

The **P**ALIMPSEST

NOVEMBER 1927

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THE PURPOSE OF THIS MAGAZINE

THE PALIMPSEST, issued monthly by the State Historical Society of Iowa, is devoted to the dissemination of Iowa History. Supplementing the other publications of this Society, it aims to present the materials of Iowa History in a form that is attractive and a style that is popular in the best sense—to the end that the story of our Commonwealth may be more widely read and cherished.

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Superintendent

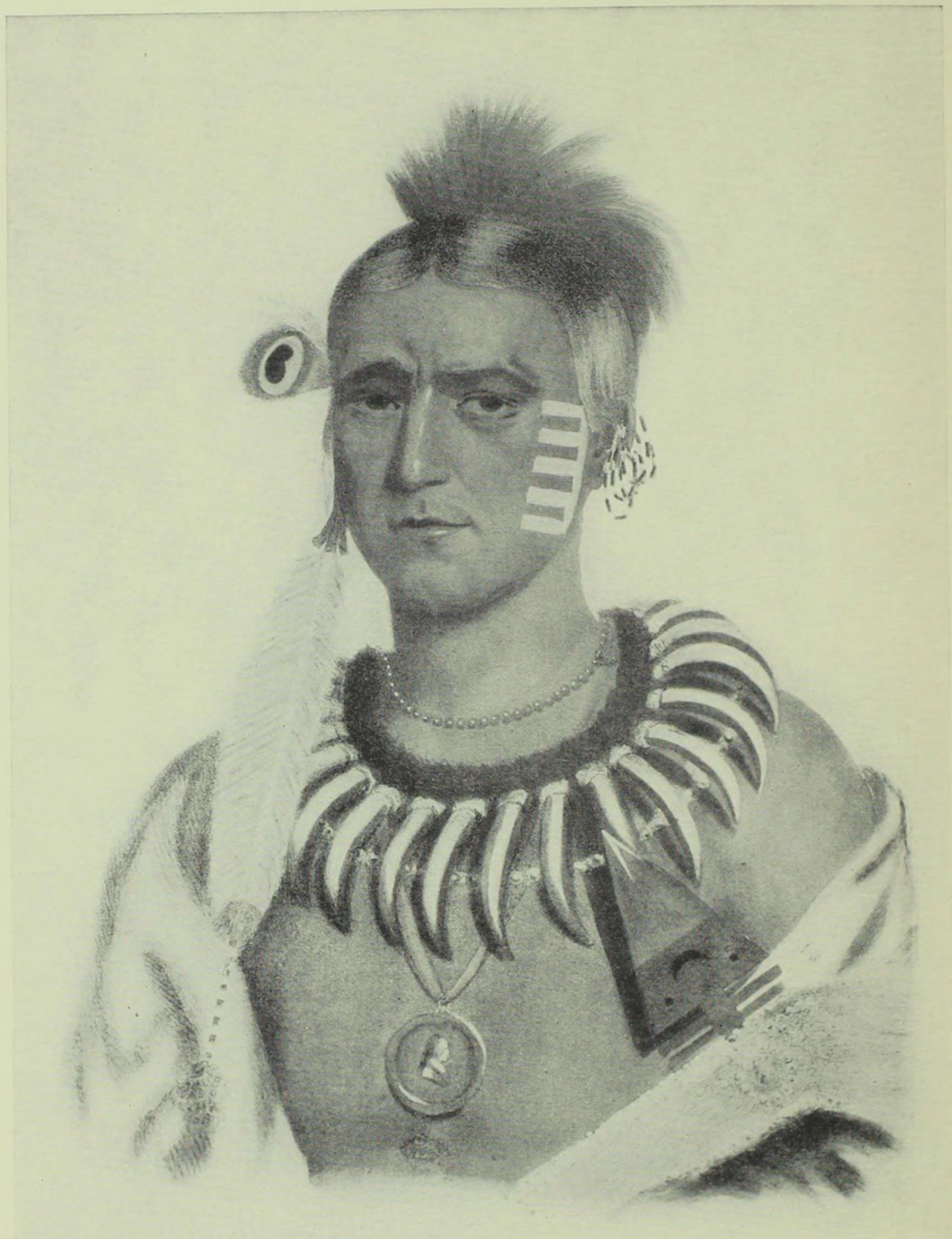
THE MEANING OF PALIMPSESTS

In early times palimpsests were parchments or other materials from which one or more writings had been erased to give room for later records. But the erasures were not always complete; and so it became the fascinating task of scholars not only to translate the later records but also to reconstruct the original writings by deciphering the dim fragments of letters partly erased and partly covered by subsequent texts.

The history of Iowa may be likened to a palimpsest which holds the records of successive generations. To decipher these records of the past, reconstruct them, and tell the stories which they contain is the task of those who write history.

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FROM A LITHOGRAPH COPY OF A PAINTING BY C. B. KING

MAHASKA

THE PALIMPSEST

EDITED BY JOHN ELY BRIGGS

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Mahaska

The most distinguished chief of the Ioway Indians during the last years of their sojourn in the State which takes their name was White Cloud, or Mahaska, as he was called in their own tongue. Son of old Mauhawgaw, the Wounding Arrow, the great man who led his tribe into the valley of the Iowa River, Mahaska was distinguished by his physical preëminence as well as his hereditary rank. Six feet and two inches in height, he was said to be a man "of perfect symmetry of person, and of uncommon beauty", characteristically broad of shoulder, deep chested, and muscular yet active like the best warriors of his tribe. Although he was a handsome, personable man, his stern, relentless gaze was at times forbidding. Always purposeful and determined, inured to hardship, disciplined to ignore pain with steely indifference, these qualities imparted a rather grim cast to his countenance in later years.

Like many Indian chiefs of his day, Mahaska found a very formidable foe in John Barleycorn. While he never became a sot like his son, he did sometimes indulge much too freely in the fire-water of the traders.

One of these occasions was on his visit to Washington in 1824. Inflamed by whisky he was engaged in beating his wife when he recognized the voice of the Indian agent outside the room. Wishing to avoid the reprimand he was about to receive, he opened the window and stepped out, forgetting that he was two stories from the ground. The result was a severe shaking up and a broken arm.

This misadventure, though painful, did not deter him from riding at least two miles the next day over rough roads and pavements. A broken arm and a few bruises were things of no great moment to a man accustomed to the wounds and rough surgery of the war party. It was at this time that he sat for his portrait by C. B. King, and his pain, it is said, was responsible for the rather stoical, frowning aspect of his countenance.

Wounding Arrow did not long survive his entrance into the Iowa country. Shortly after establishing his village on the Iowa River, he was visited by a band of Sioux. A pipe was passed around and the Ioway chief was invited to attend a dog-feast, made in honor of the Great Spirit. Mauhawgaw accepted the invitation of the Sioux in good faith, but in the course of the ceremony he was set upon

by his perfidious hosts and slain — not, however, before he had succeeded in killing one man and three women.

The indignation of the Ioways at the outrage was expressed in immediate action. A war party was raised. Mahaska, by virtue of heredity, became the chief of this party, but being young and never having distinguished himself in battle, he refused the command, choosing to take part in the expedition as a common warrior rather than as a leader. Until he gained experience and earned the approbation of his tribe by his individual prowess and achievement on the war-path, he was content to repose the leadership in an older man tried and experienced by many war parties.

The result was a hasty march into the country of the Sioux, a surprise attack, and a decisive victory, as victories were reckoned in such engagements. Ten of the enemy's scalps were taken and Mahaska himself brought home the scalp of the Sioux chief in whose lodge his father was murdered.

In this manner continual warfare was waged between the Sioux and the Ioways. Mahaska, having demonstrated conclusively his ability as a warrior, assumed complete and active command of his tribe, and for many summers thereafter his life was crowded with warlike adventures. In fully eighteen battles he led his warriors and was never defeated. His huge form and mighty war-hatchet were in the thick of every fight. The Ioways, formidable be-

hind the driving force of his powerful attack, gained the respect of all their savage neighbors. Most of these forays were against their inveterate foes, the Sioux and the Osages.

On one occasion, while engaged in an expedition against the Osages, Mahaska camped for a short time with some of his followers on the north bank of the Missouri River. A canoe with three French trappers swept by his leafy resting place. Wishing to cross the river he called out to the Frenchmen to turn back and assist him and his party. For one reason or another, through misunderstanding or fear, the Frenchmen refused. They not only refused but fired upon the Indians, wounding one of Mahaska's braves. Instantly the shot was returned and a Frenchman was killed. Mahaska himself then seized his own gun, remarking "You have killed one of the rascals, I'll see if I can not send another along with him to keep him company to the house of the Black Spirit."

A great outcry followed this act, the news spreading like fire along the border that the Ioways were on the war-path against the settlers. An expedition marched against the Indians. Mahaska was captured and thrust into prison, where he remained many months. He made no resistance as he seemed to feel that he had done no wrong. Finally escaping, he returned to his own country. In later years, when he had settled down to a life of peace, he was prone to express his great regret at having per-

mitted his warriors to fire upon the Frenchmen in retaliation for their assault.

Among the Ioways it was the custom when a husband or brother fell in battle for another brave to adopt their wives or sisters. Upon his return from a campaign Mahaska found four sisters who had lost their protection in that way, so he married all of them. Of these, Rantchewaime became the mother of Mahaska the Younger. She was a woman long remembered by her people for her great beauty, her exemplary life, and her tragic death. In 1824 she accompanied Mahaska to Washington where she attracted much attention for her beauty. Upon their return she helped her husband put into practice the good advice he had received from the President to cultivate the land and follow the path of peace. But this comfortable régime was brief. One day, while riding across the prairie, Rantchewaime was thrown from her pony and instantly killed. Mahaska and all of the Ioways mourned deeply over the tragic death of this generous and noble woman.

At the council in Washington, Mahaska received a medal from President Monroe and signed a treaty whereby the Ioways ceded all their land in Missouri to the United States in return for fifty-five hundred dollars in annuities, blankets, farming implements, and cattle. The government also promised to assist the Indians in their agricultural pursuits.

Mahaska took these negotiations very much to

heart and upon his return to his native prairies he began the task of cultivating his land very earnestly. He built himself a comfortable double log house and adjusted himself to his new life with dispatch and thoroughness in compliance with the wishes of his Great Father.

In the month of August, 1825, a great council was held at Prairie du Chien, composed of the chiefs and warriors of the Sioux, Sac and Fox, Ioway, Chippewa, Menominee, Winnebago, Pottawattamie, Ottawa, and Chippewa nations. The purpose of this conclave was to reconcile these Indian tribes residing on the Mississippi who had been for years involved in constant and destructive wars among themselves over their hunting grounds. General William Clark and Governor Lewis Cass represented the government.

At the head of the Ioway delegation was Mahaska. He had awaited General Clark at the Des Moines Rapids and, supplied with government provisions, proceeded up the Mississippi in a canoe borrowed from the American Fur Company. Having deserted the war-path the year before, he used his influence to establish peace among the tribes.

"My fathers", he said, "I claim no lands in particular. The land I live on is enough to furnish my women and children. I go upon the lands of our friends the Sacs and Foxes — we alternately go upon each other's land. Why should we quarrel about lands when we get enough on what we have?"

"My fathers: the Sacs, Foxes, Winnebagoes, Menominees, and Pottawattamies are links of the same people. I speak for them as well as for myself.

"My fathers: you see people here apparently of different nations but we are all one. You Sacs, Foxes, Winnebagoes, and Menominees, we are but one people. We have but one council fire and eat out of the same dish."

Mahaska, the man of war, the victor in eighteen battles, the inveterate foe of Sioux and Osage since early youth, pleaded the cause of Indian unity. Passing through the land of the white men on his visit to Washington, observing on every hand evidences of their numbers, power, and wealth, Mahaska realized the futility of any resistance. He also seemed to understand the weakness of the red men, and to feel the need of conserving such strength as they might still possess. Further depletion of their numbers by wars among themselves, this man of many war-parties could not condone. Ever after, Mahaska turned his back upon the tomahawk which he had wielded so well in his youth.

In 1833, the son of Crane, one of the subordinate chiefs of the Ioways, was killed by the Omahas. A war party was immediately organized, but when the warriors went to their great chief to secure his leadership in their expedition, Mahaska refused to go. "I have buried the tomahawk", he said, "I am now a man of peace." Nine years had passed since his visit to Washington but the promises made there

were still fixed firmly in his mind. "The treaty made with our Great Father provides for the punishment of such outrages", he declared.

His tribesmen were not of the same mind, however, and an incursion was made into the land of the Omahas, with the result that six scalps were taken. On their return the usual victory feast was prepared and everything was made ready for the scalp dance. Mahaska refused to take part in any of these activities.

His lack of culpability did not prevent him from becoming embroiled in the affair however. The murders having been reported to the government, General William Clark, who was Superintendent of Indian Affairs at St. Louis, ordered the arrest of the Ioways. The agent of the Ioways, to whom the "Red Head Chief", as he was called by the Indians, assigned this duty, called upon Mahaska and explained his mission. Mahaska, still acting in the spirit of the treaty of 1824, assented. "It is right," he said, "I will go with you."

The guilty Indians were arrested and taken to Fort Leavenworth. While imprisoned there, one of the members of the war party called Mahaska to the window of his cell and said, "Father, if I ever get out of this place alive, I will kill you. A brave man should never be deprived of his liberty, and confined as I am. You should have shot me at the village." The freeborn, prairie-bred Ioway was not comfortable in those close quarters. Chafing at con-

finement, his whole being revolted against his plight and his heart turned against his old leader who had brought him there.

When he escaped at last, true to his promise he forthwith sought out the object of his revenge with a party of others. He found Mahaska encamped on the Nodaway River, about sixty miles from his village. Setting upon their erstwhile leader with "guns, tomahawks, and clubs", they slew him, but not without difficulty. Mahaska, like his father, the old Mauhawgaw, parted with his life dearly. One of his murderers remarked that "he was the hardest man to kill he ever knew."

This unhappy event occurred in the year 1834, when Mahaska was about fifty years old. In such fashion "the greatest man who ever made a moccasin track on the Nodaway" passed from the land of the Ioways, a victim of his loyalty to the pledge made to his "great white brother" to lay down the tools of war and take up the instruments of peace. Ushered into manhood and his career of warfare by the tragedy of his father's death, losing his beautiful and devoted Rantchewaime in an equally tragic accident, his own end was in keeping with this dominant note of his life. The story of Mahaska, the Ioway, is not lacking in the dramatic requirements of an old Greek tragedy.

F. R. AUMANN

The Missouri Slope

The lower portion of the Coteau des Prairies forms two spurs; one of which turns off the rivers that flow into the Mississippi, the other those that run into the Missouri. The divisional line of these two spurs is plainly indicated by the course of the Des Moines from $43^{\circ} 30'$ of north latitude. The divide now referred to is a prominent ridge, separating the waters that empty into the Des Moines from those that flow westwardly into the Missouri. But, as it falls off in a very gradual slope when it has reached 42° of latitude, the head-waters then take first an easterly and afterwards a southeasterly direction and are divided from each other only by moderate swells or undulations of the country that cause them to ramify into a rain of streams, carrying their waters, after long ramblings, easterly to the Mississippi and southerly to the Missouri.

To the north and west of the *Nadoway*, or Snake River — meaning a particular species of snake — several important streams take their rise on that side of the Coteau des Prairies I am now consider-

[This description of some of the geographical features of the Missouri River and the western slope of Iowa is adapted for THE PALIMPSEST from J. N. Nicollet's report of his explorations of the hydrographical basin of the upper Mississippi River in 1839. The complete report, accompanied by a splendid map, may be found published as House Document, No. 52, 28th Congress, 2nd Session. — THE EDITOR]

ing, to empty themselves, of course, finally, into the Missouri. I shall now give an account of those which appear to be least generally known.

The name of the *Inyan-yanke*, or Little Sioux River, implies that there is a rock somewhere along its course. It is said to be navigable for canoes. As I saw but the two extremities of this river, and having obtained no reliable information concerning its intermediary courses, I do not insist on its accurate representation on my map. I may most probably have placed too high up one of its tributaries — the *Otcheyedan* — a name derived from a small hill, the literal meaning of which is “the spot where they cry”, alluding to the custom of the Indians to repair to elevated situations to weep over their dead relations.

The Little Sioux River has its origin from a group of lakes, the most important of which is called by the Sioux, *Mini-wakan*, or Spirit Water; hence its name of Spirit Lake. This lake has a triangular form; being about seven miles wide at its largest extremity, and seven miles in length. It is not remarkably well wooded; the smaller lakes to the north of it being better supplied in this respect.

The *Tchan-kasn-data* is the Big, or simply the Sioux River, and is one of the most importance to the country through which it flows. Its Indian name means that it is continuously lined with wood. Its sources are at the head of the Coteau des Prairies, not more than a mile from those of the St. Peter's,

and separated only by a low ridge, as Mr. Frémont and I had an opportunity to observe. Its length can not be less than 350 miles; in which distance, there are two principal bends — the more southerly and smaller being terminated by a fall, said to be the only obstacle to its entire navigation. From this circumstance, the upper part of the river bears another name: the Sioux calling it *Watpa-ipak-shan*, or Crooked River; and the French *la riviere Croche*. It flows through a beautiful and fertile country; amidst which, the Ndakotahs, inhabiting the valleys of the St. Peter's and Missouri, have always kept up summer establishments on the borders of the adjoining lakes, whilst they hunted the river banks. Buffalo herds are confidently expected to be met with here at all seasons of the year.

The fall of the Mississippi from St. Peter's, and that of the Missouri from Fort Pierre Chouteau, to the confluence of the two rivers, are in the ratio of 45 to 85; in other words, the average rapidity of the Missouri is nearly twice that of the Mississippi.

These rates are far from being the limits of navigation by ordinary power, which I believe to be laid down within a fall of two feet to the mile. This explains, in reference to the Mississippi, how it is that steamboats of great power are now able to ascend in five or six days the great distance of 1,286 miles between New Orleans and St. Louis, which formerly required more than two months to effect by human labor. The fatigue was then so great

that it is not wonderful that the rapidity of the current should have been greatly exaggerated.

As to the Missouri, there are other difficulties that present themselves to its navigation, even by steamboats, besides the rapidity of the current; and, among these, the principal and most insurmountable is the constant shifting of its sand-bars. If, in this respect, the Missouri is to be deemed unimprovable, this is not the case with the Mississippi along a very extensive portion of its course. It is evident that, in alluding to the obstacles in the navigation of these rivers, I have no reference to accidental accumulations of drift-wood, or the occurrence of snags, that are entirely within the control of man, and will completely disappear with the progress of civilization. The Mississippi is one of the easiest navigable rivers in the world, as it is one of the longest; and its course only requires to be a little more studied, to render us perfect masters of it.

The difference of level of the valleys of the two rivers under consideration may readily be determined. Thus, if I take the level of the Missouri at Council Bluffs, and that of the Mississippi at Rock Island, the localities differing but slightly in latitude, ($41^{\circ} 30'$) we obtain for respective elevation of each above the Gulf of Mexico, 1,023 feet for the former place, and 528 for the second. In the same way, if two other places in more elevated latitudes are compared — such as Fort Pierre Chouteau on the Missouri, and the lower end of Lake Pepin on

the Mississippi, both in latitude $44^{\circ} 24'$ — we obtain 1,456 feet for the elevation of the first, and 710 feet for that of the second. These numerical relations establish the fact, that the average level of the Missouri valley above the ocean is nearly twice more elevated than that of the Mississippi.

From these considerations alone, we would expect to find the comparative vegetation of the country between St. Louis and the above-mentioned limits to exhibit a change, not only on account of a change in the latitude and in the nature of the soil, but also a variety due to a difference of elevation. Accordingly, Mr. Geyer has observed that the great luxuriance of the growth in the valleys of the Missouri and Mississippi, and even the uplands, is much diminished on reaching the mouth of the Platte River on one side, and the vicinity of Rock Island on the other. Further: that, within the limits of this zone, we find gradually disappearing the most conspicuous members of the forest, as the sycamore, the pekan tree, the shell-bark hickory, pignut hickory, white walnut, pin and overcup oaks, and the honey locust, together with many smaller trees and plants, as the buckeye, persimmon, sassafras, trumpet flower, ginseng, and May apple.

From the mouth of the Platte River the forests are narrower. The principal trees are the American and red elm, the soft maple, Canadian poplar, white and red ash; the most common undergrowth, horse-briar, fox and false grapes, red root, gray

dogwood, currant, and gooseberry, with shrubs and dense rushes along the banks of the river. The same trees and shrubs grow on the numerous islands, that are generally bordered with black and long-leaved willows. In the higher situations, and at the head of creeks, we meet with the black walnut and mulberry, basswood, nettle-wood, intermingled with the common hawthorn and prickly ash. On the high grassy or rocky banks, the black and bur oaks constitute the principal growth, but occasionally intermixed with the wild cherry, red cedar, hornbean, wild roses, and sumach. The low prairies bordering the rivers have a deep, fertile soil, and abound with sedge grasses and leguminous plants. Finally, taking a pictorial view of the country, the verdure of its hills and prairies affords a pleasing contrast with the naked sand-bars in the rivers.

It may be well to state here, that all such rocky banks as the one just alluded to, noticed by Lewis and Clark, and subsequently by Major Long, are constantly wearing away; so that they offer landmarks to the traveller only for a limited period of time. But we are not to judge of their oryctognostical character from the detritus found below them; because this is composed not only of the materials derived from the bluffs, but of others carried down the Missouri during its season of high waters. Among these materials is the oft-mentioned pumice-stone, which is brought down from the upper parts of the river. I have ascertained, by a more careful

examination than had probably been given to it previously, that it is not a true pumice, but a semi-vitreous substance, produced by pseudo-volcanoes.

Above Council Bluffs the hills on either side are observed to be at a greater distance from the river, which is itself twice its preceding width. The valley is fully fifteen miles wide; and the broad prairies that carpet it exhibit the same richness of soil and luxuriance of vegetation as those I have already had occasion to describe. The bends on the river have courses of longer radii, and are more multiplied, so as greatly to increase the travelling distance between two spots. The width of the river varies from one-fifth of a mile to two miles. In its widest parts, the navigation is frequently impeded by sand-bars and drift-wood; but, where it narrows, the current flows in a straight, onward direction, between picturesque banks or passages, such as may be seen at the mouth of Little Sioux River. But in those instances, it is easy to discover that these passes are cut off through some of the bends. Thus we could not recognise many of the bends described by Lewis and Clark; and, most probably, those determined by us in 1839, and laid down upon my map, will ere long have disappeared, such is the unsettled course of the river. Already I have been informed, in fact, that the great bend opposite Council Bluffs has disappeared since our visit; and that the Missouri, which then flowed at the foot of the bluff, is now further removed by several miles to the east of

it. It is, in this respect, curious to compare our journal of travelling distances with that of Lewis and Clark. They are found always to differ, and sometimes considerably. Yet, on arriving at any prominent station, as the confluence of a large river, the amount of the partial distances computed agree as nearly as could be expected from the methods employed to estimate them.

After a navigation of two days, the hilly country, which had receded from us since our departure from Council Bluffs, came again into sight, and we stopped at the foot of the bluff on the right side of the river. This place affords a beautiful site, formerly occupied by a Mr. Wood, an Indian trader; and it still bears his name. Having reached this place by night, and as it was fixed that the steamboat was to leave the next morning before day, being very anxious to know whether the geological character of the country had changed or remained the same, so soon as we had completed our astronomical observations, Mr. Frémont and I ascended the bluff to obtain specimens of the rock in place. On examining them, I discovered that we were still in the carboniferous formation.

The next day we passed before the magnificent amphitheatre of hills, the summit of that nearest the river being surmounted by the tomb of Blackbird, a celebrated Maha chief and murderer by poison, whose history was told in Major Long's first expedition but has been since reproduced with various

versions in many public prints. Several miles higher up, we got a glimpse of the vale watered by the Maha Creek, in which is the principal village of the Maha nation. The hills on the left bank of the river, of which we had lost sight, again came into view toward the close of the afternoon, covered by a soft and grateful verdure. We stopped before night at the foot of the bluff on which is Floyd's grave; my men replaced the signal, blown down by the winds, which marks the spot and hallows the memory of the brave sergeant who died here during Lewis and Clark's expedition. Our steamboat then started under full blast to take shelter at the mouth of the *Tchan-kasn-data*, or Sioux River, against an impending storm that soon after broke over us and lasted during the whole night.

I had previously, however, landed a mile or so before reaching the mouth of the Sioux River, on the left bank of the Missouri, to examine a rocky bank, seemingly a continuation of those apparent at Wood's hill. I found it to consist of a carboniferous limestone and an argillaceous schistose limestone.

The rocks in this locality reach only to an elevation of seven or eight feet above the level of the river; and I take notice of them here because I am disposed to think that they are the last representatives of the carboniferous series in the ascent of the Missouri, and that the mouth of the Sioux River is the true limit of the old fossiliferous rocks.

J. N. NICOLLET

The Amana Meteor

As late as the beginning of the nineteenth century, some men of science ridiculed the idea that stones ever fell to earth from the sky, despite the fact that museums in Vienna, Munich, and London contained concrete evidence to the contrary. Narratives of meteors were usually received with an attitude of scornful incredulity. A special committee appointed in the year 1768 by the renowned French Academy of Sciences to investigate rumors of a "fall" in southern France returned an adverse report in spite of more than three hundred affidavits prepared by eye witnesses of the phenomenon. In 1807, when President Jefferson, who counted himself something of a scientist, was told that Professors Benjamin Silliman and J. L. Kingsley had described a shower of stones at Weston, Connecticut, he is said to have remarked: "It is easier to believe that two Yankee professors will lie than to believe that stones will fall from heaven."

Gradually, however, such a ponderable mass of supporting evidence was accumulated that no intelligent person could longer deny the possibility of solid material falling to earth, some of which, from its very nature, must have originated from that vast outer space lying beyond the limits of our own solar system. Indeed, one hypothesis assumes that the

earth was built up, little by little, in the course of billions of years, through the gradual accretion of planetesimal bodies of varying size, about a central nucleous.

By the beginning of the fourth quarter of the last century, most people of learning were familiar with the accepted tenets of science. With the spread of higher education superstition gave way to reason and natural phenomena became subjects of scientific interest instead of the manifestation of supernatural forces to be feared. In Iowa the total eclipse of the sun in 1869 particularly had been a marvelous lesson in astronomy which gave the sciences a tremendous popular impetus. Meteors, or "shooting stars", as they were frequently called, were no longer viewed as uncanny and mysterious except by those who were inclined toward superstition or religious fanaticism.

One night in the winter of 1875 a marvelous spectacle appeared in the heavens over Iowa which created such a profound impression upon those who were privileged to witness the phenomenon that the memory of it has never been erased from their consciousness. The winter, coldest for many years, had been especially notable for its heavy snowfall, pearly moonlight nights, and exhilarating atmosphere. Temperatures ranging to twenty degrees below zero were not infrequent and frost had penetrated the ground to a depth of nearly five feet in some places. Between the hours of ten and eleven on the night of

Friday, February 12, 1875, many people in southeastern Iowa were returning to their homes from social engagements and the highways were gay with sleighing parties.

Suddenly, without a moment's warning, there appeared in the southern sky, a bright light from which emerged a great ball of fire. Shooting across the sky in a northern direction with tremendous velocity, it lighted up the whole earth as by a flash of lightning except that a reddish and then a greenish tint was imparted to objects. To one observer, it appeared as if "the face of the moon had fallen off and was approaching the earth" obliquely. The moon for a moment was entirely eclipsed by the superior splendor of the meteor. To many the ball of fire appeared pear-shaped, the larger end foremost, as it should be. The color was of "red hot iron, verging to a white heat", and many persons saw sparks flying from it as it passed. Following the phenomenon, reverberating along the path of flight, was a rumbling roar, comparable to the passing of a heavy train over a trestle bridge, and several sharp detonations varying in intensity according to the position of the hearer.

The passing of the meteor came about so suddenly and so unexpectedly that every one seemed stunned by the spectacle. The shock sent the revellers hurrying to their own firesides, as if to await the approach of some impending catastrophe. Those who were near to the line of flight were thoroughly fright-

ened, for the fire-ball, hurled into space apparently from the battlements of heaven, "seemed to come down upon them with a rapid increase of size and brilliancy." Horses reared and plunged to escape, while dogs went howling and barking to places of safety.

"An instantaneous bright light, filling the whole heavens, shone about us, almost blinding us", wrote J. A. Donnell in the *Sigourney News*. "This was followed by a quivering or shaking light, which continued for about two seconds. It seemed to be a combination of zig-zag and sheet lightning, the light being both vivid and diffuse. I stood still, instinctively looking upward. A globe of fire with lines of pale light radiating therefrom appeared to be falling towards the earth from a point about 10° west of the zenith. I could see it drop through a succession of clouds until it came apparently inside of the dome above me, and then for a moment it stood apparently still, and flashed and sparkled like a firebrand. Within a second afterward it started through the atmosphere like a sky rocket, crossed the meridian in the direction of the North Star, and then continued its descent more slowly in the same line until it finally disappeared about 10° above the horizon at a point about 20° east of north."

According to C. W. Irish, a civil engineer who made an extensive and careful investigation of the appearance and course of the meteor immediately afterward, the solid portion at the head was "en-

closed in a pear-shaped mass of vivid white light" fringed with deep red blending with the white and marked by flashes of green, yellow, and other prismatic colors. To observers who stood in front of the meteor, the mass of light appeared round in shape, but "fringed with rays of white and red light" that gave it the appearance of being surrounded with a halo, the rays of which darted out from the center of the head in all directions. The train of the meteor, estimated to be from seven to twelve miles in length, was principally white, though red near the head and edged with yellowish green. From the body of the meteor burst clouds of smoke or vapor "like puffs of steam from the funnel of a locomotive, or smoke from a cannon's mouth," which were suddenly whisked into the space behind, giving evidence of the rush of air into the vacuum caused by the tremendous velocity of the flying mass.

Nearly five minutes after the meteor had flashed out of sight, observers near to the south end of its path heard "an intensely loud and crashing explosion" from the point in the sky where they first saw it. Mingled with and following this deafening explosion came a "rushing, rumbling and crashing sound" that seemed to proceed along the course of the meteor, punctuated at intervals, as it rolled away northward, with the crash of distinct explosions much greater in volume than the general roar of the continuous sounds. This commotion of noise grew fainter as it continued until it died away in

five explosions from the direction in which the meteor was last seen.

But to witnesses near the north end of the meteor's track the succession of sounds was reversed. About two minutes after "the dazzling, terrifying and swiftly moving mass of light had extinguished itself in five sharp flashes, five quickly recurring reports were heard. The volume of sound was so great that the reverberations seemed to shake the earth to its foundations. Buildings quaked and rattled, and the furniture that they contained jarred about as if shaken by an earthquake; in fact, many believed that an earthquake was in progress. Quickly succeeding and in fact blended with the explosions came hollow bellowings, and rattling sounds, mingled with clang, and crash, and roar, that rolled slowly back southward as if a tornado of fearful power was retreating upon the meteor's path."

The meteor was visible as far away as Omaha and Chicago, from St. Paul to St. Louis, the latter place being two hundred and fourteen miles distant from the point where the meteor first appeared. At Mount Pleasant the final explosion was observed as a "brilliant pyrotechnic display" low on the northern horizon. The roar, as of a strong wind, was distinctly heard at a distance of more than fifty miles, while the noise of the explosions carried fully seventy-five miles from the point where the meteor disappeared. Some people thought a boiler had burst, others ran

up stairs to see if the plaster had fallen, and one woman, imagining that her house was on fire, rushed outdoors declaring that she had seen red-hot bricks falling past her window.

As is natural in the description of any event of similiar character, occurring so suddenly and lasting at most but a few seconds, considerable discrepancy occurred in the narratives of the observers. Much of this was due to the various geographical positions of the individual witnesses, as well as to their temperament, intelligence, and education. Under the most favorable circumstances two persons may not see the same thing exactly alike, even though each may be equally sincere and confident as to the accuracy of his own observations. But on one fact there was very general agreement: the meteor appeared between ten-twenty and ten-thirty at night.

Observations on all other factors pertaining to the meteor, such as size, course, elevation, color, brilliance, sound, and detonation, were necessarily dependent upon, and consequently vary with, the location of the observer. To many the fire-ball appeared to be as large as the moon while others thought it was two or three times as large. Similar discrepancies as to other characteristics can usually be explained by the position of the witness, if some allowance is made for natural inaccuracy of human observation. For example, although the meteor actually disappeared about five miles northeast of Marengo, a news dispatch from Dubuque reported

that a "brilliant meteor flashed through the heavens last night, and appeared to strike the earth within the city limits, on the bluffs, in a southerly direction. The light produced illuminated the city with a bright glare, dazzling to the eye, as it penetrated dwellings through windows and lasted for a moment. The ball of fire appeared to be the size of a small balloon or a person's head. Skeptical individuals hastened home considering the visitor a bad omen."

The light of the meteor, from first to last, was exceedingly brilliant. At the southern end of its course the first flash was blinding even to those who were looking away from the point where it appeared. Very few actually saw the meteor at its first contact with the atmosphere because their eyes were overpowered at once. People instinctively turned away or put their hands over their eyes, and so the fire-ball sped on its way for a second or two before it was observed. At one town a group of people facing a church saw the building enveloped in a sheet of flame from steeple to foundation and thought it had been struck by lightning. Thus hundreds of persons were attracted by the unusual appearance of objects and continued to look at the strange scene without seeing the meteor itself. Near the north end of the meteor's path, according to C. W. Irish, "the light was so intense that at the final flash the eyes impressed by it were totally blind to all impression of light for several seconds after". The moon and stars, though shining brightly at the

time, "were utterly blotted from the sky, and the surrounding landscape illuminated as if at noon-day."

Concerning the path of the visitor through the heavens, there was much conflicting testimony, even when the location of the various observers was considered. At Mount Pleasant numerous people stated that the meteor was first seen in the southeast passing swiftly toward the northwest, while at Fairfield, about twenty-five miles westward, it was reported to have appeared in the southwest passing toward the northeast. Obviously one of these reports must have been in error. Scientists proceeded to gather data regarding its course and direction. Professor N. R. Leonard of the State University of Iowa, determined that it travelled from southwest to northeast at an angle of about 18° with the meridian. The course could be approximately marked on a map, he thought, by a line drawn through Agency City and South Amana. The altitude of the meteor above Ottumwa he estimated to be about sixteen miles.

In determining this difficult matter it seems that even scientists failed to agree absolutely, for Professor Gustavus Hinrichs, writing in *Popular Science Monthly* and basing his conclusions upon the careful work of C. W. Irish, stated that the meteor in coming in contact with the atmosphere of the earth became first visible at an "altitude of 150 miles vertically above the little village of Pleasantville in northern Missouri. Descending at an angle

of about 45° towards the earth's surface, it moved a little east of north, gradually deviating more and more toward the east, so as to describe a curve, the concavity of which is turned eastward. This track of the meteor passed a couple of miles east of Centerville and Moravia in Appanoose County, Iowa; almost directly over Eddyville on the Des Moines River; crossed almost diagonally the northwestern (Prairie) township of Keokuk County; passed one and a half miles east of Marengo in Iowa County, and finally exploded over a point three miles southwest of the little station of Norway on the Chicago & Northwestern Railway, over the boundary line of Benton and Iowa counties at an altitude of about ten miles." This seems to be the most accurate description available. The total length of the visible path was about two hundred miles which was traversed in approximately ten seconds, or at the rate of twenty miles per second.

While the meteor was crossing the northwestern corner of Keokuk County, it was seen to divide into two parts, one portion deflecting somewhat eastward but soon losing its brilliancy, and a seven to fourteen times brighter part continuing on its course until the final explosion. The fainter portion produced a meteoric shower in Iowa and Amana townships of Iowa County, many pieces of which were subsequently recovered but no fragment of the brighter portion which exploded farther north has been found. This may be explained by the modern theory

that the brilliant illumination of meteors comes, not from the surface of the stone, but from a gas cap pushed along in front and heated by the terrific friction and pressure. If this is true, the main mass of the Amana meteorite may have been thrown back at the time of the first explosion and descended as "glowing coals", while the dazzling gas cap was carried on at increased velocity by a relatively small fragment which eventually reached the earth in pieces no larger than marbles.

Interest immediately centered upon locating the spot where the meteor struck the earth and the discovery of fragments if possible. There were many guesses as to where the "glowing coals" had descended, most of them quite erratic. The first fragment was found by Sarah Sherlock on her way to school about two miles west of Homestead. This meteorite weighed seven pounds and six ounces. Immediately scientists and others hastened to the vicinity of Homestead and the search began in earnest but without much success. It was not until the farmers began cultivation in April and May that numerous small stones were discovered, most of them weighing less than ten pounds. Fragments recovered in the timber were located by observing broken twigs and scars where the flying particles had struck the trees. The meteorite field was approximately three miles wide and five miles long extending south of the Iowa River and southwest of Homestead.

Meanwhile C. W. Irish, influenced by mathematical

computations, had instituted a futile search north of the river. In the spring, however, the two largest meteorites recovered were unearthed in a field just south of High Amana. One piece weighed seventy-four pounds and the other forty-eight. Both had penetrated the frozen ground to a depth of about two feet. In the course of two years and a half over eight hundred pounds of meteoric stone had been recovered and distributed all over the world by collectors and men of science. Some of the stones were sold to the famous European museums, though two of the largest specimens and numerous smaller fragments are deposited by the Amana Society in the geological collection of the State University of Iowa.

BEN HUR WILSON

Comment by the Editor

THIS AMAZING UNIVERSE

As the earth goes whirling about the sun it is continually pelted with "star dust" — or would be if the particles were not melted by the friction of the atmosphere and changed to gas. Probably millions of shooting stars strike the earth in a single day. From comet heads and meteors the substance of the universe is gathered. According to one hypothesis the planets of our solar system were formed by the accumulation of just such celestial debris, though the principal harvest must have been finished millions of years ago. Other worlds are now in the process of creation. The heavens are apparently full of the stuff that stars are made of.

Most of the matter encountered in space never reaches the earth in solid form; some of it "falls" in pieces no larger than marbles; but occasionally a meteorite descends with such a roar and dazzling light that people pause to wonder what it is and whence it came. Stones do fall from the heavens, but how they got into space is uncertain. No terrestrial volcano has the power to eject missiles with sufficient velocity to carry them beyond the earth's attraction. Maybe they are the remains of a previous solar system that was wrecked by a passing star.

The substance of meteorites is the same as the earth — usually stony, though sometimes composed of nickel-iron. They are irregular in shape, with corners rounded and surface pitted by the friction of the atmosphere, while the exterior is normally coated with a thin black crust formed by the tremendous heat generated during the flight through the air. No new chemical element has been discovered in them, and only about a third of those already known. A meteorite in Arizona contained small diamonds, but no traces of gold or silver have been found. Although carbon compounds occur, like those resulting from the decay of vegetable life, no forms of vegetation such as often exist in sandstones have yet appeared. But who can tell what the next one will bring?

Nor can any one say when or where the next one will fall. The orbits of comets have been computed and spectacular "star showers", the relics of defunct comets, can be predicted to the day (November 13, 1932), but most meteors are irresponsible rovers. They appear at any time of the day or night and strike the earth at random. The largest known meteorite, weighing thirty-six and one-half tons, was found by Peary in northern Greenland. Several have fallen in Iowa. C. W. Irish accounted for four in 1886, and a thorough survey, now in progress, will doubtless add others to the list.

J. E. B.

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