenomenon of aerial perspective. And even when landscape was not the theme, Roman artists effectively utilized such aerial effects of shading, blurring, and color gradation for purely dramatic purposes.

Sky Color and Aerial Perspective

Why is the sky blue?

This remained an unanswered question to the Ancient Greeks and Romans. The Ancients also probably had no idea why the sky whitens toward the horizon or why it turns red at sunrise or sunset. They may not have realized that light from the intervening atmosphere makes distant dark features of the landscape appear blue. The astute Roman artists simply recorded their observations of sky color and aerial perspective. Explanations would come much later.

All atmospheric optical phenomena - sky color, rainbows, mirages, etc. - are produced when the path of light is disturbed or obstructed. If visible sunlight passed through the atmosphere without being disturbed the sky would be as black as it is on the moon and the stars would be visible during the day.

Many atmospheric optical phenomena are also beautifully colored even though they derive their light from the sun, which is almost white. White light, as Isaac Newton first demonstrated, is actually a composite of all the colors of the spectrum - violet, blue, green, yellow, orange, and red. The various colored atmospheric optical phenomena are produced by processes that separate the different colors of the spectrum.

In 1802, Thomas Young demonstrated that each color of the spectrum corresponds to a different wavelength. The colors of the spectrum are arranged in order of increasing wavelength from violet (0.4 micrometers) to red (0.7 micrometers). Sorting colors amounts to sorting wavelengths.

In 1871, Lord Rayleigh (John Strutt) answered the age-old question of why the sky is blue. Skylight is sunlight that has struck air molecules or dust particles (aerosols) in the atmosphere and been scattered in all directions. Rayleigh showed that tiny particles such as air molecules scatter the shorter visible light waves (violet and blue) much more efficiently than the longer light waves (orange and red), just as your body easily reflects the tiny ripples that strike it in the bathtub while ocean waves pass around you undisturbed on their way to shore. This preferential scattering of short waves by tiny particles is called Rayleigh scattering in honor of its discoverer.

Why then isn't the sky violet? Although violet light is scattered most easily, significant amounts of blue and green light are also scattered in the atmosphere, and progressively smaller amounts of yellow, orange and even red light are scattered as well. We perceive the weighted average of this mixture of scattered light as blue.

The sky is seldom a very deep blue, particularly when the air is polluted and humid. Water vapor and dust do not scatter short waves quite so preferentially. Indeed, the largest dust particles scatter all colors of light with comparable efficiency. Therefore, the more water vapor and especially the more dust in the atmosphere the more bleached or whitened the sky appears.

Large quantities of aerosol particles in the atmosphere can produce unusual color effects in the sky. Major forest fires or large volcanic eruptions change sky color by filling the stratosphere with tremendous concentrations of aerosol particles about 1-2 micrometers in diameter. Particles in this size range behave in an anomalous way, actually scattering red light better than blue, as Gustav Mie demonstrated in 1908! During the day, these particles have a pronounced but typically rather bland effect. Countering the normal Rayleigh scattering, they whiten the sky within about 45° of the sun. But at twilight, while the lower atmosphere lies

in the shadow of night, the particle-laden stratosphere is still bathed in sunlight. Then, scattering by particles dominates, and the sky turns a spectacular, deep blood red to a great height. This preferential scattering of long waves by micron size particles can also turn the moon or sun blue near the horizon!

Spectacular twilight colors last only several months after huge volcanic eruptions. Slowly, the micron size particles fall out of the stratosphere, and are then rapidly washed to the ground by rain or snow. Smaller sulfate particles, also produced by the eruptions, can continue to whiten the sky and cool the earth's climate for several years, but they do not produce the red sunsets. Eventually even the smaller particles settle out of the stratosphere, and sky color returns to normal.

Even under normal, clean air conditions, sky color is never uniform, but gradually whitens toward the horizon (Fig. 2-1). The color gradient is largest near the horizon and almost imperceptible near the zenith. Around sunrise and sunset, the sky can take on the entire range of color from blue above to deep red at the horizon, and the gradation is often so dramatic, even without the aid of volcanic dust, that everyone is familiar with the colors of twilight.

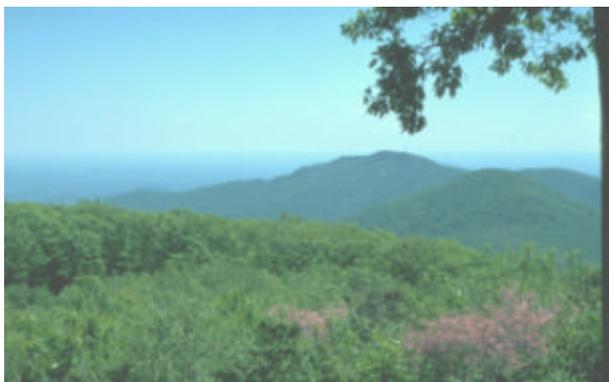


Fig. 2-1. View from the crest of the Blue Ridge Mountains in Virginia. The sky grades from blue above to near white at the horizon and the distant landscape features are tinged blue by the light of the intervening atmosphere.

Why is the horizon sky so bleached or reddened? While a modest amount of Rayleigh scattering makes the sky blue, too much Rayleigh scattering can turn it white or even red! Thus, Rayleigh scattering, like the Lord, both giveth and taketh. Any beam of light passing through the atmosphere is attenuated by scattering. Since the short waves are scattered more easily, they are rapidly removed from the beam, while the less easily scattered long waves tend to remain in the beam and penetrate the atmosphere. Thus, any beam of light is reddened in its passage through the atmosphere. The greater the thickness of atmosphere a light must penetrate, the redder it gets.

This process turns the sun red as it approaches the horizon. The atmosphere is a thin veneer above the Earth's surface. The lower the sun in the sky the longer its path through the atmosphere and the more the sunlight is depleted by scattering. When the sun is overhead, a pure, dry atmosphere scatters about 4% of the red light and 30% of the violet light in the sunbeam. Thus, 70% of the violet light still penetrates this thin veneer and the sunlight at sea level is only slightly yellow. But when the sun is at the horizon its path through the atmosphere is so oblique that it must penetrate about 40 times as much air to reach the ground (Fig. 2-2). By the time a sunbeam reaches the ground, 80% of its red light and 99.9999% of its violet light have been scattered. Thus, the sun turns red because virtually all the blue and violet light have been removed from the direct sunbeam.

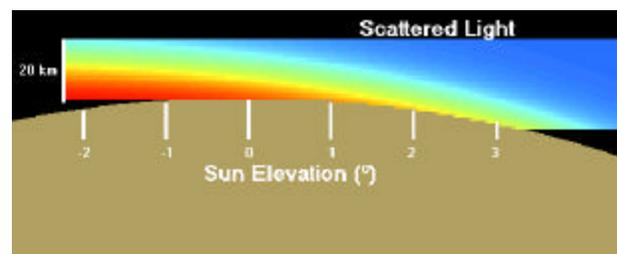


Fig. 2-2. Progressive reddening of scattered sunlight as it passes through the atmosphere near twilight.

The horizon sky is bleached or reddened for the same reason. At twilight the observer stands shrouded in darkness and only the distant sky beyond the horizon is bathed in sunlight. The directly illuminated part of the atmosphere then scatters a small amount of sunlight toward the observer's eyes. At its source, this scattered sunlight or skylight is predominantly violet and blue, but it must pass through so much air before it reaches the twilight observer that a second scattering removes virtually all the blue and violet. What finally does reach the observer is a small fraction of the yellow, orange and red light, but virtually no violet or blue light at all. Thus, even distant skylight appears red!

During the middle of the day the red light from the distant horizon mixes with the predominantly blue scattered light from the nearby atmosphere. The net result is a bleached or whitened horizon sky.

The horizon will turn orange or red at noon if the nearby sky is darkened. This happens during a total solar eclipse or when a dark cloud comes overhead. The dull orange horizon is correctly interpreted as an ominous sign, for the dark cloud is often the leading edge of a thunderstorm. But the color results from the selective depletion of a light beam by scattering due to air molecules and aerosols, and is incidental to the weather's impending violence.

Rayleigh scattering is responsible for the phenomenon of aerial perspective for it imparts a blue tinge to the distant features of the landscape (see Fig. 2-1). Several mountain ranges including the Blue Ridge Mountains of Virginia and North Carolina, and the Blue Mountains of Jamaica and Australia have been named for their apparent color. But the blue color is as elusive as the water beneath Tantalus, for as you approach the mountains, it gradually merges into the color of the underlying vegetation or rocks. The blue ridge is always the next ridge.

Distant landscape features turn blue so long as they are darker than the sky. The little light that reaches your eyes from distant dark objects is overwhelmed and tinged by blue light from the intervening atmosphere. Interestingly, the most distant mountain ridges turn almost white because the horizon sky is itself considerably whitened by distant scattered light. The scattering of light from the object and its replacement by sky light also blurs distant objects.

Aerial perspective, the progressive coloration and blurring of objects with distance provides us with a qualitative scale to judge the distance and size of landscape features. The manifestations of aerial perspective have long been part of the stock-in-trade of virtually all landscape painters. For over a millenium, Chinese artists have focused on the various effects of aerial perspective, while Leonardo da Vinci, who first explained the phenomenon, was preoccupied with finding the ways to best capitalize on its dramatic value.

Even today's cartoonists execute their scenes with blue skies, white horizons and distant blue hills. But it was in Roman art that a knowledge of aerial perspective first appears.

Roman and Hellenistic Painting

Several of the earliest and best examples of Roman sky painting come from the series of murals known as the *Odyssey Landscapes*. These were found in a Roman house that was uncovered during excavations on the Esquiline Hill in 1848. One of the scenes, *The Laistrygonians Hurling Rocks at the Fleet of Odysseus* (Fig. 2-3) could serve as a primer in sky painting.

The ships are anchored in a natural harbor that is almost enclosed by precipitous cliffs. The view looks out from a brown and golden promontory towards the distant silvery gray cliff. The sky is cloudless and blue but whitens appreciably in the gap between the distant cliffs just above the surface of the open sea.



Fig. 2-3. *The Laistrygonians Hurling Rocks at the Fleet of Odysseus.* C. 50-25 BC. Vatican Museum.

The *Odyssey Landscapes* exhibit a level of technical facility and confidence that suggests landscape art was already part of a well-established tradition. This conclusion is reinforced by the emphasis on shading and aerial effects. In the early development of an art form, the outlines of objects are stressed. Only much later is attention shifted to the more subtle differences in shading that characterize the airiness of the *Odyssey Landscapes*.

The Romans sometimes exaggerated aerial effects. In their architectural vistas, buildings only a short distance from the immediate foreground were painted as indistinctly as if they had been seen through a thick mist. In some works, buildings literally emerged from the blue without any solid earth to anchor their foundations. On occasion, the mood was

further enhanced by eliminating any trace of the horizon line. The net effect was to create the impression of a 'floating' world. Roman patrons apparently found the floating world effects quite pleasing, for they were repeated often enough. This seemingly innocent practice does not accord well with the normally limpid air of Italy. It suggests a people bent on a life of ease, luxury, and perhaps even decadence.

The *Villa Beside the Sea* from Stabia (Fig. 2-4) shows some of these aerial properties although it retains a distinct horizon line. The scene contains two villas, one in the foreground and another no more than 200 meters behind it. As in the *Odyssey Landscapes*, the villa in the foreground is distinct and has gold and brown highlights while the more distant villa is pale gray and almost invisible. To complete the

mood, there is no trace of any solid earth in the mural; besides the villas, only water, sky and trees are shown.



Fig. 2-4. A Villa Beside the Sea. C. 70. Pompeii. Museum of Fine Arts, Boston.

If atmospheric visibility in *A Villa Beside the Sea* were as poor as is suggested by the faded appearance of the more distant villa, then the horizon line could not be seen. Nevertheless, the sky is shown quite distinctly and even has a lighter, orange band near the horizon. The horizontally banded sky would later become a mark of Early Christian and Carolingian art; thus it probably continued to appear frequently in Roman art. The discrete banding is an unfortunate sign, for it indicates that the artists had identified a shortcut and no longer needed to refer directly to nature when painting the sky. Observations made directly from nature carry their own value and are not easily conventionalized or trivialized. Technical shortcuts, on the other hand, indicate the artist has been severed from the initial source of inspiration. Ultimately, technical shortcuts can become ends in themselves. Whenever they do, they show the feeling for nature has grown stale.

The Romans used grossly exaggerated atmospheric effects for dramatic purposes to highlight the principal characters or actions.

Figures in the foreground would be painted distinctly with bold colors so as to stand out from blurred and gray figures just a few feet back. An example of this technique appears in the *Zeus in the Clouds* from Herculaneum (Fig. 2-5). Here, even the wingtips of Eros are made to fade in the distance.



Fig. 2-5. Zeus in the Clouds. C. 70. Herculaneum.

Zeus in the Clouds is one of the earliest true landscape paintings that contains clouds, a rainbow and a thunderbolt. The bow consists of several opaque colored stripes which give it a distinctly unpleasant effect. Real rainbows exhibit a sharp but continuous color gradation that the artist should have noticed considering his sensitivity to the effects of aerial perspective. Much of the almost ethereal beauty of rainbows derives from their shimmering translucence, yet artists have almost invariably insisted on painting them as if they were arched leaden cloaks that clog the sky. The thunderbolt was merely intended as a spear, like so many earlier painted or engraved thunderbolts. Clouds, however are a much rarer breed in Ancient Art. The clouds Zeus rests on are very poorly preserved but do appear to be the puffy tops of cumulus.

Clouds appear in the *Sacrifice of Iphigenia* (Fig. 2-6) from Pompeii, but this has been extensively repainted and so, may have been altered. The clouds in this mural lack distinct outlines. They are essentially amorphous mists that serve to hide Artemis and one of her

nymphs until they emerge to rescue Iphigenia. The background of the mural resembles a stage backdrop more closely than a landscape; it exhibits a continuous gradation from deep blue above to a pale earth tone below without giving the slightest hint of a horizon line. Seldom in the history of art has the distinction between earth and air been denied with such effectiveness and indifference.



Fig. 2-6. *Sacrifice of Iphigenia*. C. 70. Pompeii.

The appearance of clouds is exceptional in Roman art, for the Roman artist preferred to keep the sky clear. There is some meteorological basis to such a choice. The skies of Italy and Greece do tend to be relatively cloud free during the summer. Zeus, of course, is the cloud gatherer so it is natural to find him surrounded by clouds and Artemis herself was no mere earthbound mortal. But if the *Sacrifice* and some later Carolingian illuminated manuscripts are representative, most of the few clouds that do appear in Roman art were treated as formless mists with deemphasized outlines.

The complete absence of distinct cloud forms from Roman landscape paintings

constitutes another sign of a mature art form. No one begins life by focusing attention on the nuances of the things in nature. How then did the mature art form of sky painting begin? The scenes take their story lines from Greek mythology and hint at a Greek origin. Certainly the Greeks seem to have established the fundamental frame of mind needed for sky painting. They traveled widely and founded trading posts all around the Mediterranean. In these cities Philosophy was born with Science grafted to her side, Mathematics was advanced and the foundations of Drama were laid. Then came the Persian Wars. The improbable Greek victory imparted a spirit of ebullience, which was transferred to all their subsequent endeavors. All the possibilities of life seemed limitless. Landscape art could only be born of an outward looking people.

Plato, in the *Critias*, wrote that artists were "reproducing the earth, mountains, rivers, forests, sky and all that encompasses them." Greek pottery of Plato's time reveal no such vistas. A few details from the world of nature such as trees were included in rather piecemeal fashion but there were no landscapes and certainly no sky. But after about 450 BC, they do reveal recognition of and perhaps the first serious attempts to deal with the problems of perspective.

Landscape is more conveniently displayed on walls or panels than on pots. Background scenery was required for the Greek plays and this may have provided the direct impetus and proper stage for the birth of landscape art. About 440 BC, atmospheric effects of shade and light were apparently recognized and described in a treatise by Agatharchus, an artist employed by Sophocles and Aeschylus to paint scenery for their plays. A few years later Appolodorus was nicknamed shadow painter for his mastery of these effects. Apparently most of these works still focused on the human figure and did not stress landscape but it is easy to imagine that the props for Aristophanes' play, *The Clouds* might have shown some sky.

Some classical Greeks seem to have disdained the artistic innovations of their contemporaries. Solon thought of theatrical art as a deception, and Plato's objections to the lure and trickery of the arts are well known. These criticisms suggest to me that the Classical Greeks made tentative advances in representing the landscape, but did not fully develop landscape art. Realistic and convincing landscape art may well be spurned and disparaged but in general it is far too matter of fact to elicit such virulent opprobrium. Of course, our ancestors have surprised us more than once.

In 1968 a rare find, a Greek mural, was discovered in a tomb in Paestum, one of the Greek outposts in Italy. This mural, which dates to about 400 BC shows a diver in mid-air plunging toward the water. The water is painted and the scene is framed by a few trees, but the space for the sky was left neutral.

A decade later, in 1978, an even more significant find was announced. At Vergina in Macedon the tomb of Phillip II, the father of Alexander the Great was uncovered. A mural on the outer wall shows a hunting scene. The mural has been credited to either Nicomachus or his son Aristides, who flourished around 325 BC. The latest the scene could have been executed was shortly before 270, when the Royal tombs were buried to protect them from being plundered by the Gauls. Humans, animals and trees are all crowded as if on a narrow stage and the sky is still left neutral, but behind this stage loom mountains that have been turned purple by the distance. An atmospheric effect had finally been acknowledged. Sky painting could not be delayed much longer.

Landscape and sky art was probably developed in the Hellenistic or Roman worlds during the century or two after Alexander the Great. Throughout this most interesting time a great transformation in the human soul was taking place around the Mediterranean. The world was becoming increasingly

cosmopolitan. War, commerce and trade brought diverse peoples, goods and ideas in close contact. Science, which had been invented some time before, was now being distinguished from philosophy and finding a new ally in technology. And when people rested from their labors they sought respite in less crowded, idyllic surroundings. This tendency is reflected in their art.

One of the prevalent attitudes that permitted the birth of landscape art is exemplified by a statement reportedly made by Archimedes to King Hieron II of Syracuse - "Give me a place to stand and I will move the earth." Fundamental advances in astronomy and mechanics had been made around the Mediterranean and especially in Alexandria and Syracuse. Archimedes' claim typifies the almost revolutionary sense of confidence and feeling of power that came with the adoption of the scientific attitude about the world of nature. For the first time the universe seemed basically rational and capable of subjugation. Humans envisioned themselves the ultimate masters of their own fate. It is the anticipation of power rather than its possession that leads to optimism.

Just as Archimedes' life symbolized the new outlook that permitted the development of sky painting, so too the events surrounding his death were of pivotal importance in art history. For years Rome had coveted the wealth of Syracuse but had been content to use the Sicilian city as a buffer against Carthage. Syracuse was at that time the most glorious of the many outpost city states which the Greeks had established in Italy and the western Mediterranean several centuries earlier. In 212 the expanding Roman Republic finally overran Syracuse despite Archimedes' war machines.

The Roman general, Marcellus had given specific orders to his army that Archimedes be spared. Most of us know the story of how a young soldier came upon the old man drawing geometrical figures in the sand and slew him when he insisted on a little more time to

complete a proof. After the victory, Marcellus commanded his troops to strip Syracuse of her works of art and haul them back to Rome. This was an order his soldiers followed scrupulously.

The confiscation of an enemy's art represented a radical departure from accepted Roman practice. Rome had previously taken gold, silver and slaves back from her victories, but had always spurned the art of her foes, long considering it a mark of degeneracy. Marcellus was one of a breed of Roman generals who deeply admired Hellenistic culture and his decision, according to Livy, marked "the beginning of [Roman] admiration for Greek works of art." For the next two hundred years most Roman victories in the Hellenized part of the world were marked by the wholesale confiscation of Greek statuary and panel paintings. Wealth flowed into Rome on an unprecedented scale and quickly transformed her. Long before the pillage finally tapered off, Rome, the connoisseur, was actively importing and commissioning the art she had so belatedly but rapidly fallen in love with.

The concentration of wealth and the growth of slavery from all these wars caused a mass migration of the disenfranchised to the larger cities. As the poor poured into Rome the wealthy fled to country estates. A love of the countryside and a feeling for nature that had never existed before developed among the Romans and reached an intensity that would not be encountered again until the end of the 18th century. Historians constantly remind us of Petrarch's celebrated climb of Mt. Ventoux (near Avignon in Southern France) in 1336, but 1200 years earlier in AD 125, the Roman emperor, Hadrian climbed the more difficult Mt. Aetna in Sicily at age 50. He did so with far less literary fanfare, simply to witness the majesty of the sunrise. This is the spirit that had the Romans cover their walls with landscape fantasies.

Greek and Roman art were basically secular even if mythological themes were

constantly repeated. So far as we know, religion did not contribute directly to the birth of sky painting. In fact, the retreat of religion's sphere of influence over human affairs - its need to "render therefore unto Caesar the things which are Caesar's" helped render the ground fertile for the birth of sky painting. Religions around the world had for centuries gradually been yielding ground to science on matters concerning natural phenomena and refocusing their messages on moral and ethical solutions to the world's problems. Christ's response to the Saducees and Pharisees when they asked him to convince them by performing a miracle highlights this transformation of religious emphasis.

The Pharisees also with the Saducees came, and tempting desired him that he would show them a sign from heaven.

2. He answered and said unto them, When it is evening, ye say, It will be fair weather: for the sky is red.

3. And in the morning, It will be foul weather to-day: for the sky is red and lowering. Oh ye hypocrites, ye can discern the face of the sky; but can ye not discern the signs of the times?

4. A wicked and adulterous generation seeketh after a sign;

King James Bible. The Gospels According to St. Matthew. Chapter 16.

This quotation suggests that a considerable repository of meteorological knowledge was taken for granted in the ancient world. More fundamentally, it demonstrates that even Christ treated religious and naturalistic matters on separate planes. For the first time in history the sky had become part of the human domain and could be painted as it really appeared. A window had been created that gave us access to the heavens. Thereafter, although it might at times be painted over, it could never again be sealed.