CHAPTER 1
BEFORE THE SKY: THE EPIC VACUUM

Art, like the Earth, was born without an atmosphere. Five billion years ago, the solar system did not exist. Nearby space contained only a giant, slowly rotating nebula composed of rocks, dust and gases, remnants of an ancient supernova. There were no planets and there was no Sun. Then, about 4.6 billion years ago something disturbed the equilibrium of this nebula and it began to contract. The Sun grew as a ball in the center but a small amount of excess matter revolved too rapidly to be drawn inward and flattened into a swirling disk where the planets eventually coalesced.

The Earth formed airless within this disk by silent collisions and gradual aggregation of rocks and dust that circled the infant sun. The larger the Earth grew, the more strongly its gravitational field attracted nearby meteors and, in geologic terms, nearby space was soon swept clean. The continuous bombardment heated the Earth so intensely that it melted the scarred surface.

The heat generated within the young Earth also helped create the atmosphere and oceans. A noxious mixture of gases including carbon monoxide, carbon dioxide, methane, water vapor, ammonia, hydrogen sulfide, and nitrogen were expelled from the depths of the Earth, as they are from volcanic eruptions today. The present atmosphere, which consists almost entirely of free oxygen and nitrogen and a variable amount of water vapor, took eons to evolve.

The expelled water vapor condensed to form a canopy of great clouds, and rained down upon the bare ground. Salts in the rocks dissolved in this water as it cascaded downhill to form the oceans. By four billion years ago the Earth had an appreciable ocean and atmosphere. Life began somewhere in the seas over 3.5 billion years ago. Still, it would take more than another 3 billion years for photosynthesis to produce enough oxygen to support its artists.

Life first emerged from the sea about 500 million years ago. Humans have walked the face of the Earth less than 1% of that time. And it is only about 40,000 years ago - the last 1% of the human episode - that we began to deliberately create works of art. Then, a little more than 2000 years ago, sky painting was added as a belated afterthought to the artists' repertoire.

Not surprisingly, the earliest painted skies were blue. Prior to that we must infer the appearance of the sky and the workings of the atmosphere from occasional writings or more indirect evidence.

There is good reason to believe that by the time life appeared on Earth, the sky had already turned blue and the clouds looked like the ones we see today. The early continents, propelled by the slowly churning molten interior of the Earth, drifted across the globe as they still do and experienced similar excursions of climate.

Only silent witnesses testify to all these past events. But the climate, the weather, and even the clouds have left their signature upon the Earth and in our souls. Where an early glacier surged and then wasted, a large rubble heap of rocks and soil called a moraine was left behind to mark its terminus. Where raindrops impacted on the surface to leave little craters or pits in the sand that later hardened into rock, we see the fossilized footprints of ancient cloudbursts. And even in our early art, where the sky was almost always summarily excluded, there is a record of the atmospheric environment our ancestors experienced.

Prehistoric Art
Art is a child of the climate. It was born during the winter of the last Ice Age and blossomed as the world began to thaw. We, Homo sapiens, are its other parent, for many earlier Ice Ages had come and gone in the past million years without leaving any such legacy. Our `modern' ancestors followed the abundant game to the brink of the ice. The severity of the climate may have prodded their increased capacity for ingenuity. But art, no matter what its function or purpose, is a luxury, so it was the occasional respite from the normally harsh climate that afforded sufficient leisure and surplus to create masterpieces.

The earliest known remains of art are found in caves from Spain to Czechoslovakia. Some of the finger scratch marks in the clay and painted handprints date back about 40,000 years. The oldest known animal paintings, found in the Chauvet Cave in the Ardeche Valley of Southeast France date back 31,000 years. Carved 'Venus' (usually faceless) and a few etchings of animals are as much as 35,000 years old. The oldest known convincing human portrait, found at Dolni Vestonice, just east of Vienna, was carved from ivory 30,000 years old. Realism in sculptures may have been achieved earlier than in paintings because paintings require the additional intellectual hurdle of transforming three dimensions into two.

Technology also played its role in locating and preserving the paintings. The deep interiors of the caves, where most of the murals are found, were neither visited nor painted until adequate lighting was provided by torches or by the more reliable, spoon-shaped lamps invented at least 25,000 years ago.

The great cave murals were executed from the peak of the last Ice Age through the period when the ice sheets were most rapidly melting about 10,000 years ago. After that, the proper environment for the creation or preservation of such exquisite works apparently no longer existed. The caves were abandoned and their entrances were sealed by landslides, deposits or roof collapses, or, as in the case of the Cosquer Cave near Marseilles, by rising sea level. The memory of cave painting was obliterated for some 10,000 years but the murals were simultaneously protected from vandalism and atmospheric corrosion.

The secrets of these caves were first revealed in the 19th century. In 1863, a French paleontologist came upon a reindeer figurine in a cave in the Dordogne region of southwestern France. The next year he found an engraving of a mammoth in another nearby cave. At first, he and others discounted the possibility the works were ancient, but the discovery of hundreds of prehistoric artifacts convinced people of our long heritage. Many of these artifacts were displayed at the Paris Exposition of 1878.

Marcelino de Sautuolo was one of the tourists at the Paris Exposition. The next year he began to open a recently discovered cave on his property at Altamira in northern Spain. His five-year old daughter playing within the cave spotted painted bison on the low ceiling and excitedly cried out "Papa, look at the painted bulls!". De Sautuolo was certain the works were genuine pieces of an ancient art because they resembled some of the carvings he had seen at the Paris Exposition, and because he knew that Altamira had not been previously explored.

De Sautuolo's claim was greeted with a sense of incredulity that quickly escalated to public ridicule. Professional archaeologists at the 1880 Congress of Anthropology and Prehistoric Archaeology held in Lisbon summarily dismissed the paintings as forgeries. However, many more caves were reopened over the next few decades, so that the case for the prehistoric origin of much cave art became indisputable. Our ancestors had to be accorded new respect.

The vast preponderance of prehistoric art dwells on animals. The animals were often portrayed in etching, painting, or sculpture with a remarkable fidelity to nature. At the climax of this art, shading was used and the
rock surface for a painting might be chosen so that its relief would add to the illusion of depth. The artists strove to depict the animals as realistically as possible and used all the means at their disposal to achieve this end.

All other aspects of the cave murals are primitive by comparison. With few exceptions, including the ivory carving at Dolni Vestonice and some etched portraits at La Marche, the human figure remained undeveloped, anonymous and even faceless, acquiring individuality only when disguised with an animal mask. If narrative was present in the paintings, it was simple and generally confined to some interaction between hunter and hunted. Typically this was indicated by an injured or dismembered animal or human.

The landscape and weather were also neglected in Ice Age art. The few examples of painted objects from the landscape were rudimentary at best, and arranged haphazardly. Ice Age people were deeply concerned about their surroundings and about the weather but it apparently never occurred to them to express that concern overtly in art. There is not a single painting in which the sky appears.

Despite these thematic limitations, the cave murals have always been seen as climatological documents. The animals - mammoths and wooly rhinoceroses, among others - were recognized as Ice Age creatures adapted to enduring severe winter conditions.

However, there is a work that does contain another sign of the climate conditions of the waning Ice Age. This is the so-called Swimming Stags (Fig. 1-1), a mural in the cave of Lascaux.

Lascaux is situated in southwestern France, about 85 miles east of Bordeaux along the slopes of the valley of the Vezere River. The present climate around Lascaux is temperate. In most years, summers are pleasant while winters are cloudy but mild. Snow is unusual near sea level. But at the height of the Ice Age, some 26,000 to 22,000 years ago, the
climate was bitter. The Gulf Stream was shunted far south of its present track across the Atlantic and left the Bay of Biscay frigid. Temperatures averaged almost 10ºC below present values, so that southwestern France had a climate like Lapland has today.

The harsh climate restricted forest to fragmented stands of cold-resistant trees such as birch and spruce. The region was then at the northern fringe of the boreal forest and bordered on the tundra where large herds of grazing animals could be supported. It was this abundant food supply that kept people from visiting sunnier climes. Ironically, once the post Ice Age warming had progressed sufficiently, closed forest reclaimed the land. The large herds then emigrated and the hunters, in pursuit, abandoned the caves.

For millennia a layer of soil sealed the entrance to Lascaux. Then, late in the nineteenth century disease destroyed a vineyard located right over the cave. A pine forest quickly reclaimed the land. A small opening to the cave was exposed around 1920 when a large tree was uprooted and ripped off the soil layer covering the entrance. Still, another 20 years passed before anyone ventured into the opening. On 8 September 1940, a group of four teenage boys followed their dog into the cave. They discovered the paintings almost immediately and, within a few days, penetrated to Lascaux's deepest recesses. The boys realized the significance of their find and brought their teacher, who helped spread the news.

Lascaux proved to be a miraculous find. The recesses of the cave were occupied for less than 500 years, around 20,500 years ago. The short occupancy minimized the amount of overpainting and resulted in a high degree of stylistic uniformity. Curiously, a census of the painted animals reveals no mammoths in Lascaux, which suggests that the cave was occupied during a period of warmer conditions than prevailed for most of the Ice Age. Traces of pollen brought into the cave by the artists confirm this picture, showing that trees characteristic of warmer conditions had taken root nearby. It appears that at the time the paintings were executed, Lascaux was basking in interstadial conditions. Winter may still have been cold but the summers then were almost as warm as at present. The respite lasted roughly 500 years, after which frigid conditions (and mammoths) returned, and the cave was abandoned.

The climatic warming not only brought painters into the depths of Lascaux, it provided a theme for the Swimming Stags. This frieze consists of a procession of five stags apparently crossing a river. All are portrayed from the neck up, emerging from what looks like a water line but is really nothing more than a fortuitous line of color change in the rock that the artist used to advantage to create a feeling of an environment.

The description of the scene offered by Mario Ruspoli, in The Cave of Lascaux: The Final Photographs, is compelling. The first stag has head tilted up but neck tilted back as if climbing out of the water at river's edge. The second stag, whose head is level, appears to be walking in the shallow, near-shore water. The last three stags, shown with necks stretched forward and upward, are apparently still swimming in deeper, mid-stream waters. The narrative and presence of an element of landscape makes the Swimming Stags unique in prehistoric cave art. No sign of the sky is present, but the abrupt color discontinuity at the supposed water surface is as close an approach to atmosphere as exists in all of prehistoric art.

The Swimming Stags celebrated and perhaps was intended to invoke the vulnerability of the swift and powerful red deer when water briefly deprived them of their great speed. Today caribou reenact the same pageant during their annual migration across northern Canada and Alaska. Pressed by the inflexible timetable of the seasons, the caribou risk both drowning in raging streams or rivers
and eager predators hiding on the far banks rather than waiting a few weeks for the season to advance and the flood waters to subside.

The stags were crossing one of the streams or rivers in the vicinity of Lascaux swollen by melting snow and glacial ice from the nearby highlands.

At the height of the last Great Ice Age not all the rivers ran into the sea, for many were frozen. A great volume of water that evaporated from the sea fell as snow upon the land and accumulated into continent-size ice caps. The world is no stranger to such ice caps. Today they cover some 6 million square miles of land in Antarctica and Greenland to an average depth of over a mile. But 22,000 years ago ice caps buried an additional 8 million square miles to a similar depth (Fig. 1-2). The largest covered Canada and the northern United States, halting midway through what is now New York City. Another covered northern Europe, kindly stopping just north of London. Further south, extensive glaciers spread out from the Alps and Pyrenees onto the surrounding plains. Even some of the modest highlands near Lascaux, such as the Auvergne and Cevennes Mountains of southern France, experienced glaciation.

The world's coastlines were also altered. So much of the ocean's water remained in escrow upon the land that sea level was roughly 400 feet lower than today and much land now submerged was then high and dry. If people migrated from Asia to North America at that time they would never have suspected they were entering a new continent, for Alaska and Siberia were not separated by water. England and France were also physically united, for there was no English Channel.

During the Ice Age there were also places where the watery domain expanded. Many lakes were much larger than they are today, for one influence of the cold is to reduce water loss by evaporation. The Caspian Sea was 100 feet higher than it is now and, at 300,000 square miles, was about twice as large. The expansive Lake Bonneville, now shrunken to a remnant called the Great Salt Lake, then overflowed its banks, spilled into the sea, and was fresh.

This flood contains the key to the meteorological message of the Swimming Stags. The time is spring during the warm interregnum in the wake of the Great Ice Age.
The landscape was also carpeted differently. The refrigerating influence of the ice caps was felt for hundreds of miles. Frigid, dense air cascaded down the edges of the ice caps, blasting the surrounding plains with brutal regularity. The colder Atlantic Ocean chilled Europe further. The zones of vegetation appeared in more or less the same order as today but were displaced southward. Thus, the ice caps were surrounded by a belt of tundra that almost reached Lascaux and Altamira.

Twenty one thousand years ago the ice finally began to melt faster than it could accumulate. One of the primary driving forces for the major climate changes over at least the past 2,000,000 years has been Earth’s changing orbit. The gravitational pull of the Moon and other planets disturbs the Earth’s orbit, changing it slightly each year. Slowly, the eccentricity and the obliquity of the orbit change, while the equinoxes precess.

The climate-related changes of Earth's orbit are almost periodic. The eccentricity varies with cycles of approximately 400,000 and 100,000 years. Right now the orbit is nearly circular and the distance from the sun varies by 3 million miles from its average of 93 million miles. Around 50,000 years from now the orbit will be more elliptical and the distance from Earth to Sun will vary by almost 8 million miles. The obliquity, or the tilt of the Earth's axis, which is now 23.5° and decreasing, varies between 21.75° and 24.25° with a period of about 40,000 years. The equinoxes advance or precess with a complex period of approximately 22,000 years. Right now we are closest to the Sun around January 3, the heart of winter in the North Hemisphere. Around 11,000 years from now we will be closest to the Sun on July 3.

The orbital changes scarcely affect the total sunlight striking Earth each year, but alter the climate by increasing the sunlight at some seasons and latitudes, and reducing it at others. The ice caps of the North Hemisphere seem to grow best when more sunlight strikes the high latitudes during winters and less during summers. This increases the winter snowfall and reduces the summer melting.

Three of the orbital cycles match documented cycles in the climate. For the past 700,000 years the 100,000-year cycle has dominated, with major Ice Ages repeating every 100,000 years. The disproportionate impact of the 100,000-year cycle on climate is not yet well understood, but may be a consequence of the long time it takes for the great volume of ice to melt and the earth's surface to rebound. Whatever the reason, about 21,000 years ago the sun finally began to heat the Earth more effectively and the ice caps began to melt.

The melting started slowly but accelerated to a fever pitch. In its most rapid phase from about 14,500 to 7000 years ago, the ice caps melted so quickly that sea level rose an average of 4 feet a century, with bursts exceeding 12 feet per century. The sea finally approached its present level about 5000 years ago.

The torrents of melt water carved out huge river valleys down whose mostly empty beds today's meandering rivers trickle. Epic floods were much more common than now. Occasionally, ice dams temporarily blocked the flow of water but would eventually burst, and produce monumental floods downstream. Around 7500 BP the rising Mediterranean burst through the Bosphorus, flooding the Black Sea, which had previously been fresh, and possibly giving rise to the flooding myths of Gilgamesh and Noah. In all the regions bordering the icecaps, the glacial runoff, seasonal or episodic in nature, inundated the lowlands. The Swimming Stags therefore stands as a document symbolic of flooding on a grand scale - a surge of release that led us from the depths of the Ice Age to civilization.

Nine thousand years ago, the great Scandinavian Ice Sheet was gone and Europe was warmer than today. The epoch of general warming had been eventful, for it was marked by periods in which the retreating ice halted or
even readvanced. By 12,500 years ago almost half of Scandinavia had emerged from the ice. Then the ice advanced once again to reclaim southern Sweden and Finland for some 1100 years. This temporary climatic reversal in Europe, called the Younger Dryas, coincided with the opening of the St. Lawrence River and the outpouring of previously blocked melt water by the withering North American Ice Cap. The fresh water spread across the surface of the North Atlantic Ocean, quickly refreezing in the winters, and cooling Europe. But eventually the ice and tundra retreated northward, the flood subsided, and Europe warmed. This drew the artists out of the caves, scattered them ever further about the face of the Earth, and forced them to ply their trade on other convenient surfaces.

Nine thousand years ago the thriving town of Jericho was already ancient. By then, agriculture, animal husbandry, and the manufacture of pottery were time-honored although not universally known practices. Jericho had been founded at least 1000 years earlier at a fresh water spring in the Jordan River Valley. It is now about seven miles from the Dead Sea but the ancient Sea's salty shoreline was closer to the city than it is today. Jericho owes its antiquity, its successes and its misfortunes to its location at a strategic crossroad in the Near East. It was both an oasis and a trading post. It had access to two of the Ancient world’s vital natural resources - salt and bitumen.

Jericho's wealth allowed her to purchase luxuries such as obsidian, which was widely used in the ancient world to make knives, arrowheads and even mirrors. But there is no natural source of this dark and very hard, volcanic glass anywhere near Jericho, so it had to be imported. Analysis of the exact mineral content has enabled us to pinpoint the source of Jericho's obsidian as the Anatolian Plateau of Turkey, about 500 miles to the north.

For many years, nothing was known of the early peoples of the Anatolian Plateau. Then, in 1952, James Mellaart spotted the mound of Çatal Hüyük in the distance and vowed to return. Excavations began late in 1961. Over the next three years Mellaart's research team unearthed about 3% of what may have been the largest, most populous, and most artistic city in the world 9000 years ago.

Çatal Hüyük is located on the Konya Plain, about 35 miles west of the hilly region where obsidian is found. Although precipitation is only about 10 inches a year, several rivers flowing out of the nearby highlands watered the area. Thus it teemed with wildlife and wild grains and so was ideally suited for hunting and agriculture. Çatal Hüyük first became a major city about 9400 years ago and was occupied for about 1200 years. Around 8200 BP it was abandoned without any signs of violence, most likely as the result of an abrupt climatic shift to cooler and drier conditions.

Almost from the moment excavations began, it became apparent that Çatal Hüyük had been a major art center. James Mellaart noted that, "The people of Çatal Hüyük painted what they could and when they could." Carvings of women, bull's heads and a variety of animals jutted from the walls of the shrines and houses, and bucrania (altars with bull's horns) were built into platforms on the floors. Unlike the art of Lascaux, in Çatal Hüyük the human being was often portrayed with as much care as the animals. This rise in self-appraisal is quite understandable; the citizens of Çatal Hüyük exercised far more control over the environment than did their ancestors in Lascaux.

The mud-brick houses of Çatal Hüyük had their entrances in the roof, possibly for security. The walls were protected from moisture, even as they are today, with a fresh coat of plaster applied each summer, after the brief rainy season around May. The plastered walls were then decorated with paintings, mostly of animals and hunting scenes. The painters' palettes had virtually no restrictions,
for the available pigments included red, blue, green, yellow, brown, white and black! The artists also seem to have been quite confident and experienced; they painted directly on the walls without even tracing preliminary outlines.

In the midst of this city of religious shrines, one anomalous painting captured a volcanic eruption that took place shortly after 7100 BC, and is the earliest known example of a landscape (Fig. 1-3). Perhaps it required an earthshaking event to rouse the artist from the entrenched complacency of the accepted repertoire and look aside for a new source of inspiration.

![Fig. 1-3. Eruption Above Çatal Hüyük. (c. 7100 BC.) Çatal Hüyük: A Neolithic Town in Anatolia. James Mellaart. Mc.Graw Hill, 1967.](image)

A profile of a twin-peaked volcano rises beyond the houses of the city or of a town at the base of the volcano. This is Hasan Dag, located 80 miles east of Çatal Hüyük and one of the chief sources of the city's obsidian and wealth. Hasan Dag is now extinct, its last eruption ending more than 3000 years ago, but it was active when the city thrived. The houses of Çatal Hüyük are shown in plan view as in a map, packed closely together with their entrances in the roofs. The erupting volcano is miniaturized because of its great distance from the city, but is seen in great detail. Lava streams flow from several vents at the base while incandescent tephra bombs are shot from the cone and dot the slopes they have fallen on.

A great, amorphous cloud created by the eruption towers over the peak and has already broadened considerably. Two lines extend downward from this cloud, one striking the mountain, while two other forked horizontal lines appear to the right of the peak. These lines are almost certainly lightning bolts, which are so often produced in and around volcanic clouds. The painting thus contains the earliest known representation of both clouds and lightning in art. Lightning bolts would not appear again until the Sumerians represented them almost 4000 years later. The next known painted or carved cloud arose even later!

Few early artists had access to such finely plastered walls. For most, bare rock surfaces sufficed. Rock etchings and paintings are found
around the world from easily accessible locations to some of the most hostile and remote settings. In 1850, Heinrich Barth, a German explorer and artist in his own right, saw rock paintings at the Springs of Isolane and near Tel Issagahan in the middle of the Sahara desert. Barth reasoned that the climate must have been wetter when the paintings were executed because the animals depicted in them could not possibly have survived the forbidding desert conditions he was experiencing. Barth's conclusion of a once wetter Sahara is now universally accepted.

Today the Sahara is a true desert. It lies in a band between 20º and 30º North Latitude that stretches the width of Africa (Fig. 1-4). The mean annual rainfall in this broad zone is less than 4 inches everywhere but in the few isolated highlands. The core regions of the desert receive less than 1 inch per year and several years may elapse between successive rainfalls. The landscape is of course mostly bare but seldom sterile; life has learned to wait in suspended animation for the rain.

The Sahara now has been abandoned by all but the wildest excursions of the storm belts that water the lands both to its north and south (Fig. 1-5). North of the Sahara lies the mid-latitude storm belt with its extratropical cyclones or simply, lows. This storm belt is located at the boundary of polar and tropical air masses because extratropical cyclones are powered by temperature contrasts. In the months around January, the domain of polar air surges southward in pursuit of the retreating sun. Winter storms cross the Mediterranean frequently, watering the northern fringe of Africa from Morocco to Tunisia. Mediterranean Africa was the granary of Rome and still could be fertile with proper management. But the storms seldom track south of the Atlas Mountains, so there the Sahara begins.

It was not always so. At the height of the Ice Age the domain of polar air was much larger. Some of the winter storms tracked further southward, crossing the northern Sahara from west to east. The northern Sahara was wetter then and certainly cooler. But gradually the cold and storms retreated northward with the shrinking ice caps and abandoned the Sahara.
the case in much of the Sahara between about 14,000 and 5,000 years ago. Lake Chad was then over 100,000 square miles - more than 10 times larger than it is today. Many other lakes, long since reduced to dry beds, dotted the southern Sahara. The Niger and Senegal Rivers had discharges far greater than at present and active rivers filled the now empty and often dune-covered channels that cross the entire desert. Water loving animals such as hippopotamuses and crocodiles made wetter parts of the Sahara their home. Humans traversed the Sahara or settled there freely, hunted the abundant game and immortalized them on the rocks. Then, beginning about 5,500 years ago, the Sahara fell victim to a progressive desiccation that has continued up to the present.

Eventually the slow, inexorable advance of perihelion, the date the Earth is closest to the sun, exacted its toll. Around 5,500 years ago perihelion did not come until October and the summer rains began to fail. Years of drought and famine became more common. By the time of Christ, perihelion had advanced to early December, far too late to arouse summer rains. From the Atlas Mountains of Morocco to the Indus River of India the desert had conquered.

The history of Saharan rock etching and painting mirrors the climate changes. One of the greatest outdoor art museums is found in the Tassili n’Ajjer in the central Sahara. At higher elevations the Tassili gets a few showers late in summer and perhaps a winter storm but for the most part it is a desiccated and almost uninhabited sandstone plateau marked by immense cliffs and spires. But rain helped carve the Tassili. As it ran off the plateau it ate into the soft sandstone, creating a network of deep gullies and pinnacles much as in Bryce Canyon. In a humid climate, sandstone pinnacles would become waterlogged near their bases and soon collapse. But even in the wettest of times the Sahara was not a humid region and the occasional rains cut deeply into the dry rock fabric. Sandblasting by wind and water seepage then slowly undermined these cliffs and spires, leaving hollows and overhangs at the bases. And it was in these protected hollows that the people of the Tassili lived and painted.

The earliest Saharan artists were hunters. In at least one work (Fig. 1-6), about 5500 years ago, they depicted a hippopotamus hunt conducted from canoes. Independent archaeological evidence indicates it described a local event in a watery environment. How
inviting a place the Sahara must then have been. But some time after this pictograph all the hippos, crocodiles and boats disappeared from Saharan art. Cattle were depicted with increasing frequency, sometimes in large herds, showing that herdsmen had replaced the hunters and that the artists had some notion of perspective.

Fig. 1-6. Hippopotamus Hunt. C. 3500 BC. Aounrhet, Sahara. H. Lhote, The Search for the Tassili Frescoes: the Story of the Pre-historic rock painting of the Sahara. Hutchinson 1959

Agriculture also came to the Tassili, and with it a greater concern about the weather and the human figure. At Aounrhet is a famous fresco known as the White Lady or Horned Goddess (Fig. 1-7). A shower of grain from a row of wheat falls on the Goddess. Could this be a rainstorm? The Goddess and twenty other small figures (which may have been painted earlier) are running toward the right. Some are leaning, as if caught by a sudden summer shower. The Japanese artist, Hiroshige, would later delight in capturing such moments.

A single figure in the Horned Goddess stands apart from the crowd. A small, stately goddess between the legs of the Horned Goddess stands erect and faces the left. The rain does not bother this small goddess and never will, for a protective covering arches above her head - the unmistakable 3-stripped rainbow. Here is the earliest known indisputable example of a painted rainbow!

If the Horned Goddess with its rainbow represented a promise of adequate rain, that promise was not fulfilled much longer. The drying Sahara began evicting her tenants. Many went to Egypt, long famous as a refuge from famine. After about 1200 BC, horses with
chariots replaced the Sahara's painted herds. Some of these are shown in the "flying gallop" pose common in (but not original to) Minoan and Mycenaean art, in which all four legs of the running animals are stretched outward as far as possible. This cultural link to the Mediterranean suggests that the Saharan highways were still active. But the Sahara's progressive dessication was irreversible. By 300 AD, camels had replaced the horses on the highways and walls of the Tassili. The camels were painted poorly, for none fared well in the unforgiving Sahara.

Ancient Art

As the Sahara dried up, thirsty peoples converged on Egypt and squeezed into the narrow Nile River Valley. Egypt is as rainless as the rest of the Sahara but the Nile provides a thin strip of its land with a water supply as dependable as the precipitation of a humid climate. By the time of the First Dynasty the Egyptians rarely saw rain and had little reason to suspect that all rivers ultimately derive from precipitation. Instead, the Egyptians accorded rain secondary status, referring to it as the Nile of the sky.

Every year the Nile begins to rise about the time of the summer solstice and, before being dammed, continued doing so until the land was flooded and fertilized some hundred days later. The insular Egyptians had absolutely no idea this was due to the northward excursion of the tropical rain belt, for in historical times it never reached Egypt, but they grew to depend on its rhythm.

Thus the Nile was a good parent, providing water, fertile soil and, because of a prevailing wind from the north, round-trip transportation so that civilization took root there naturally. Egypt was for the most part a land of plenty; we know from the biblical stories how it fed outsiders. But on each side the desert was ever threatening and the Egyptians remained pressed in this loving but shockingly narrow ribbon of land.

These basic environmental features impressed themselves deeply in the Egyptian soul and marked the character of Egyptian art. The Hunt Among the Papyrus (Fig. 1-8) is set in the shallow water of a papyrus marsh, perhaps in the Nile Delta. Flying birds and lotus blossoms are seen near the top of the papyrus reeds that tower over two hunters. The men stand in step on a boat. Each is about to spear a submerged hippopotamus that has already been tethered, while a crocodile also crouches below the water line to avoid detection. The style of dress shows, to no one's surprise, that Egypt's climate has long been warm. Here is a land of plenty with the controlled, confident sport and rhythm of civilization. Art and humankind had come a long way since Lascaux, Çatal Hüyük and the Tassili.

But Egyptian art also has its limitations. To begin with, the scene lacks dimension. All the participants have been pressed onto a narrow ledge from which they may not stray. The papyrus reeds form a high wall at which the universe terminates. The picture ends at the top of the papyrus for, as is characteristic of works lacking apparent depth, there is no sky. Water appears but it is rendered only in cross section.

There is something peculiar about the way Egyptians painted water. Egyptian artists were generally not satisfied merely to color water blue but also felt compelled to cover it with a parallel set of zigzag lines as in their hieroglyphics (a convention that also arose among the Maya). This reaffirmed water's material and wavy nature. But in the Hunt Among the Papyrus the zigzag lines are inappropriate, because the water surface consists of an unruffled horizontal line, even where penetrated by the boat.
Landscape art was one of the first victims in the triumph of convention and symbolism over observation and innovation in Egyptian art. This has been the case ever since the dawn of painting - landscape art has been offered as a sacrificial lamb wherever convention and symbolism have reigned.

In the Hunt Among the Papyrus there was no need to paint the sky because the reeds block out all hints of a background. But through all their wall scenes the Egyptians never painted the sky or its clouds, even when nothing obstructed the view. In place of the atmosphere was always empty space. When the sun god, Aten, sent his rays to shine upon the Pharaoh, Akhenaten they passed through the void. When birds were shown flying they flew through a vacuum. Often, birds were crowded together like Egyptians in the Nile Valley and would not have had room to flap their wings.

Despite the complete absence of sky from all Egyptian scenes the Egyptians did find a way to paint the sky! Where do these artistic Egyptian skies appear? The answer struck me by complete surprise when I finally visited the temples of Egypt yet it is eminently logical - the Egyptians represented their skies not on the temple walls but on their ceilings. These ceiling skies remained true to the disjoint Egyptian mode of thought, for in this manner they have been separated from the landscapes on the walls. Thus earth and sky have been forever distinguished. All the Egyptian skies are unrealistically deep blue skies of outer space crowded with ranked troops of five pointed stars, as if in an astronomical Nile Valley. Sometimes this sky would appear propped up by the long, thin Goddess Nut, whose golden body was lined with stars and other heavenly bodies.

Although the Egyptians chose not to reveal any evidence of the atmosphere and its clouds in their art, some meteorological information does appear almost surreptitiously in their hieroglyphics. Fig. 1-9 shows several of the symbols used to represent storms and clouds.

The zigzag lines painted on an unruffled water surface imply a strangely disjoint mode of thought that appears to have been prevalent in ancient Egypt. It is similar to the rigidly obeyed Egyptian convention of painting human bodies frontally and faces in profile. Once a style became accepted and established, Egyptians allowed little or no room for innovation.
In these symbols it is easy to recognize both whirlwinds (spirals) and flat-based clouds (semicircles) from which showers (diagonal lines) or water (zig-zag lines) are falling.

Fig. 1-9. Storm hieroglyphics. http://hieroglyphs.net

Egypt may have had its occasional storms but there the sun god, Amun-Ra, reigned supreme. But even though the floodplain of Mesopotamia is almost as rainless and sunbaked as Egypt, swirling storms and intense showers occur far more often in the mountains just to the north. Thus the Mesopotamians knew that it was their winter rains that swelled their rivers. For this reason the sun god, Shamash had to share power with Enlil, god of air and Earth. For this reason also, Mesopotamian art has a bit more meteorological content than Egyptian art.

Agriculture is often assumed to have originated in and around the highlands that abut Mesopotamia. The move to the almost rainless floodplains of the Tigris and Euphrates Rivers was accelerated once techniques of irrigation were mastered. There, empires arose even earlier than in Egypt but the course of Mesopotamian civilization, like their weather, was never as regular or predictable as in Egypt. The rich, flat, open land of the floodplains provided an impetus to continual armed conflict. Not only did the Mesopotamians fight ceaselessly among themselves, they were regularly at war with the mountain peoples. Fragile works of art in ancient Mesopotamia were not likely to be preserved.

Fortunately for us, Mesopotamian artists in the mineral-poor floodplains frequently worked in stone and clay. Perhaps the most common form of their art is the seal, an engraved stone tablet or cylinder, which left a raised impression when stamped or rolled on a clay surface. In many of these seals the pitiless sun, surrounded by rays like the petals of a flower, blazes above a scene with animals, people or gods. The crescent moon accompanies the sun in some of these scenes, which first appeared in Sumerian art about 4000 BC and continued to do so for several millennia. Lightning bolts also made their Sumerian debut in Akkadian times (c. 2300 BC). In Fig. 1-10, a roll seal shows the lightning goddess, Zarpenik riding on a winged griffin with a bunch of thunderbolts in each hand. Thunder, created by the whip of the weather god, duly follows in her wake.


The Akkadian, Sargon established the first great Mesopotamian empire around 2300 BC. At his death, Sargon’s subjects rebelled and his third son, Naram-Sin spent much of his reign reconsolidating and then expanding the empire. One of Naram-Sin’s successful campaigns was probably conducted to confiscate mineral wealth from the Lullubu, a people of the nearby Zagros Mountains. The Victory Stele of Naram-Sin (Fig. 1-11) commemorates this achievement. But Naram-Sin’s victories did not long endure. Insidious drought vanquished his empire about 2200 BC and imposed 300 years of silence on the land. A millennium after Naram-Sin, an Elamite art devotee (conqueror) raised the stele from the dust and imported it to
his mountain kingdom for his collection, no doubt at bargain rates. Finally, in 1897 the stele was dug out of the ground at Susa in the Zagros and transferred, once again at bargain rates, to Paris.

Fig. 1-11. Victory Stele of Naram-Sin. C. 2250 BC. Louvre, Paris.

The Victory Stele shows the monarch as a towering figure, glorified like a god and standing atop a wavy foothill in front of a conical peak. The landscape features represent the Zagros Mountains and the trees in the foothills suggest the battle took place in or at the edge of a forest. Two auspicious stars shine overhead but, as with Egyptian works, only an ominous void can be found between heavens and Earth. Yet even though drought's handwriting was on the wall, what monarch would allow carved clouds to overshadow a triumph? From that point, nature in the art of the Ancient Middle East was rarely treated as more than a mere handmaiden to the exploits of kings and gods.

After the drought, other Empires arose only to fall again. Shortly before the palace at Mari was destroyed in 1760 BC, a wall painting commemorated the Investiture of its king, Zimri-Lim. The painting shows a bird flying between palm trees and has a mottled blue and tan background. This painting almost revealed a cherished secret - the sky - and does betray a sincere, developed appreciation for nature.

The elements of a scenic sense in this painting at Mari call to mind the contemporaneous art of the Minoans. Other evidence at Mari shows the city was a thriving commercial center that maintained economic ties with Crete.

Around 2000 BC, a great civilization arose on Crete and the nearby islands. The Minoans established an impressive commercial fleet and capitalized on the strategic location of their island. They apparently remained immune from invasion for centuries and peaceably acquired immense wealth. The Minoans knew that the sky could enrage the sea and make it swallow their ships but most of the time the sky was clear, the wind predictable and the sea not as tempestuous as the North Atlantic.

So we must thank the sea and sky for their art but it was the earth that preserved it for us. Crete, like Çatal Hüyük lies directly above the boundary of the colliding African and Eurasian continental plates. Frequent earthquakes and, in places, volcanic eruptions mark this geologically active region. About 1700 BC a catastrophic earthquake leveled the palaces on Crete but they were rebuilt on an even grander scale only to suffer destruction once again.

The archaeologist, Spyridon Marinatos, hypothesized that the second destruction of the palace at Knossos, and even the collapse of Minoan civilization was due to the eruption of Santorini. Seventy five miles north of Crete stand the crescent-shaped islands of Thera and
Therasia. These form a fragmented ring eight miles in diameter around a bay in which there are two volcanic islets known as the Kameni or Burnt Ones. They are all that remains of the island of Kalliste and of Santorini, which erupted and then collapsed into the sea in a summer between 1628 and 1626 BC.

Santorini was one of the largest eruptions in the last 10,000 years. Over 30 cubic miles of volcanic ash were blown into the sky, four times more than at Krakatoa in 1883. The ash was carried in a spreading plume to the southeast by the northwest winds that prevail during summer in the eastern Mediterranean. Deposits of this ash on the sea floor indicate that it lightly coated the eastern half of Crete but buried nearby Rhodes with from 6 inches to a foot. If the eruption occurred before the harvest, widespread famine on Crete could have resulted.

An even more devastating blow, however, may have come from the sea. When the hollowed volcano finally collapsed it produced a series of tsunamis or tidal waves that radiated outward and took aim for the north shore of Crete. In deep water such waves are innocuous and are rarely more than a foot high. But as they enter shallow water they slow down and pile up into walls of water that can tower over 100 feet. Such waves would have utterly destroyed all coastal structures and led to enormous loss of life.

No known writings record the eruption of Santorini, although it may have been the source of the legend of Atlantis. Even so, the eruption was recorded and preserved in places far removed from the eastern Mediterranean. Sulfurous gases and dust particles shot into the stratosphere by the volcano were then carried around the world by the winds. Some were deposited as an acidic veneer on the ice of Greenland and buried by the inevitable snowstorms. Icecaps, like trees, are marked by annual rings. In the center of Greenland an almost uninterrupted sequence of ice rings led to an estimated date of 1645 BC for the eruption. This date was then refined to 1628-1626 BC by the stunted growth of Irish oaks and frost damage to Bristlecone Pines in the American Southwest.

In 1967, after years of searching, Marinatos uncovered the town of Akrotiri on the island of Thera, buried like Pompeii under a thick layer of pumice and ash. Whatever was the fate of the Minoans on Crete, Akrotiri was certainly a victim of the eruption. The excavation exposed a number of buildings that had been partially destroyed and then crudely repaired. In the weeks or months before the final blast, damage to structures indicates the town was rocked by earthquakes - typical precursors of major eruptions. The volcanic activity seems to have begun gradually but convincingly. Only one body and few valuables have been found in the excavations. Apparently the people took Santorini’s warnings to heart and had ample time to evacuate with most of their possessions.

Since the treasured murals were stuck to the walls they were left behind for us. One of these is the so-called Flotilla Frieze (Fig. 1-12). This work documents the voyage of a fleet between two port cities. It shows the sea with harbors, the cities at each end of the voyage, and the surrounding hilly countryside. The artist attempted with some success to develop a sense of perspective. The Flotilla Frieze is a legitimate landscape, perhaps the first in the history of the human race and represents an astonishing advance over all known earlier paintings.

The picture shows complete human dominance everywhere but in the hills at the top left, where a lion is chasing some deer. Above the lion, the deer and the trees is a small space reserved for the sky. Strangely, the sky is a neutral gray rather than blue, while the sea and even some of the land does appear blue. The Minoans were getting ready to paint the sky. They stood on the brink of the modern world some 3650 years ago.
The Flotilla Frieze is unique in Minoan art but it was not an accident. A bronze dagger dug up from a tomb at Mycenae shows engraved lions running beneath some stylized cumulus clouds. The dagger dates to approximately 1550 BC. A gold cup recovered from another Mycenaean tholos (round) tomb at Vaphio in Laconia shows a scene of a bull being captured (Fig. 1-13). Two trees grace the background while what seems to be garlanded cumulus clouds hang from the top, possibly the oldest known cumulus in the history of art. The cup is dated to 1500 BC and although nothing like it has been found on Crete it is done in the style of the Minoan artists.

After the demise of Minoan civilization, art declined throughout Greece and Crete. Its unique scenic art and even its memory were buried like Atlantis. When interest in scenic art
was revived in Greece over a millennium later, the art of Egypt and the Near East served as its source. By the ninth century BC, the Assyrians had proudly elevated their chief god, Ashur from his humble status as the god of agriculture to the sunlike war god. In Ashur in the Aura (Fig. 1-14), this winged and bearded prototype of Zeus is shown encased in a flaming halo or nimbus. Behind him in all its glazed glory is the perfect, imperturbable blue firmament.

**Fig. 1-14. Ashur in the Aura. C. 850 BC.**

Appraisal of Prehistoric and Ancient Sky Painting

For perhaps 30,000 years, painters viewed the world before their eyes but made virtually no attempt to portray the sky realistically. Prehistoric and ancient art is characterized by a world view fixated on animals or people and their actions. In order to gain admission to the world of early art, elements from the vegetable and mineral kingdoms had first to pass in shrunken form through a fine sieve. Meteorological elements were screened by an even harsher censor. But to portray a scene with a proper sense of perspective or show a graded pale blue, cloud-filled sky was summarily forbidden.

The way a people depict the sky in their art amounts to a cultural autobiography. The evolution of sky painting thus parallels not only the evolution of all art but of the human adventure as well. We must, of course be careful about drawing conclusions about the limitations of early sky art on the basis of the grossly incomplete and probably biased artistic remains we possess. Funerary art, religious in outlook and therefore thematically limited, was buried purposely and hence was far more likely to be preserved than any secular art with its
more worldly focus. Whenever art has been found on the walls of dwellings, as at Çatal Hüyük, Mari, or Akrotiri, a more worldly focus emerges and our ideas and knowledge concerning the ancients have been revolutionized. Much of this secular art probably still remains to be discovered; for example, only 3% of Çatal Hüyük has been excavated. But even when these provisos are taken into account, the absence of sky in what early art we have points to something significantly different about the way our ancestors viewed the universe.

Several properties of the atmosphere made it particularly difficult for early peoples to comprehend and represent. First, most meteorological phenomena are highly transitory. Clouds are ever changing, rainbows last but a few minutes, and the life of a lightning bolt is so brief that we know it mainly by the fuzzy afterimage it burns into the retina. The sky could not be tamed to pose for artists until after the invention of the camera.

The elusive air takes on the character of an invisible and intangible abstraction rather than a concrete object. Water, with its waves and vortices, was depicted long before the sky, for water can be seen and felt. Even Aristotle in the Meteorologica (Book II, Ch. 4) insisted there was a difference between air and wind – “Yet it is absurd to suppose that the air which surrounds us becomes wind simply by being in motion.”

The atmosphere also seems to be remote. For this reason it is consigned to act as a medium rather than an object. In art, the sky serves primarily to provide the setting. In this sense it plays the same role as linear perspective in landscape, which may be why sky painting and linear perspective both appeared and developed almost simultaneously. To a surprising degree and in more than a metaphoric sense, the presence of landscape in a people's art shows they have attained a sense of perspective concerning the world and people around them while the appearance of sky demonstrates an appreciation of the "atmosphere" of their surroundings.

Early peoples viewed the world and framed their art largely in epic terms as a series of acts performed with no reliance on the environment by various heroic or superhuman figures. Even if the ancients made astute observations about the state of the sky and could anticipate some changes in the weather by watching the wind or clouds, they still regarded these happenings as actions of the Gods. In epic (or religious) literature, meteorological description was used only as a means to heighten the dramatic impact of or testify to some heroic action. Homer, for instance, knew that a northwest wind was a drying wind but he stressed the role of personal actions rather than nature in allowing the funeral pyre of Patroclus to burn.

There was some delay with the body of Patroclus also; the pyre refused to kindle. But a remedy suggested itself to the swift Achilles. Standing clear of the pyre, he prayed and offered splendid offerings to the two winds, Boreas of the north and Zephyr of the Western Gale....

The two winds rose uproariously, driving the clouds before them.... When they came to the deep soiled land of Troy, they fell upon the funeral pyre and the fire blazed up with a terrific roar.

Homer, The Iliad.

In most early art meteorological description would have been impossible, for any accurate rendition of the natural setting would automatically destroy its anthropocentric foundation. Thus, when the world of nature was depicted it could only consist of disjoint, subservient elements taken out of context. Zeus could hurl his thunderbolts but to put him on a cloud in the sky would have made him look small and would have
been tantamount to botching the story. The sky and the landscape could be tolerated only on very restrictive terms.

There are enough elements of sky art to outline its early evolution through 30,000 years. Prehistoric cave art, the product of a hunting society, dealt almost exclusively with animals and their interactions with people. References to the climatic conditions that nurtured and preserved this art are certainly present but were always inadvertent.

Meteorological objects appeared in art with the development of agriculture, animal husbandry, and other trades and industries, for people then assumed greater control over their environment and became increasingly aware of their dependence on it. The sky itself could not yet appear in their art but important discrete aerial objects made their debut. It is always easier to represent a few apparently solid objects than to show the medium that relates one thing to another. Thus, the shock of a volcanic eruption aroused an early artist in Çatal Hüyük to paint its volcanic cloud and lightning bolts while the joy of a life-sustaining rain shower in the drying Sahara inspired one of its artists to paint a rainbow.

Art of the early civilizations was more complex. Increased mastery over the environment was coupled with a new form of dominion - control of one's fellow humans. Definite ideas about scenery developed, but still the sky was omitted or at best removed to ceilings even when space on the murals was reserved for it. In this art the absence of sky suddenly becomes both conspicuous and disturbing. Whereas prehistoric artists did not seem to even think about painting the sky, painters of the early civilizations appear to have refused. The apparently deliberate, routine removal of sky where it surely belongs bespeaks a loss of innocence bordering on belligerence. It furthermore marks the imposition of ideology, propaganda and censorship, the sophisticated substitutes for taboo. Civilization brought with it great powers for humanity but its cost in terms of lost innocence was high.

Minoan artists broke these shackles and seemed about to paint the sky. The Flotilla Frieze represents a profound advance in scenic conception. Yet that concept was as fragile as Minoan civilization itself. A volcanic eruption, a loss of markets or an invasion was enough to bring about its demise and no one afterward carried the scenic banner. When Minoan civilization collapsed, its scenic sense disappeared with it. Minoan influence did indeed spread far, as the 'flying gallop' pose of Saharan chariot scenes indicates, but people selectively adapt from others only what they are ready for. The world was not yet ready for the sky.

What unique features enabled the Minoans to arrive at their new scenic conception? More fundamentally, what are the preconditions that must be satisfied before sky painting can begin? People tend to depict in their art only what they feel some control over. The feeling of control takes two forms - either the ability to manipulate the environment or the feeling that its workings are comprehensible. The natural setting and the sky with its unpredictable weather long remained far beyond human control and comprehension. No wonder they were so long left out of the picture. In a certain sense our ancestors simply could not see the sky or acknowledge its existence.

The sky was not revealed to us until science and technology extended our knowledge and sense of power over the elements. Prior to that, all atmospheric phenomena had to be brought down to size. This was accomplished by one of two universally adopted techniques - either miniaturizing concrete objects such as lightning, or transmuting the phenomena into tangible symbols via the epic view. Thus, the Egyptians sometimes represented the air and sky in personified manner by showing Shu, the god of air holding up the star-studded figure of the sky goddess, Nut arched over a scene,
while the various civilizations of the Near East employed a panoply of weather related gods to act out their meteorological dramas. But the direction of symbolic representation was never reversed; for example, early peoples may possibly have used the hair of the wooly mammoth to symbolize rain, but rain was never used in early art to symbolize mammoths.

A feeling of control over the elements comes only when a naturalistic outlook replaces the epic view of the universe. Events can then be depersonalized and treated as manifestations of general laws. The consciously inventive faculty can then be developed to manipulate the environment. Here the leading role of natural philosophers or scientists, inventors, and businessmen is fundamental to the development of landscape art.

Consider the Minoans. They conquered the sea and established a commercial network that brought them great wealth. Successful businessmen built the villas in Akrotiri. The fate of landscape art has always hinged on the support and mundane tastes of such pragmatic patrons. Practical considerations always underlie the conduct of business. Minoan businessmen provided a home for the murderer, Daedalus because he was a sculptor, architect and inventor par excellence, thereby allowing scientific and naturalistic attitudes to flourish.

Success in commerce and industry also spurs landscape art indirectly by leading to urbanization. The countryside comes to represent a refuge from the hectic pace and crowded conditions of city life. The more cosmopolitan and commercial a society, the more it is apt to portray and romanticize the natural setting in all the arts. Landscape painting is also a child of the city.

A strong dose of idealism is essential for the creation of sky art, but unbridled idealism is not. Whenever exclusive control of sky art has passed into the hands of an established church or state or the intelligentsia it has been redirected to serve other gods than nature, and it has withered. Whenever theologians and bureaucrats have been left to their own devices, they soon transform sky art into an uninspired but palatable chant of stylized, ideological assertions. The intelligentsia revel in esoteric and often abstract formulations of self-created worlds, and vainly delight in purging memory of the simple, natural roots of their creations. Oddly, it is the businessmen, often unfairly stereotyped as the incarnation of everything culturally philistine, who have always proven faithful allies of sky art by keeping its worldly focus intact. And the ancient world was slowly growing more businesslike.