CHAPTER 1 Meteorological Synopsis of the Expedition

“Saw a black cloud rise in the west which we looked for immediate rain we made all the haste possible but had not got half way before the Shower met us and our hind extlettere broke in too we were obledged to leave the load Standing and ran in great confusion to Camp the hail being So large and the wind So high and violent in the plains, and we being naked we were much bruzed by the large hail. Some nearly killed one knocked down three times, and others without hats or any thing about their heads bleeding and complained very much...The plains are so wet that we could doe nothing this evening.”
—Sergeant John Ordway
June 29, 1805
Along the Portage Route around the Great Falls of the Missouri, Montana

“In the afternoon, there arose a storm of hard wind & rain; accompanied with amazing large hail at the upper camp. We caught several of the hail Stones which was measured & weighed by us, there were 7 inches in Surcumference and weighed 3 ounces—Captain Lewis made a small bowl of punch out of one of them. As luck would have it, we were all...Safe...the party that was at the upper camp, were under a good shelter, but we feel concerned about the men on the road with the baggage from the lower Camp—”
—Private Joseph Whitehouse
June 29, 1805
White Bear Island, Upper Portage Camp Southwest Great Falls, Montana

For decades, exploration of inland portions of the North American continent had been a goal of many governments worldwide, and lucrative trade with Indian nations led many countries to develop remote trading posts. Thomas Jefferson was intrigued by the idea of an expedition up the Missouri some twenty years prior to the Lewis and Clark Expedition. He tried to interest General George Rogers Clark in making the expedition in 1783, but lack of funding prevented an attempt. While serving in Paris, Jefferson tried to engage John Ledyard to cross Russia, enter North America by way of Alaska, and explore eastward to St. Louis. This too fell through as Ledyard was stopped by Russian officials while trekking through Siberia. Jefferson’s concern over who would control interests in the Pacific Northwest was further aroused when he learned of overland journeys by British explorer Alexander Mackenzie. Mackenzie made two westward trips from northern Alberta’s Lake Athabasca. During his first journey in 1789, Mackenzie led a small party northwest to the Arctic Ocean down a broad river (later named for Mackenzie). On his second journey in 1793, Mackenzie made a trek to the Pacific Ocean down the Peace River and later Fraser River. Arriving at the coast, he threw down the gauntlet to other countries by painting the rocks near the shore with the following inscription: “Alexander Mackenzie, from Canada, by land, the twenty-second of July, one thousand seven hundred and ninety-three” (Mackenzie 1801; Bakeless 1947; Salisbury 1950; DeVoto 1953; Gilbert 1973; Allen 1975; Appleman 1975; Wood and Thiessen 1985; Ambrose 1996; Ronda 2000;
Hayes 2001; Ronda 2001; Saindon 2003). As a twist of irony, the Lewis and Clark Expedition took liberties of a similar nature during their journey, and one of these markings still remains at Pompey’s Pillar near Billings, Montana; it is the only remaining physical evidence of their journey on the landscape.

Undaunted by other setbacks, Jefferson tried once again to enlist an explorer to tour the Missouri River system. In 1793, backed by the American Philosophical Society, Jefferson tried to hire Andre Michaux, a French botanist, to make the journey. The plan failed when it was learned Michaux was a French spy attempting to stir up trouble between the Americans and Spaniards (Salisbury 1950; Steffen 1977).

Thomas Jefferson found himself in a better position to promote an expedition when he became president of the United States. On January 18, 1803, he submitted a confidential message to Congress (see Appendix A). Near the end of the message was a small paragraph requesting “an appropriation of $2,500 for the purpose of extending the external commerce of the United States” (Richardson 1897; Bruun and Crosby 1999). On February 28, 1803, Jefferson received word from Congress that they had approved the journey. Meriwether Lewis, President Jefferson’s personal secretary, was selected to lead the expedition and spent the spring of 1803 in Philadelphia preparing for the journey. Lewis requested a co-leader for the journey and chose his former army captain, William Clark. While in Philadelphia, Lewis also completed training in astronomy, natural history and sciences, health and medicine, and ethnology. In addition to his studies, he spent time purchasing and obtaining a vast array of materials needed to complete the journey successfully (Biddle 1814; Jackson 1978; Botkin 1995; Burroughs 1997; Burns 1997; Chuinard 1998; Paton 2001; Peck 2002; Cutright 2003; Patient 2003). Included in his packing list were three thermometers (see Appendix B).

**Meteorological Instruments**

There is uncertainty as to the type of thermometers used on the Lewis and Clark Expedition. Although not discovered until the late 1600s, the basic principle behind thermometers was known as far back as the third century B.C.E. Galileo is credited with inventing the first thermometer sometime around 1593. By 1641, Ferdinand II, Grand Duke of Tuscany, developed a sealed thermometer. Other advancements were made by Robert Boyle, who recognized the need for a standard scale. Various trials took place using water, air, liquor, spirits, alcohol, linseed oil, and finally, mercury as the measuring element within a thermometer. As science advanced during the 1700s, Robert Hooke increased the accuracy and established a fixed measurement for the freezing point of water. Dutch mathematician Christian Huygens is credited with suggesting two fixed points, the second being that of boiling water. Sir Isaac Newton chose a scale using fixed points of melting snow and of the human body. In 1714, Gabriel Fahrenheit developed the first mercury thermometer with a reliable scale. He established the first point of his scale by dipping the thermometer into a solution of ice, water and sal ammoniac, and/or sea salt, and designated it zero. A second point was assigned at 32° F when the instrument was placed in a mixture of water and ice only. The third point of 96° F was based on the temperature reached when the thermometer was placed in the mouth or armpit of a healthy man. Swedish astronomer Anders Celsius provided another alternative in 1742. He used two fixed points: that of boiling water, which he assigned zero on his scale, and the temperature of melting ice, 100, with equal marks between. It was Jean Pierre Christin of Lyons, however, who inverted the scale as it appears today. In fact, by 1779 there were as many as nineteen temperature scales in use (Middleton 1969; Frisinger 1983; Middleton 2003).