We Proceeded On

SHOOTING THE MOON (AND THE SUN AND STARS)

Lewis and Clark as Celestial Navigators
**The Lewis and Clark Trail Heritage Foundation, Inc.**

P.O. Box 3434, Great Falls, Montana 59403  Ph: 406-454-1234 or 1-888-701-3434
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**Mission Statement**
The mission of the Lewis and Clark Trail Heritage Foundation, Inc. is to stimulate public appreciation of the Lewis and Clark Expedition's contributions to America's heritage and to support education, research, development, and preservation of the Lewis and Clark experience.

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On the cover
We chose Gary Miller’s painting of Fort Mandan for the cover of this issue because of the articles, on pages 19-30, about Lewis’s efforts to find longitude and latitude there during the Corps of Discovery’s winter encampment of 1804-5. The painting shows the captains in early April 1805 preparing the keelboat for its return to St. Louis. Our thanks to the artist. More examples of Gary Miller’s paintings of Lewis and Clark and other themes can be found on his Web site, www.garypmillerart.com (701-258-0060).
Letters

Interpreting the character of Meriwether Lewis

At the Foundation’s annual meeting in Pierre, South Dakota, in August I purchased a copy of Clay Straus Jenkinson’s The Character of Meriwether Lewis: “Completely Metamorphosed” in the American West. After reading the book and the review of it in the May WPO, I offer this brief response. While there is much to admire about Jenkinson’s book, it is, nevertheless, puzzling and troubling. Its powerful prose is eminently readable and its design appealing. But the message—there’s the rub. If one were forced to summarize it in one sentence, it might read: Lewis was a psychotic, alcoholic, racist, sexual pervert who was a terrible governor, fiscally incompetent, and who killed himself because he was unable to cope with re-entry into civilization.

Rather than as a “standard history,” Jenkinson describes his 116 pages of text as a “humanities essay” in which he will “speculate a great deal.” Near the end (pp. 97-98) he admits that we should not judge 19th-century people by 21st-century standards; nor should we view Meriwether Lewis’s entire life in terms of his alleged suicide. Furthermore, he admonishes that the “Lewis and Clark community has jumped on the bandwagon … too uncritically” regarding those who label Lewis a victim of melancholia, alcoholism, and suicide. Yet Jenkinson, by dwelling on these very themes, constantly violates his own advice as well as that of Francis Bacon, whose warning to view our certainties with suspicion he quotes on page 98.

Jenkinson’s study of Lewis provides a wonderful example of the error of “presentism.” The author excuses himself by reminding us that he is writing an essay—a form that allows “speculation.” And does he speculate! Frequently, indeed constantly, he finds melancholia in Lewis’s poetic journal entries. For instance, the author repeatedly cites the passage Lewis wrote on his 31st birthday—thoughts completely normal unless viewed with a preconceived obsession with melancholia. Doubtless the majority of those who have read this letter have had similar thoughts on some particular birthday.

To label this extended essay puzzling and troubling does not mean that it is not useful. Jenkinson plays the provocateur beautifully. Nor should one jump to the conclusion that I am not an admirer of Jenkinson’s many talents. Indeed, seeing his masterful performance in Pierre (playing Thomas Jefferson, a role he alternates with that of Meriwether Lewis) was the fourth time I have enjoyed one of his historical presentations.

The Character of Meriwether Lewis illustrates why the integrity of American scholarship demands a forensic examination of Lewis’s remains to determine, if possible, the cause of his death. One hopes that Jenkinson’s book will put pressure on the National Park Service to reverse its decision to allow Lewis’s relations to proceed with an exhumation. Finally, Jenkinson’s speculations may prompt sorely needed research into Lewis’s finances and administrative affairs—scholarship that just might counterbalance the myths of Lewis’s oft-cited insolvency and incompetence.

John D.W. Guice
Laurel, Miss.

Chinook Point redux

Re “Decision at Chinook Point” (WPO, May 2001), as a career officer in the U.S. Army I have long been vexed by the notion—so prevalent in books and documentary films about the expedition—that Lewis and Clark’s decisions were “votes” or “elections” and thereby quintessential acts of American democracy. Voting, fairness, inclusiveness, or protocol had nothing to do with the decision at Chinook Point and all the other decisions made by the captains, with one possible exception I’ll mention shortly.

Lewis and Clark were two army guys who asked their subordinates what they thought, then did what they wanted to do. Similarly, throughout history, commanders from Alexander the Great to Caesar to U.S. Grant have held councils of war to discuss pending decisions with their subordinates, then made the decision on their own.

After the second day at Gettysburg, General George Meade wanted to retreat. When he called a council of war, his corps commanders recommended that they
stay and fight. The result was a major victory for the Union cause. But it was Meade’s decision and his alone, just as it was Lewis and Clark’s decision at the mouth of the Marias, in the face of nearly unanimous advice to the contrary, to proceed up the south branch of the river. Likewise, dozens of times I have called together key subordinates and requested their input on some matter in question, but they never shared in the decision or in the responsibility for it.

In his letter in the August WPO, Dayton Duncan hit it square on the head when he acknowledged that the expedition was a military undertaking and that the “vote” at Chinook Point was not a vote in the strict democratic sense in which the result is binding. The fact that Clark recorded the “votes” makes no difference—he recorded everything.

I do, however, believe that the election of Patrick Gass as sergeant was binding. In the American army, and in many European armies as well, there was a time-honored tradition of enlisted men electing officers. This normally occurred in the militia, where men would elect their officers, who would then either appoint or nominate the noncommissioned officers (sergeants and corporals). This was still happening as late as World War I. In 1917, Harry Truman was a newly enlisted private in the Missouri National Guard when the men of Battery D, 129th Field Artillery Regiment, elected him their commanding officer.

Lt. Col. Sherman L. Fleek
Chief Historian, National Guard Bureau
Washington, D.C.

In “Decision at Chinook Point,” however author Martin Plamondon might interpret the other “votes” by the Corps of Discovery, the selection of Patrick Gass to replace the deceased Charles Floyd as sergeant was almost certainly an election as we understand that term.

The election of officers and noncoms had been the norm in many units during the Revolutionary War. It remained a custom as late as the Civil War, at least among militia and irregular units. However, knowing that the most popular man would not necessarily make the most competent leader, an officer would sometimes restrict the slate of candidates. The Confederate cavalry leader John Singleton Mosby did this, and Lewis and Clark may have followed a similar strategy in the election of Patrick Gass, who shared the slate with William Bratton and George Gibson. The captains probably proposed the contenders and retained the right of approval, but it is not likely that they would have denied their command the morale-enhancing privilege of a vote, particularly in the wake of the party’s first (and as it turned out, only) death.

Pauline Griffin
Brooklyn, N.Y.

Historians are on a constant quest to establish a useable past. History has many attributes, including a good story for a good story’s sake. Lewis and Clark is a great story, and few moments within this epic of exploration are as useable to modern readers as the vote to establish winter quarters at Station Camp. More than any other writer, Dayton Duncan has helped us appreciate this moment of decision, and I find right and proper his letter in the August WPO defending the word “vote” to describe what happened at Chinook Point.

In that same issue, I was delighted to read Grace Wilson’s letter regarding previous ships named for Lewis and Clark. Some years ago, when the Polaris missile submarine U.S.S. Lewis and Clark was decommissioned, its executive officer, Bill Johnson, presented to the Washington State Historical Society a plaque with the submarine’s logo. The fine print reads, “Theirs to discover, ours to defend.” I still have this plaque in my office.

David L. Nicandro
Director, Washington State Historical Society
Tacoma, Wash.

Library of Congress on line

Readers may be interested in the Library of Congress’s American Memory Collection. The library has scanned numerous historical documents and placed them on its Web site, allowing folks to use primary documentation for research purposes without having to travel or pay for reproduction costs. Many of these items are just pictures of the document, page by page, but some pages also include the con-
tent in text form, which can thus be searched electronically. This site is a major benefit to the American public.

The link is http://memory.loc.gov/ammem/mdbquery.html. A search for the phrase “Meriwether Lewis” yields 76 items, including: Thomas Jefferson to Paul Allen, August 18, 1813, with Meriwether Lewis’s biography; Jefferson to Meriwether Lewis, August 16, 1809; Jefferson to Lewis, August 24, 1808; Jefferson to Lewis, August 21, 1808; Jefferson to Lewis, August 8, 1807; Charles Gratiot to Lewis, November 13, 1804; William Clark to Lewis, July 18, 1803; Lewis to Jefferson, April 27, 1803; William Brent to Lewis, February 25, 1803; Lewis to Jefferson, August 31, 1801; John Newman to Lewis, August 10, 1801; Newman to Lewis, August 8, 1801; Lewis to Jefferson, April 10, 1801; Lewis to Jefferson, April 5, 1801; and Jefferson to Lewis, March 31, 1801.

JAY RASMUSSEN
Hillsboro, Ore.

WPO welcomes letters. We may edit them for length, accuracy, clarity, and civility. Send them to us/c/o Editor, WPO, 51 N. Main St., Pennington, NJ 08534 (e-mail: wpo@lewisandclark.org).

Carns leaving post: board seeking new executive director

As this issue of WPO goes to press we’ve learned that Cari Karns, the Foundation’s executive director, will be leaving us. Cari’s fiancé, an Air Force captain stationed in Great Falls, has been transferred to California — a direct result of the current national emergency — and Cari will be moving there to be with him after their marriage, in late December. We deeply regret Cari’s departure and wish her well. The directors will begin an immediate search for her replacement and welcome applications and recommendations. Please send them to the Foundation’s president, Jane Henley, at 1564 Heathrow Lane, Keswick, VA 22947 (434-296-5162; fax 434-296-5163; MLewisNut@aol.com) —

To keep our bonds strong and our spirits high, the Foundation offers new and improved communication tools. Our Web site, www.lewisandclark.org, will be revamped and connected to chapters and other Lewis and Clark sites and kept current by office staff. A new membership newsletter is being introduced in this issue of WPO. We welcome comments and suggestions.

In September, director Dark Rain Thom attended a meeting in Bismarck, North Dakota, of the Circle of Tribal Advisors and the Native American Tourism Conference. On behalf of the Foundation, she distributed to all attendees strands of dentallium shells and cobalt-blue beads. Dark Rain reports that the gifts were very popular and gained the Foundation new friends.

Carns leaving post:

From the Directors

“The most fun experience I have ever had”

After receiving the gavel from Barb Kubik at the final banquet of the Foundation’s 33rd annual meeting, held in August in Pierre, South Dakota, I looked out at the audience of 480 Lewis and Clark enthusiasts and was overwhelmed with the feeling of joy shared by all. We had just experienced an expertly crafted and moving talk by James Ronda and gained new understanding of the Corp of Discovery’s “encounter” on the prairie with the Sioux. The week’s activities had been stimulating beyond measure, and we shared Jay Vogt and his team’s joy of a job well done. It was also a great joy being in the presence of one another and sharing our love of the Lewis and Clark experience.

What makes following this story, visiting the sites, and reenacting the experience so much fun? Even if we cannot explain the special nature, we all feel it, know it, and respond to it. On three occasions in the last month, new recruits have come up to me in Charlottesville, Virginia, and said, “I just want you to know, Jane, that working on Lewis and Clark activities is the most exciting, the most fun experience I have ever had.”

The Foundation is working hard to support the Bicentennial Council (which the Foundation created) as it prepares for the bicentennial’s inaugural event at Monticello on January 18, 2003. We want to share the fun of the Lewis and Clark adventure with the rest of the nation and see the number of L&C enthusiasts grow in the years ahead. Our chapters have been working with Jeff Olson, trail stewardship coordinator, preparing for the many thousands of expected visitors. The Philadelphia Chapter, with the assistance of the Ohio River Chapter, has produced a map of the eastern legacy of Lewis and Clark. Many of our seasoned members are doing double and triple duty by serving on local and state bicentennial committees as well as carrying out chapter activities.

We need your support

At the conclusion of the Annual Report for 2000-01, a letter from former president Jim Fazio brought to your attention some serious financial problems. With so many groups asking for money for bicentennial programs, contributions to the Foundation are getting harder to come by. Remember, this organization will be here after the bicentennial is long behind us, and our programs must continue to grow. The board is preparing a plan of action and will be asking for your support.

At this time of threats against our nation, we should all be reminded of the examples of leadership, partnership, courage, and cooperation exhibited by the Corp of Discovery and pass these lessons on to others. May our own courage be undaunted.

—Jane Henley
President, LCTHF
From the Bicentennial Council

A renewed commitment; annual awards

For several years the National Council and a unique coalition of partners have been preparing to commemorate the bicentennial of the Lewis and Clark Expedition. Now, following the September 11th terrorist attacks on the World Trade Center and the Pentagon, we have entered an extraordinary time in our history, and a sense of urgency and a quest for relevance vie for equal attention in a changed nation. We have an opportunity to share with a world eager for greater wisdom and understanding the uniquely American story of the Lewis and Clark Expedition.

But as Chet Orloff, a member of our board, recently wrote, “If Americans believe … that we have turned a page in our nation’s history, then we’d better know what book we’re reading. It is a text more complex than we might imagine.” The complexity is embedded in the legacy of the tribes as the first stewards of the land traversed by Lewis and Clark. As another board member, Bobbie Conner, reminds us, the tribal story is usually left out of the history taught in schools.

The Council embraces this complexity and all its challenges. In the days before September 11, the Circle of Tribal Advisors, representing over two-thirds of the 50 modern tribal governments along the trail, met to consider how the bicentennial can promote retention of vanishing cultural practices, oral histories, and traditional languages; bring economic benefit to tribes struggling with unemployment, poverty, substance abuse, and disease; correct cultural stereotypes and misunderstandings; lead to better stewardship of our earth’s resources; and preserve sacred and historical sites along the trail.

In the months ahead, the Council will unveil a national public-relations campaign with help from the firm of Eisner Sanderson. Among other goals, this effort will promote sustainable tourism and encourage travel along the trail and attendance at more than a dozen national signature events. We will also be working with the National Park Service to promote Corps of Discovery II, an interpretive exhibit that will travel the length of the trail, and with Stephen Ambrose to meet his $1 million fund-raising challenge grant. We will develop our education campaign for trail stewardship with Hugh Ambrose and work with the National Geographic Society on a series of public-service announcements.

We will feature a special section in Smithsonian magazine’s Spring 2002 issue, lend our support to tribal programs of oral history and language preservation, expand our national merchandising campaign, and develop a commemorative-coin marketing program to benefit trail projects and tribes. We will promote educational programs and teacher-training institutes so young people can learn about the legacies of Lewis and Clark and use that knowledge to make our world strong and peaceful.

We will be reaching out to all members of the Foundation as our partners in telling this story and commemorating the bicentennial. Join us for the journey—an American experience!

Seeking nominations

The Council is seeking nominations for two important national awards:
• The Harry Hubbard Award, in recognition of outstanding efforts by an individual or organization in promoting the commemoration of the bicentennial via a project, publication, or special event.
• The Outstanding Service Award, recognizing outstanding service by an individual or an organization to the National Council of the Lewis & Clark Bicentennial.

Nominations are due by January 15. For more information and nomination forms, contact bicentennial@lewisandclark200.org or call 888-999-1803.

—David Borlaug
Michelle Bussard

Estate Planning: Charitable Remainder Trusts

It was hot at the annual meeting in Pierre! The “only cloud in the sky” was unfortunately a figurative one: our income is inadequate for the full and rich program that we believe the Foundation should offer.

As we said in the last WPO, one way for members to help is through planned, or estate, gifts. There are many ways to do this, including the easy and well known bequest by will, but prospective donors should look carefully to see if there are better options for their financial and family situations.

One person at the Pierre annual meeting told about attending a recent pre-retirement seminar at which long-term giving techniques that have current income-tax deductions were outlined. Although these are more complex to set up, they are attractive and advantageous to donors who have the right assets!

For example, a charitable remainder trust can provide lifetime income to you and your spouse as well as a gift to the Foundation at your death. These trusts (and other plans such as charitable gift annuities) can be funded tax-advantageously with highly appreciated assets. Funding such a trust does not take a lot of money.

If you have questions, please contact Executive Director Cari Karns at the Foundation’s headquarters (P.O. Box 3434, Great Falls, MT 59403) or call her at 888-701-3434. Cari can help you find a plan that will help you, your family, and the Lewis and Clark Trail Heritage Foundation.

November 2001 We Proceeded On 5
Reflections on September 11; protecting Bozeman Pass and Tower Rock

Where does trail stewardship fit in the overall scheme of things? That question has been on my mind since the September 11 terrorist attacks in New York and Washington, D.C.

It is painfully obvious that our lives, our country, and our world have been radically altered. But they will go on. When the terrorists struck, I was visiting family and friends in Seattle and waiting for a flight home. Four days and countless canceled flights later, Joanne and I rented a car and began the long drive to Bismarck.

Along the route we got a glimpse of the New World. At our first stop, in Snoqualmie, Washington, we chatted with a gas station clerk who noted the lack of commercial aircraft in the skies east of the Emerald City. Later, on the car radio we listened to the memorial services at the National Cathedral in Washington.

Driving through Spokane, we saw a woman standing on an I-90 overpass holding aloft a U.S. flag. Near Coeur d’Alene, Idaho, we talked to a woman operating the visitor counter at a rest area and learned that we were just two of more than 100 people she had seen that day who had rented cars in Seattle and were headed east. At day’s end, we stood at the Super 8 check-in counter in Butte, Montana, where we met a man driving west. He was headed to Seattle from his home in Pennsylvania, just eight miles from the crash site of the fourth hijacked plane.

We finally made it to Bismarck, and I got back to work. The routine helped. I picked through the 10 days of e-mail and snail mail accumulated in my absence. The stock market opened and tumbled. The baseball season resumed. Soon it was time to hit the road again to work with Foundation chapter members and property owners along the trail, time to resume efforts related to United Harvest’s grain-elevator project near Pompeys Pillar, time to put one foot in front of the other.

The terrorists who struck the World Trade Center and the Pentagon changed our world, but the changes in the wake of September 11 don’t erase the importance of the Corps of Discovery and the changes that followed its return in 1806. We maintain our interest in the Lewis and Clark National Historic Trail. We continue to learn about the captains and the people of the nations they encountered, and through them we continue to learn about ourselves.

Back on the Trail

We also continue to deal with many trail stewardship matters. Energy companies are forging ahead with plans to drill for coal-bed methane gas in Montana’s Bozeman Pass, an area traversed by Clark and his party on the return journey from the Pacific. The Headwaters Chapter is monitoring this issue.

Earlier this summer, thanks to an alert from Foundation member Adam Saling of San Diego, we learned that the Montana Department of Transportation plans to sell off land near Craig, Montana, that includes Tower Rock, a landmark climbed by Meriwether Lewis. Foundation President-elect Larry Epstein and others attended a public meeting and encouraged the state to keep Tower Rock in public hands. It remains to be seen which state agency will take ownership of the site. Portage Route Chapter members will make sure that interpretative signage will be a part of a future pull-off on the frontage road near Tower Rock.

Private-lands inventorying continues, albeit at a slower pace than we envisioned. The inventory in Montana and Idaho should be wrapped up by year’s end. Work proceeds in the Dakotas with help from the new Saka-kawea Chapter and the Minnesota Chapter. The new Mouth of the Platte Chapter, in Omaha, has also tackled inventory work, with Bob Berry leading the efforts. Darryl Hersemann is inventorying lands in the Nebraska City area with the Missouri River Basin Chapter.

We remain committed to facilitating ways to convince United Harvest to move its proposed high-speed grain handlers away from Pompeys Pillar National Monument. The company began pouring concrete footings on its 100-acre site last August. Montana’s Department of Environmental Quality shut the project down because United Harvest did not apply for an air quality permit, but the DEQ later granted the permit. That action remains the subject of legal protest by the Pompeys Pillar Historical Association, the Foundation, and other groups and individuals across the country.

The PPHA promises to pursue judicial relief to the Montana Supreme Court if necessary. Participants at the annual meeting in Pierre, South Dakota, contributed nearly $2,000 to the PPHA to defray legal expenses, but more is needed. Those wishing to help can send checks to PPHA, POB 213, Worden, MT 59088.

We have a new partner in our efforts to convince United Harvest to move its project elsewhere in Yellowstone County, Montana. In August, the National Trust for Historic Preservation joined with the PPHA and the Foundation to help bring United Harvest into the ranks of good corporate stewards. The Trust also made a grant of $2,500 for legal expenses.

—Jeff Olson
Trail Coordinator

Jeff Olson can be reached at trail@lewisandclark.org (POB 2376, Bismarck, ND 58502; Tel: 701-258-1809 or 701-258-1960).
SERENDIPITY

A newly discovered letter reveals that John Ordway planned to publish his expedition journal

by Kerry Oman

It was Friday. I had just eaten lunch, and its effects were slowly starting to combine with the heat of the afternoon and the end of a long week in the reading room of the New York Public Library, where I was doing research on early government-Indian affairs. My eyes began to blur as I struggled to decipher the handwriting on the nearly 200-year-old letters in front of me. Reading, scanning, searching old and frail brown paper that emitted tiny particles of dust that seemed to head straight into my lungs as I turned page after page; ink bleeding through one side of a document and nearly obliterating any hope of deciphering the words; and the occasional letter written in pencil and faded beyond recognition—all seemed to compound against me.

One more folder, I told myself, and I would take a break. Then a sentence drew me up short. It began, “The bearer hereof being one of the party that attended Captains Lewis & Clark on their late tour up the Missouri and across to the Pacific ocean, and is in the possession of a journal kept by himself that may increase our knowledge of the western country … .”

My heart beat faster. Lewis and Clark? A journal? As I continued reading, I discovered it was a letter of introduction written on behalf of Sergeant John Ordway, one of at least seven of the Corps of Discovery’s enlisted men known to have kept a journal on the expedition. Suddenly I no longer needed that walk to wake up, but to calm down.

Call it serendipity or just plain luck, but before leaving for New York I had just finished volume eight of Gary Moulton’s edition of the Lewis and Clark journals, the last volume of the captains’ writing, and I was nearly 100 pages into volume nine—John Ordway’s journal. I have been a member of the Lewis and Clark Trail Heritage Foundation for several years, and one reason I de-
cided to become a historian stems from reading James Ronda’s Lewis and Clark Among the Indians. So Lewis and Clark are never far from my mind. But on that Friday afternoon, the last thing I expected to find was a letter concerning the expedition—particularly one that seemed to reveal new information regarding one of its most important primary documents.

I came across the letter on April 27, 2001. A week later, after returning to Dallas, where I am a graduate student at Southern Methodist University, I called Doug Erickson, a friend and the head archivist at Lewis and Clark College, in Portland. Doug noted how little is actually known of Ordway and expressed excitement about the two-page letter. I promised to send him a copy as soon as I received the black-and-white photographs of it I had ordered from the New York Public Library. I felt like a child waiting to open presents on Christmas morning, for it seemed an eternity before the photos arrived. (In actuality, the library processed my order quickly.)

The letter, from one Arthur Campbell to the Reverend Jedidiah Morse, a prominent geographer, was written two months after Lewis and Clark’s return to St. Louis. It dealt with Ordway in the first half and an unrelated matter in the second:

Kentucky. 20 Nov. 1806.

Rev Sir,

The bearer hereof being one of the party that attended Captains Lewis & Clark on their late tour up the Missouri and across to the Pacific ocean, and is in the possession of a journal kept by himself that may increase our knowledge of the western country; I have taken the liberty to advise him to apply to you for information & advice where he might make it useful to the public & at the same time be of some profit to himself. True it is that the Captains journal may be more full and correct, but as he has said that it will be at least 2 years, before his is ready for publication, in the mean time Mr. Ordway’s journal being published, it will serve as an introduction to the other larger work, and give much useful information that may be much needed, before that of the Captains can appear. Besides I understand that this journal has been examined and corrected by Lewis, and as far as it goes, gives a true statement of facts, as to the Geographical part of the journey. That which relates to animal, mineral & vegetable production, we must restrain our curiosity until the large work appears. I have also sent you by the same hand, a Kentucky newspaper, that contains a Eulogium on the late Chancellor Wythe of Virginia that contains some sentiments that may be useful to young men in any Nation in life, especially that of the bar if you accord with me in opinion you will readily procure it a place in the Maps Magazine, or some such permanent work, for the benefit of the rising generation. In Virginia & other Southern States, It is a rare thing for a woman to have justice done her when prosecuting for a rape. The sentiments [of] the honored Chancellor may assist to open the minds of his countrymen, and to make liberal judgment on that delicate and most important subject.

I am Rev Sir, being respectfully your most obed Sert

Arthur Campbell

The writer, Arthur Campbell, is a minor historical figure, best known for his role in an abortive effort, during the 1780s, to create the new state of “Franklin” out of contiguous parts of western Virginia and North Carolina. Campbell was a land speculator caught up in frequent property disputes. In 1776, he fought with George Rogers Clark and Thomas Jefferson over their plans to make Kentucky, which was then part of Virginia, a county. Campbell served in the Virginia militia for most of his adult life. By 1806 he had retired from the militia and was living in Washington County, Virginia, while making frequent visits to land he owned in Kentucky, just west of the Cumberland Gap.

It appears that Ordway met Campbell while traveling overland from St. Louis to Washington, D.C., with Meriwether Lewis and an Indian delegation in the late fall of 1806. Their route took them through the Cumberland Gap and into southern Virginia, where Campbell lived. Campbell’s letter is the first inkling we have that Ordway intended to publish his journal and that Lewis had examined and corrected it. The trip would have provided him an opportunity to discuss its publication with Lewis. One can also infer from Campbell’s letter that the sergeant and his captain reached some sort of agreement about the kind of information Ordway could include in the published work.

As mentioned, Ordway was one of at least seven enlisted men of the Corps of Discovery known to have kept a journal. But only one of those journals, Patrick Gass’s, appeared in print in the years immediately following the expedition’s return. The journals of Ordway, Charles Floyd, and Joseph Whitehouse were not published until the early 20th century. The other three journals—by Robert Frazer for certain and perhaps by Nathaniel Pryor and Alexander Willard—are lost.

For whatever reason, Ordway did not go ahead with his publishing plans. Instead, his journal was purchased by Lewis and later came into the possession of Nicholas Biddle, who used it as a reference while writing The His-
tory of the Expedition Under the Command of Captains Lewis and Clark. Published in 1814, Biddle’s account is mainly an extended paraphrase of the journals kept by Meriwether Lewis and William Clark. Ordway’s journal then vanished for a century until discovered among Biddle’s papers by his grandsons in 1913. Edited by Milo M. Quaife, it was published three years later by the State Historical Society of Wisconsin and is now in the archives of the American Philosophical Society, in Philadelphia.4

It is no surprise that Ordway’s journal promised to reveal strictly geographical discoveries, or, as Campbell put it, to give “a true statement of facts, as to the Geographical part of the journey.” In October, before leaving St. Louis, Lewis had edited the prospectus for the proposed publication of Private Robert Frazer’s journal. Lewis had given Frazer permission to publish his account, but upon reviewing the prospectus he was taken aback by its promise to give a full description of the expedition’s discoveries in natural history. Lewis demanded that this promise be expunged, claiming that Frazer was “entirely unacquainted with celestial observations, mineralogy, botany, or zoology.”5 Historian Stephen E. Ambrose has argued that Lewis regarded his scientific discoveries as the most valuable part of his journal.6 Ordway was surely aware of Lewis’s proprietary feelings and would have couched his prospectus in terms agreeable to his commanding officer. He must have proposed restricting his account to a narrative of the journey, avoiding anything “which relates to animal, mineral & vegetable production” and leaving such matters to “the large work” that Lewis expected to write.

Campbell’s letter also informs us—and we can assume he learned this from Lewis—that it would be approximately two years before Lewis and Clark’s journals (in effect, the official account) would appear in print.

There is no direct documentary evidence for a meeting between Ordway and Jedidiah Morse, the geographer to whom Campbell’s letter was addressed, but it is fair to assume that it did occur. We do know that, from Washington, Ordway returned to his home in New Hampshire with the intention of publishing his journal. It is unclear whether he stopped en route at Morse’s home in Charlestown, Massachusetts, or if they met later.

**Jedidiah Morse, eminent geographer**

Morse, who was well known in New England intellectual circles, is regarded as the father of American geography (he was also the father of Samuel F.B. Morse, a painter and the inventor of the telegraph). Born and raised in Woodstock, Connecticut, he attended Yale College and later taught on its faculty while doing graduate work in theology. For many years he was a practicing minister, although his love of geography eventually caused him to leave the pulpit. His first book, *Geography Made Easy* (1784), was also the first American geography text published in this country. After settling in Charlestown, in 1789, Morse published a far more ambitious work, *The American Geography*, which sold more than 20,600 copies in five years. His research methods were systematic. He read widely, traveled throughout the country, and collected data from questionnaires he distributed.7

Morse’s output of geographical texts continued, and they made him a wealthy man. By 1820, when he left the ministry, his list of titles included the *American Universal Geography*, a two-volume work in its seventh edition. *Geography Made Easy*, meanwhile, had by then had gone through 20 editions. He constantly revised his earlier works, including *Elements of Geography* and *The American Gazetteer*, while also finding time to start a newspaper and a magazine.8

We cannot be certain how well Campbell and Morse knew each other, but they had carried on a sporadic correspondence from at least the early 1790s.9 Clearly, Campbell recognized the wealth of information a member of the Lewis and Clark Expedition could provide the geographer, and the meeting between Ordway and Morse likely did more good for future editions of Morse’s geographies than it did for Ordway, who at some point after their meet-
ing abandoned the plan to publish his journal.

Why he did so we can only speculate. Lewis hoped to make a lot of money from his own published account, and perhaps, upon further reflection, he persuaded Ordway not to publish his.13 We do know that Lewis and Clark together ended up purchasing Ordway’s journal. Although most sources say they paid him $300, there is evidence that the price may only have been $10. Writer Olin D. Wheeler included in his travel narrative The Trail of Lewis and Clark, 1804-1806, published in 1904, a letter from one of Ordway’s descendants, Martha Ordway Kibbler. According to Kibbler,

In an old letter which he [John Ordway] wrote just after he returned from the expedition, and which I read in 1862, he distinctly stated that the diary he kept and which he wore beneath his shirt, was bought by the commanders of the expedition to be used by them in their report to the Government, and he thought the ten dollars they paid him for the diary was a good price. Probably the diary was copied and the original lost. This letter with several others, giving details of their journey, sufferings and eventual success was lost in a fire about 1865.11

A note about the last section of Campbell’s letter, in which he states that he gave Ordway a newspaper “Eulogium” (eulogy) for one Chancellor Wythe to deliver to Morse. Campbell was referring to George Wythe, a signer of the Declaration of Independence and and mentor to Thomas Jefferson, who had been one of his law students at the College of William and Mary. Campbell’s reference to Wythe appears to concern some legal assistance he gave to the victim in a rape case. In one of the era’s most notorious crimes, Wythe was murdered by a grandnephew on June 8, 1806. Jefferson called him “the Cato of his country, without the avarice of the Roman.”12

Campbell’s letter adds to the small mysteries of the post-expeditionary phase of the Corps of Discovery. We will never know how the immediate publication of Ordway’s journal might have altered the captains’ efforts to publish their own work, or how it might have changed America’s image of the expedition. As a result of it, however, we do know that Ordway intended to publish his journal and discussed this with Lewis. The letter also reminds us that, buried in archives, other Lewis and Clark documents surely await discovery.

Foundation member Kerry Oman is a graduate student in American history at Southern Methodist University.

NOTES

1Arthur Campbell to Jedidiah Morse, November 20, 1806, Jedidiah Morse Papers, Box 1, folder “Correspondence 1801-1806,” Manuscripts and Archives Division of The New York Public Library. At the end of the letter is a docket, or inscription, in Morse’s hand stating that the letter was from “Gen Campbell. “Gen” is presumably short for “general,” although Campbell’s top rank in the Virginia militia was colonel.


4Ibid., Vol. 9, pp. xvi-xvii.

5Donald Jackson, ed., Letters of the Lewis and Clark Expedition, with Related Documents, 1783-1854 (Urbana: University of Illinois Press, 1978), Vol. 2, p. 386. Frazer’s journal was never published and appears to be one of those lost to history.


7This brief account of Jedidiah Morse is based on Richard J. Moss, The Life of Jedidiah Morse: A Station of Peculiar Exposure (Knoxville: University of Tennessee Press, 1995).

8Ibid.

9The Filson Historical Society, in Louisville, Ky., owns at least one letter from Jedidiah Morse to Arthur Campbell, dated Aug. 27, 1793.

10Ambrose, pp. 396-411.


12Thomas Jefferson, “Notes for the Biography of George Wythe,” as quoted in Alonzo Thomas Dill, George Wythe: Teacher of Liberty (Williamsburg: Virginia Independence Bicentennial Commission, 1979), p. 82. An interesting note regarding the connection between Arthur Campbell, Thomas Jefferson, and the West: In Notes on the State of Virginia, Jefferson discusses the possible existence of the mammoth in North America. Apparently, Arthur Campbell helped fuel this idea in Jefferson by telling him the following story: “Mr. Stanley, taken prisoner by the Indians near the mouth of the Tanisse, relates, that, after being transferred through several tribes, from one to another, he was at length carried over the mountains west of the Missouri to a river which runs westwardly; that these bones abounded there; and that the natives described to him the animals to which they belonged as still existing in the northern parts of their country; from which description he judged it to be the elephant.” Jefferson specifically mentioned the mammoths to André Michaux in his instructions to him in 1793, at the start of Michaux’s abortive exploration of the West. By the time of the Lewis and Clark Expedition, Jefferson had become more tentative about mammoths roaming the plains and instructed them to watch for “extinct animals.” See Donald Jackson, Thomas Jefferson and the Stony Mountains: Exploring the West from Monticello (Norman: University of Oklahoma Press, 1981), pp. 29-30.
INTRODUCTION: Celestial Navigation on the L&C Expedition

How did Meriwether Lewis and William Clark know where they were? Mostly they relied on dead reckoning. By keeping daily records of courses and distances traveled from a position of known latitude and longitude (for example Camp Dubois, their base, north of St. Louis, during the winter of 1803-4), they were able to plot their progress across the continent. The system wasn’t perfect, for they tended to overestimate distance, but it gave them at least a rough sense of their location.

A future issue of WPO will treat the subject of dead reckoning. This issue deals with the more accurate but also more difficult method of fixing position by celestial navigation—observation of the sun, moon, and stars. For this purpose the captains carried a sextant, an octant, a chronometer, artificial horizons, and the requisite celestial almanac and tables.

As the following three articles point out, celestial navigation is simple in theory but often dauntingly difficult in practice. It takes skill to use the instruments effectively, and deriving a position from the raw data requires a series of calculations that must be done with accuracy and in the proper sequence. It is not an exercise for the mathematically faint-of-heart.

Finding latitude—a position on a line running parallel with the equator—is relatively straightforward, but finding longitude—a position west or east of Greenwich, England—takes multiple observations over days or weeks, and the subsequent mathematics require a strict exactitude and sometimes a knowledge of spherical trigonometry. Without great success, the captains tried several times to calculate longitude, but mostly they made the observations and recorded the data with the understanding that a professional mathematician would do the numbers after the expedition.

With near unanimity, historians have discounted Lewis and Clark’s abilities as celestial navigators. The captains themselves admitted their limitations. It is true they were tyros who often erred in their calculations, but as demonstrated by Robert Bergantino in “Revisiting Fort Mandan’s Longitude” (pages 19-26) and by Laurence Rudner and Hans Heynau in “Revisiting Fort Mandan’s Latitude” (pages 27-30), their observations were usually pretty good, especially considering the often difficult field conditions.

Much has been made of the apparent uselessness of the captains’ data for longitude. Ferdinand Hassler, the mathematician hired to convert the data, labored at the task off and on for 10 years before giving up in despair. Although his failure has often been blamed on Lewis and Clark’s inadequacies as celestial observers, it now appears that the fault lay with Hassler and not the captains. Richard S. Preston, a physicist at Northern Illinois University, in a recent article concludes that Hassler probably failed to understand or accept the valid but “somewhat unorthodox” observation method used by Lewis.1 The method, which Lewis had learned from his celestial-navigation mentors, Robert Patterson and Andrew Ellicott, simplified the observation but complicated the subsequent calculation, an eight-step process that for optimal results had to be repeated three times. Calculating a single longitude by this method, Preston estimates, can take a person using pencil and paper at least three hours, but a computer program he wrote for the job whipped through the numbers in seconds. Preston reports that the results of 20 of 23 longitude calculations based on Lewis and Clark’s data for positions along the trail “agree with the modern values to within a half a degree.” (Preston’s method is similar to a procedure developed independently by Bergantino.)2

So let’s hear it for Lewis and Clark, who were better celestial navigators than they knew.

Notes
2Ibid, pp. 181, 179.
We Proceeded On November 2001

Thomas Jefferson’s orders to Meriwether Lewis were straightforward as he prepared for his expedition to the Pacific: “Beginning at the mouth of the Missouri, you will take observations of latitude & longitude, at all remarkable points on the river.”

Latitude is the distance, in degrees, north or south of the equator. The number is expressed as parallels running from zero degrees at the equator to 90 degrees at the poles. Longitude is the distance, in degrees, east or west of a designated meridian, an imaginary line that runs directly between the earth’s north and south poles. The Prime Meridian (zero degrees longitude) runs through Greenwich, England. A place’s coordinates of latitude and longitude locate it on the globe.

INSTRUMENTS FOR DETERMINING LOCATIONS

Lewis and Clark’s celestial observations for latitude and longitude were made using a sextant, an octant, several types of artificial horizons, and a chronometer.

A sextant consists of an arm that moves along an arc marked off, or calibrated, in a scale of degrees, minutes, and seconds. It also has an eyepiece, a mirror, a horizon glass, and adjustable shades for viewing the sun. It is typically used to measure the angular distance of the sun from the horizon, although it can also be used to measure the angular distance between the moon and the sun or a star.

The image of the sun reflects off the mirror, which is fixed on the movable arm, and onto the horizon glass, which is mirrored on one side and clear on the other. The observer sights on the horizon and moves the arm to align the sun’s reflection with it. The base of the arm slides along the arc with its calibrated scale. After aligning the sun with the horizon, the observer reads the sun’s altitude off the scale.

Lewis’s sextant was purchased from Thomas Whitney of Philadelphia. It was made of brass and had a radius of 10 inches. Its scale was graduated by degrees and quarter degrees (15 minutes of arc). Two other components—a vernier scale and a micrometer—allowed Lewis to take readings to the nearest 7 1/2 seconds. The sextant had three interchangeable eyepieces. One was a hollow tube. The other two were telescopes, one of which reversed the image of the observed object. Lewis used the reversing-telescope eyepiece most often because it gave a fuller and better image than the others.

An octant, also known as a quadrant, is similar to a sextant, but simpler. Lewis’s octant had a radius of 14 inches, an arc graduated to 20 minutes, and a fixed eyepiece. A vernier scale and micrometer allowed readings to the nearest half minute. The octant was used in high summer, when the sun’s altitude at noon was greater than could be read using the sextant.

Whether working with the sextant or octant, Lewis and

Celestial Navigation Basics

How the captains found latitude and (sometimes) longitude

by Eileen Starr
Clark used an artificial horizon for measuring the altitude of celestial bodies. They had to use an artificial horizon because on land (unlike at sea), the actual horizon is almost always obscured by hills, trees, or other landscape features. An artificial horizon is a reflecting surface, parallel to the earth, that reflects the image of a celestial object in the same way it would be reflected from the surface of a pond, lake, or ocean under still conditions. When using an artificial horizon while making an observation, the observer aligns the image of the sun reflected from the index mirror with the image of the sun reflected from the artificial horizon; the actual horizon, if it could be seen, would lie exactly halfway between the two images. The observed angle, therefore, must be divided by two to obtain the sun’s actual angular distance from the horizon.

Lewis gave the following description of his three types of artificial horizons in his journal entry of July 22, 1804. (Andrew Ellicott and Robert Patterson were his instructors in celestial navigation. A “spirit-level” is like a carpenter’s bubble level, filled with alcohol or “spirit” so that it can still be used when the temperature is below the freezing point of water.)

An Artificial Horizon on the construction recommended by Mr. Andrew Ellicott of Lancaster, Pensyla., in which water is used as the reflecting surface; believing this artificial Horizon liable to less error than any other in my possession. I have uniformly used it when the object observed was sufficiently bright to reflect a distinct image; but as much light is lost by reflection from water, I found it inconvenient in most cases to take the altitude of the moon with this horizon, and that of a star impracticable with any degree of accuracy. ...

An Artificial Horizon constructed in the manner recommended by Mr. [Robert] Patterson of Philadelphia; glass is here used as the reflecting surface. This horizon consists of a glass plane with a single reflecting face, cemented to the flat side of the larger segment of a wooden ball; adjusted by means of a spirit-level and a triangular stand with a triangular mortice cut through it’s center sufficiently large to admit of the wooden ball partially; the stand rests on three screws inserted near it’s angles, which serve as feet for it to rest on while they assist also in the adjustment. This horizon I have employed in taking the altitude of the sun when his image he has been rather too dull for a perfect reflection from water; I have used it generally in taking the altitude of the moon, and in some cases of the stars also. ...

An Artificial Horizon formed of the index specula [mirror] of a Sextant cemented to a flat board; adjusted by means of a spirit level and the triangular stand as before discribed. As this glass reflects from both surfaces it gives the image of all objects much more bright than either of the other horizon; I have therefore most generally employed it in observing the altitudes of stars.
Lewis purchased his chronometer from Thomas Parker, a Philadelphia watchmaker. A chronometer is essentially a clock. It is used by a celestial navigator to compare his local time with Greenwich time when calculating longitude. Lewis describes his chronometer in the same journal entry of July 22, 1804:

A Chronometer, her balance-wheel and escape-ment were of the most improved construction. She rested on her back, in a small case prepared for her, suspended by an universal joint. She was carefully wound every day at twelve o’clock. Her rate of going [daily error] as ascertained by a series of observations made by myself for that purpose was found to be 15 Seconds and a 5 tenths of a second too slow in twenty four hours on Mean Solar time.

The chronometer was not always reliable. Although Lewis said he wound it faithfully every day, it stopped at least twice during the Corps of Discovery’s winter at Camp Dubois. On July 15, 1804, two months into the journey up the Missouri, Lewis mentioned that the chronometer had again stopped, even though it had been wound the previous noon. The chronometer also stopped a fourth time, on August 24, 1804. There were other occasions when the chronometer ran down because the captains, concerned with more pressing matters, simply forgot to wind it.

Lewis received three weeks of instruction in celestial navigation and surveying from Andrew Ellicott, an astronomer and mathematician, and additional training from the mathematician Robert Patterson. Based on their recommendations, Lewis carried on the expedition A Practical Introduction to Spherics and Nautical Astronomy, by Patrick Kelly (London, 1796); The Nautical Almanac and Astronomical Ephemeris, which gave daily locations of heavenly bodies; and the Tables Requisite to be Used with the Nautical Ephemeris for Finding the Latitude and Longitude at Sea, by Nevil Maskelyn.

Finding Latitude and Longitude

Finding latitude is a much simpler exercise than finding longitude. Lewis typically determined latitude by measuring solar noon—the altitude of the sun at local noon, when it was directly south and at its highest point in the sky. In the Northern Hemisphere, as you move northward the sun appears lower in the sky. Although the sun rises and sets at different points along the horizon, and varies in elevation depending on the time of the year, astronomical tables of the sort carried by Lewis and Clark gave the declination of the sun at noon Greenwich apparent time for every day of the year. From the declination (the number of degrees the sun stood north or south of the equator) one could calculate the latitude of a noon observation. The calculations involved correcting for refraction (the bending of the sun’s image by the atmosphere), apparent size of the solar disc (which varies because of changes in earth’s distance from the sun), and parallax (changes in the observer’s perspective).

Finding longitude is based on the relationship between time and distance in the sun’s apparent passage from east to west. The earth turns once on its axis every 24 hours. During that 24 hours, a point on the earth moves 360 degrees, or 15 degrees every hour relative to the sun. Longitude can be found by comparing the local apparent time of an event, such as the time when the sun is due south, with the apparent time of the same event at the Prime Meridian (zero degrees longitude, at Greenwich, England). The difference in time in hours, minutes, and seconds can be converted to the distance west from the Prime Meridian in degrees, minutes, and seconds.

The difficulty is knowing the time at the Prime Meridian. The easiest way is to use a chronometer, a clock set to Greenwich time. But chronometers are not perfect time pieces, so an observer must know the chronometer’s “rate of going,” or daily error, and factor that into his calculations. He can calculate this error by observing the time of local noon on successive days and seeing how fast or slow
his chronometer is running on “clock time” relative to true “solar” time. If the chronometer stops (as it did on several occasions for Lewis and Clark), it can be reset.

Distinguishing between local time and mean time was an essential correction in finding longitude. The earth orbits the sun once a year. Because earth’s orbit is an ellipse rather than a true circle, the earth’s distance from the sun varies. So too does its orbital speed, because the earth moves faster when it is closer to the sun and slower when it is farther away. As a result, clock time (as in “12 o’clock”) and sun time (as in solar noon) almost always differ. This difference is also influenced by changes in the sun’s declination (its angle in the sky) over the course of a year. The maximum difference between clock time and solar time is 16 minutes, 24 seconds—meaning that solar noon as measured by the clock can occur as early as 11:43:36 A.M. or as late as 12:16:24 P.M. Solar time is also called apparent time, and in certain calculations it is necessary for a navigator to convert apparent time to mean time. Mean time is time on a clock set to the yearly average time of noon. An adjustment called the “equation of time” [page 16] is used in calculations to determine the clock time of local noon.

The simplest method of getting longitude in Lewis and Clark’s era was to determine the Greenwich time of local noon (that is, when the sun is at its highest point in the sky in the observer’s meridian). The time of local noon was deduced by observing “equal altitudes” of the sun. In this method, two observations are made, one in the morning and the other in the afternoon, when the sun is at the same altitude east and west of the meridian. The times of
both observations are noted, and they are then averaged to arrive at the time of local apparent noon.

Longitude could also be calculated from observations of angular distances between the moon and the sun, planets, or stars and comparing the observed angular distances to angular distances listed in astronomical tables. This was known as the method of lunar distances.

If the moon or planets are observed for a month or more, they appear to change locations against the background field of stars. The moon, for example, takes nearly 30 days to complete its 360-degree orbit around the earth, so every night its location shifts a little more than 12 degrees eastward relative to the stars. Nautical tables [pictured, p. 15] list the angular distance between the moon and various stars for every day of the year at eight different times of the day. By measuring the angle between the moon and a star and noting the time, an observer can then look up the angle in his nautical tables, note the equivalent Greenwich time, and from the difference between the times calculate longitude. Lewis and Clark made many such observations and recorded the relevant data, but they almost never attempted to make the complex calculations, which involved spherical trigonometry. Jefferson expected that a professional mathematician would solve the equations after the expedition’s return.10

Finding longitude by lunar distances required three assistants in addition to the principal observer, although one person could do the necessary work with some error expected. The principal observer measured the angle between the lighted limb of the moon, and the star (or planet or the edge, or limb, of the sun). An assistant measured the altitude of the moon, a second assistant measured the altitude of the star, and the third assistant used a watch to record the times of the observations. All measurements had to be made simultaneously. The observations were repeated, and the means of the observations were calculated to eliminate small errors of observation.11

Lewis and Clark used a version of this method which, by dispensing with the simultaneous altitude measurements, required two people instead of four. (This simplified the observations but complicated the calculations.) Lewis was usually the principal observer, and apparently Clark was usually the timekeeper. This is deduced from Lewis’s entry of February 6, 1805. Lewis made 12 observations of the angular distance between the moon and sun. At the conclusion he wrote, “I do not place much confidence in these observations, as the person who took the time was not much accustomed to the business. Capt. Clark was absent.”

Lewis’s copy of the Nautical Almanac predicted an eclipse of the moon, and he was able to use this celestial event to calculate longitude during the Corps of Discovery’s winter encampment at Fort Mandan, on the upper Missouri. Lewis observed the eclipse in the early morning hours of January 15, 1805. By matching the almanac’s predicted Greenwich times of the eclipse’s phases with his own observed times for them, Lewis derived a longitude for Fort Mandan of 99° 26’ 45” W. Although the actual site of Fort Mandan can’t be documented, one of the currently accepted longitudes is approximately 101° 27’ W. If that is true, then Lewis’s longitude was too far east by more than two degrees, or about 100 miles. Because of clouds that at times obscured his view of the eclipse, Lewis doubted the accuracy of his observation. Recent research by Robert Bergantino shows that Lewis’s observation was good, but his calculations contained errors that threw off his final result.12

The journals describe many astronomical observations to determine latitude and longitude. As mentioned, most of the raw data for longitude was simply recorded, with the understanding that an expert would deal with them after the expedition’s return. In a final report to Jefferson, Lewis listed the latitudes of seven significant locations between Fort Mandan and the Pacific, and one longitude (the mouth of the Columbia).13 [See box, opposite.]

All of Lewis’s calculations were off. There are probably many reasons for this besides poor observing condi-
<table>
<thead>
<tr>
<th>LOCATION</th>
<th>LEWIS’S LATITUDE AND/OR LONGITUDE</th>
<th>ACTUAL LATITUDE OR LONGITUDE¹</th>
<th>DIFFERENCE (to nearest minute) and error in miles²</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fort Mandan (North Dakota)</td>
<td>47° 21’ 47” N</td>
<td>47° 18’ N</td>
<td>+0° 4’ Error: 4.5 miles</td>
</tr>
<tr>
<td>Falls of the Missouri (Black Eagle Falls, Montana)</td>
<td>47° 84’ N³</td>
<td>47° 30’ N</td>
<td>+0° 54’ Error: 62 miles</td>
</tr>
<tr>
<td>Three Forks of the Missouri (Montana)</td>
<td>45° 22’ 34” N</td>
<td>45° 56’ N</td>
<td>-0° 34’ Error: 39 miles</td>
</tr>
<tr>
<td>Head spring of the Missouri (Lemhi Pass)</td>
<td>44° 33’ 22” N</td>
<td>44° 58’ N</td>
<td>-0° 25’ Error: 29 miles</td>
</tr>
<tr>
<td>Travelers Rest (Montana)</td>
<td>46° 48’ 26” N</td>
<td>46° 45’ N</td>
<td>+0° 3’ Error: 3.5 miles</td>
</tr>
<tr>
<td>Mouth of Lewis’s (Snake) River (Washington)</td>
<td>46° 15’ 13” N</td>
<td>46° 12’ N</td>
<td>+0° 7’ Error: 8 miles</td>
</tr>
<tr>
<td>Mouth of the Columbia (Washington/Oregon)</td>
<td>46° 19’ 11” N</td>
<td>Cape Disappointment:⁴ 46° 17’ N</td>
<td>+0° 2’ Error: 2.5 miles</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>+0° 53’ Error: 42 miles</td>
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<tr>
<td></td>
<td></td>
<td></td>
<td>+0° 56’ Error: 45 miles</td>
</tr>
</tbody>
</table>

**NOTES**

¹Because of the uncertainty of expedition sites, current locations are given to the nearest minute.

²One degree of latitude equals 69 miles. Statute miles for longitude vary according to distance from the equator. At 45 degrees north, one degree of longitude equals 49 miles; 46 degrees equals 43.2 miles; 47 degrees equals 37.4 miles.

³This latitude was almost certainly a transcription error on Lewis’s part. The journals reveal that for Lower Portage Camp he calculated latitudes of 47° 8’ 59.5” N on June 19, 1805, and 47° 7’ 10.3” N on June 20.

⁴It is not known from which site Lewis obtained his values. Values here are given for the farthest-west points of land in Washington (Cape Disappointment, north bank of Columbia mouth) and Oregon (Clatsop Spit, south bank).
tions and mistakes in calculation. For example, there was considerable error in the published lunar distance tables. At the time of the Lewis and Clark Expedition, the mean error in the tables for celestial latitude was 13 seconds, with a maximum of 80 seconds. The mean error for celestial longitude was 27 seconds, with a maximum of 87 seconds. Instrument error was another factor. Although the standard error of each instrument was known and included in calculations, they could have been additionally affected by conditions of extreme heat and cold and low humidity; the aridity of the upper plains, for example, could have warped the wooden octant.

The Corps of Discovery, following Jefferson’s orders, did make latitude and longitude measurements at all remarkable points of the river. Considering the instruments and tables that they had to work with, the measurements were remarkably accurate and provided the approximate locations of what Jefferson termed the durable “natural marks & characters” in the lands secured by the Louisiana Purchase and those farther west.

Foundation member Eileen Starr is a professor of science at Valley City State University, in Valley City, North Dakota.

Notes


2 The captains also carried a circumferentor, or surveying compass. Since this is not, strictly speaking, an instrument for celestial navigation, it is not discussed in detail. In conjunction with an observation of the sun with a sextant or octant, a circumferentor can be used to determine magnetic declination, the difference between true and magnetic north, which varies according to one’s location. Lewis and Clark took readings of magnetic declination for their records of courses and distances traveled. Lewis gave a detailed description of his instruments in his journal entry of June 22, 1804. See Gary E. Moulton, ed., The Journals of the Lewis & Clark Expedition (Lincoln: University of Nebraska Press, Vols. 2-11, 1986-97), Vol. 2, pp. 410-14. Quotations or references to journal entries in the ensuing text are from Moulton, Vols. 2-11, by date, unless otherwise indicated.

3 The vernier scale (which Lewis called a nonius) and micrometer, or tangent screw, were attached to the arm. Moulton, Vol. 2, p. 414.

4 Moulton, Vol. 2, p. 412. Lewis referred to it as a “Gold Chronometer. It was made in England and may or may not have been an Arnold’s chronometer, which set the standard of quality for the time. See Guy Meriwether Benson, Exploring the West from Monticello: A Perspective in Maps from Columbus to Lewis and Clark (Charlottesville: University of Virginia Library, 1995), p. 77.

5 Ibid., p. 381.


7 Moulton, Vol 2, p. 87. The Nautical Almanac and Astronomical Ephemeris contained the predicted angular distances between the moon and sun and nine bright zodiacal stars—Alpha Aquilae, Fomalhaut, Alpha Arietis, Aldebaran, Pollux, Regulus, Antares, Spica, and Alpha Pegasi. Only Fomalhaut exceeded the maximum declination of the moon and was selected because there are no other bright stars in that area of the sky. The positions were given daily at eight separate times, every three hours, beginning at noon. Proportional logarithms were given in Maskelyne’s Requisite Tables to calculate the angular separation at times other than those given. The astronomical tables gave values of the position of the moon as viewed from the center of the earth, and values of distances from the center of the moon or sun. A number of tedious spherical trigonometric calculations, termed “clearing the distance” was necessary. Corrections for parallax and the refraction of light were needed, as well as the position of the center of the sun or moon. Both objects change in apparent size, depending on their distance from the earth. The daily semi-diameter of the sun or moon, found in the tables carried by the Corps, was then added to the angular distance measured with a sextant. Different methods were used to clear the distance, and all gave slightly different values for longitude. All calculations of longitude required knowledge of the latitude. See Charles Cotter, A History of Nautical Astronomy (New York: American Elsevier Publishing Co., 1968) p. 239.

8 Another method for finding latitude is to measure the altitude of the North Celestial Pole, which is located near Polaris, the North Star. In the Northern Hemisphere, the higher one’s latitude, the higher the North Star appears in the sky. Lewis doesn’t say so specifically, but he may have used this method for determining latitude while camped at the mouth of the Great Osage River in early June 1804 (Moulton, Vol. 2, p. 269). On successive nights he measured magnetic declination by sighting the circumferentor on Polaris, and it is reasonable to assume that he also took a sextant reading of Polaris’s altitude.

9 In his journal entry for December 3, 1803 (Moulton, Vol. 2, p. 121), Clark went through the steps for calculating latitude at Kaskaskia, Illinois. He did this twice after apparently realizing that his first calculation is based on a faulty measurement of the sun’s altitude (“Sexion [sextant] not right”). The latitude he arrived at—39° 46’ 41” —differs by 1 degree, 25 minutes, 53 seconds from a latitude calculation of 38° 20’ 57” recorded on the same day by Lewis. Because one degree of latitude equals approximately 69 miles, the difference between Clark’s and Lewis’s calculations is about a mile and a half. Clark also detailed his steps when he calculated a latitude on December 18 and 19, 1803.

10 Jackson, p. 62.

11 Cotter, pp. 205-06.

12 Robert Bergantino, “Fort Mandan’s Longitude Revisited,” appears in this issue of WPE.

13 Moulton, Vol. 8, p. 413. The readings were included in an undated letter written from St. Louis in late September of 1806.

We proceeded on. You will take observations of latitude & longitude, at all remarkable points on the river; & especially at the mouths of rivers, at rapids, at islands, & other places & objects distinguished by such natural marks & characters of a durable kind, as that they may with certainty be recognised hereafter.

—Thomas Jefferson to Meriwether Lewis, June 20, 1803

During their expedition to the Pacific and back, Meriwether Lewis and William Clark complied diligently with President Jefferson’s instructions. Between November 1803, about the time they moved into winter quarters at Camp Dubois, north of St. Louis, and January 1805, when they were encamped at Fort Mandan, on the Upper Missouri, they made many observations of the sun for latitude (distance in degrees north of the equator) and the moon for longitude (distance in degrees west of Greenwich, England). They routinely calculated latitude, a fairly straightforward exercise based on the sun’s angular elevation at noon, but deferred the far more complex job of calculating longitude based on the angular distance between the moon and the sun or a star. That was fine by Jefferson, who expected that a professional mathematician, using the captains’ data, would make the calculations for longitude after the expedition’s return.

Once at Fort Mandan, the captains had the time and opportunity to attempt a calculation of longitude based on an eclipse of the moon on the night of January 14-15, 1805. The longitude for the mouth of the Columbia had been plotted by mariners a decade before, and an accurate measurement of longitude at Fort Mandan would tell them how far west they still had to travel to reach the Pacific.

The captains knew of two previous longitude estimates for the vicinity of Fort Mandan. One, from fur trader Alexander Mackenzie’s account of his explorations of Canada, stated that David Thompson, another Canadian fur trader and explorer, had determined “the Northern bend of the Missouri” to be at longitude 101° 25′ W. The other came from John Evans, a fur trader who explored the Missouri between St. Louis and the Mandan villages in 1795-97. Evans’s map of the upper Missouri showed the longitude of some abandoned Mandan villages 12 miles east of Fort Mandan at about 107° W. The difference of nearly 6 degrees between Thompson’s and Evans’s longitudes was significant—about 300 miles—and the captains must have wondered who, if either, was right. They hoped the observation of the lunar eclipse would help provide an answer.

**Shooting the Moon**

Lewis knew of the upcoming eclipse from his copy of the British *Nautical Almanac* and *Astronomical Ephemeris*. The almanac recorded in Greenwich time the key phases
of the eclipse—its beginning, middle, and end as well as the start and finish of total darkness. Lewis knew he could determine Fort Mandan’s longitude providing he could accurately record the local time of any one of the eclipse’s phases.

The method for finding longitude this way is simple in theory. If, by hypothetical example, an observer records a lunar eclipse at precisely 6 P.M. and knows from his copy of the Nautical Almanac that the eclipse occurred at noon Greenwich time, then he knows he is exactly six hours west of Greenwich. Because the earth turns 360 degrees every 24 hours, the passage of time is also a measure of distance. Six hours equals 90 degrees of longitude. Greenwich is at longitude 0°, so the observer is at longitude 90° W.

Lewis knew from the almanac that the eclipse would begin at 6:42 P.M. Greenwich time, which meant that it would start at Fort Mandan sometime around midnight. The thermometer had registered minus 16 degrees at sunrise on January 14, and when Lewis left the fort that night to await the eclipse, the mercury was probably below zero. We can assume he was bundled in his warmest clothes, for he knew the eclipse would last several hours. He had with him a notebook, his chronometer, and the telescopic eyepiece from his sextant, which he knew would allow him, as he later recorded in his journal, “to define the edge of the moon’s image with much more precision that I could have done with the natural eye.” Although the night was partly cloudy, Lewis could see that the full moon rode high in the sky, bathing the plains in soft yellow-gray light. The clouds came and went and “continued to interrupt me throughout the whole observation.” Clouds obscured the moon at the start of the eclipse, and when they thinned, Lewis saw that the earth’s crescent-shaped shadow had already begun to spread across its eastern side.

As the patchy clouds drifted across the moon, the shadow continued to eat away at the yellow disc. Then the moon blinked out, and a few bright stars broke the night’s blackness. Lewis recorded the beginning of total darkness, but the clouds made him doubt the accuracy of his time.

More clouds played across the moon. Lewis waited in the numbing cold. Finally, more than two and a half hours after he had left the warmth of the fort, he saw a point of golden light where only night had been before. As the point grew into an arc, Lewis recorded the end of total darkness. The moon continued to emerge from the earth’s shadow, its color changing from gold to yellow-white. About an hour after the end of total darkness, Lewis, noting that the moon was again a perfect circle, recorded the end of eclipse. The observing conditions had been less than ideal, but he would try to make the best of his data.

ADJUSTING FOR CHRONOMETER ERROR

The eclipse over, Lewis retired to the fort for a few hours’ sleep. But his celestial work wasn’t done, for the next morning he had to determine his chronometer’s error, the difference between the time indicated by his chronometer and local mean time. (Local mean time is the time shown by a perfect timepiece set to the yearly average, or mean, time of noon at the longitude of the observer. The local mean time of noon differs from the time of local apparent noon—the instant the sun is at its highest point in the sky—by up to 16 minutes and 24 seconds.)

Once he knew his chronometer error, Lewis could determine the chronometer’s daily “rate of going,” or the amount of time it was gaining or losing in 24 hours. Knowing the chronometer’s rate of going would allow him to correct the chronometer times he obtained from the eclipse. Finally, he could compare those corrected times to their respective Greenwich times and determine his longitude.

The basic method for obtaining chronometer error was to compare the chronometer times of local apparent noon on different days. To get the time of local apparent noon, Lewis, working with an assistant, made an “equal-altitudes” observation of the sun. The observation was simple but took skill and practice to do with accuracy. In a typical observation, he used his sextant to observe the sun in the forenoon. When the morning sun, ascending in the sky, reached a convenient altitude (say, 40 degrees), the chronometer time was noted. In the afternoon, when the sun, now descending in the sky, reached the same (“equal”) altitude of 40 degrees, the time was again noted. The average of the two times, after applying a correction, was local apparent noon.

Aboard a ship, an observer measures this angular distance by sighting on the horizon and adjusting the sextant’s
Finding longitude by lunar eclipse: Lewis’s journal entries

January 14, 1805

Observed an Eclips of the Moon. I had no other glass to assist me in this observation but a small refracting telescope belonging to my sextant, which however was of considerable service, as it enabled me to define the edge of the moon’s image with much more precision that I could have done with the natural eye. The commencement of the eclips was obscured by clouds, which continued to interrupt me throughout the whole observation; to this cause is also attributable the inaccuracy of the observation of the commencement of total darkness. I do not put much confidence in the observation of the middle of the Eclips, as it is the worst point of the eclips to distinguish with accuracy. The last two observations (i.e.) the end of total darkness, and the end of the eclips, were more satisfactory; they are as accurate as the circumstances under which I laboured would permit me to make them.—

<table>
<thead>
<tr>
<th>Time</th>
<th>h</th>
<th>m</th>
<th>s</th>
</tr>
</thead>
<tbody>
<tr>
<td>Commencement of total darkness</td>
<td>12</td>
<td>28</td>
<td>5</td>
</tr>
<tr>
<td>Middle of the Eclips</td>
<td>12</td>
<td>57</td>
<td>24</td>
</tr>
<tr>
<td>End of total darkness</td>
<td>13</td>
<td>41</td>
<td>30</td>
</tr>
<tr>
<td>End of the eclips</td>
<td>14</td>
<td>39</td>
<td>10</td>
</tr>
</tbody>
</table>

January 15, 1805

Observed equal Altitudes of the ☉ with sextant and Glass artificial horizon adjusted with a spirit level

<table>
<thead>
<tr>
<th>Time</th>
<th>h</th>
<th>m</th>
<th>s</th>
</tr>
</thead>
<tbody>
<tr>
<td>A.M.</td>
<td>8</td>
<td>26</td>
<td>32</td>
</tr>
<tr>
<td>”</td>
<td>29</td>
<td>14</td>
<td></td>
</tr>
<tr>
<td>”</td>
<td>32</td>
<td>01</td>
<td></td>
</tr>
<tr>
<td>P.M.</td>
<td>1</td>
<td>49</td>
<td>46</td>
</tr>
</tbody>
</table>

Altitude given by sextant at the time of obtn. 26’ 6 15”

<table>
<thead>
<tr>
<th>Time</th>
<th>h</th>
<th>m</th>
<th>s</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chronomerter too slow on mean time</td>
<td>1</td>
<td>1</td>
<td>57</td>
</tr>
</tbody>
</table>

Chronometer’s daily rate of going, as deduced from this observation and that of the 22nd of December 1804 is too slow on mean time s 55.8

The accuracy of this observation may be depended on.

Longitude of Fort Mandan as deduced from the observation of the end of total darkness when the eclips of the moon took place the 14th of January Astronocl. 1805

<table>
<thead>
<tr>
<th>Time</th>
<th>h</th>
<th>m</th>
<th>s</th>
</tr>
</thead>
<tbody>
<tr>
<td>W. from Greenwich</td>
<td>6</td>
<td>37</td>
<td>31.2</td>
</tr>
<tr>
<td></td>
<td>99° 22’ 45.3”**</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Longitude of Fort Mandan as deduced from the end of the same eclips

<table>
<thead>
<tr>
<th>Time</th>
<th>h</th>
<th>m</th>
<th>s</th>
</tr>
</thead>
<tbody>
<tr>
<td>99° 22’ 48” W.</td>
<td>6</td>
<td>37</td>
<td>47</td>
</tr>
</tbody>
</table>

Lewis should have derived a longitude of 99° 22’ 48” W.

Footnotes:

* The three readings, top to bottom, represent the sun’s lower limb (l.l.), center (c.), and upper limb (u.l.).

** Lewis should have derived a longitude of 99° 22’ 48” W.
movable index arm until the sun’s image (reflected off the index mirror, which is fixed to the index arm) aligns with the horizon on a half-mirrored horizon glass. The base of the index arm moves along a calibrated arc that allows the observer to read the number of degrees between the horizon and the sun.

Because—unlike at sea—the skyline on land is not a true horizon, Lewis measured angular distance using an artificial horizon. This is a reflecting surface that is parallel to the real horizon. The observer aims the sextant at the image of the sun reflected off the artificial horizon. He then adjusts the index arm until the two images of the sun—the one reflecting off the artificial horizon and the other off the index mirror—converge on the horizon glass. Because the angle measured is twice the sun’s angular distance from the horizon, to obtain the sun’s altitude the angle must be divided by two.

The expedition carried several types of artificial horizons. The preferred device used water as the reflecting surface; the temperature on the morning of January 15 was well below freezing, however, so this wasn’t an option. Instead, Lewis used a mirror, fitted with three adjustable legs, that could be leveled with a bubble level.

Lewis set up the artificial horizon and began the observation. This involved shooting the sun’s upper limb, center, and lower limb at a fixed angle as the sun climbed in the sky and marking the time of each. If he got three good readings they would be averaged to “smooth” the observation. Taking three readings also ensured that if clouds spoiled even two of the afternoon’s three shoots, he would still have one set of readings to compare.

With the sextant, Lewis first aligned the two images of the sun by their upper limbs and called “Mark!,” and the assistant at the chronometer recorded the time. Lewis locked the sextant at the angle of observation and, squinting through the eyepiece, waited for the two images of the sun’s disk to align at their centers. When they did so the time was again marked. Lewis and his assistant followed the same procedure to get a reading for the sun’s lower limb. These three chronometer times and the initial angle of observation were all he needed for the forenoon part of the observation.

By early afternoon the sky was clouding up, but the sun remained visible much of the time. As the sun descended toward the approximate altitude of the morning observation, Lewis commenced the afternoon observation. The clouds kept him from shooting the sun’s lower limb and center, but they opened up enough for him to get a fix on the upper limb. Lewis could see the disk indistinctly, but he made a best guess when he thought the limbs aligned and called for a mark.

Lewis had little confidence in either the forenoon or afternoon observation. He doubted his ability to level the mirror of his artificial horizon. To make matters worse, he had to level the mirror twice—one for the morning observation and again for the afternoon observation—and there was no guarantee that he had set it up each time in the identical way.9

Despite his doubts, Lewis proceeded to calculate chronometer error. First he determined that the chronometer at noon had been 1 hour, 1 minute, 57.7 seconds slow on local mean time.10 Then he took a chronometer error on local mean time that he had calculated for noon of December 22 and subtracted it from the error he had just calculated for January 15. Dividing the result by the num-

The **Nautical Almanac** predicted an eclipse of the moon on January 14, 1805. It occurred at Fort Mandan in the early hours of the 15th.
The actual longitude of Fort Mandan, as best as can be determined from historical maps and detailed reconstructions of the expedition's courses and distances, was 101° 16' 24" W. The average of Lewis's two longitudes, 99° 24' 45" W, places Fort Mandan almost 1° 52'—about 87 miles—too far east. By contrast, the longitude derived by David Thompson for the abandoned Mandan villages 12 miles east of Fort Mandan was 101° 14' 24" W—an error placing them only about 13 minutes west (a little more than 10 miles) of their actual longitude.

There are several reasons Lewis was so far off the mark. For starters, he obtained his longitudes from an eclipse of the moon, a method that is relatively straightforward but limited in accuracy. Thompson, on the other hand, obtained his longitude from several sets of lunar distances (measurements of the angle between the moon and the sun or a star), a method that is relatively complex but capable of yielding fairly accurate results. The problem with the lunar-eclipse method is that the earth's shadow as it crosses the moon is fuzzy at the edges, and it moves very slowly. This makes it difficult to determine precisely the beginning and end of eclipse and of total darkness. For this reason, almanac times for a lunar eclipse were given only to the nearest minute or fraction thereof, while lunar distance times were given to the nearest second.

But there's a more elementary reason for the inaccuracy of Lewis's longitude: he messed up his calculations. Lewis failed to note or remember that the almanac gave the time of astronomical events in Greenwich apparent time, not Greenwich mean time. Thus, he mistakenly compared his local mean times for the end of total darkness and end of eclipse with their respective Greenwich apparent times.

Lewis was right in comparing his chronometer to local mean time to determine its error, but he should have converted the corrected chronometer times to local apparent time. (He could also have converted the Greenwich apparent times to Greenwich mean times.) The difference between Greenwich apparent time and Greenwich mean time during the latter part of the eclipse was 9 minutes 47 seconds—equivalent to 2° 26'45" of longitude! If Lewis hadn't been confused about this, his two longitude calculations would have yielded 101° 49' 33" W and 101° 53' 30" W.

Lewis also made several mistakes in determining his chronometer's error on mean time. Most of these mistakes, however, had little effect on the value that he derived for the chronometer's daily error, or rate of going, because he rejected his equal-altitudes observations for January 15 and 20 and used the chronometer error on mean time from the observations of December 22 and January 28. By not plotting all the chronometer's errors on mean time, however, Lewis failed to see that the chronometer's daily rate of going had changed appreciably between the period of December 22 to January 15 and the period of January 15 to 28. By using a daily rate of going derived only from the observations of December 22 and January 28 instead of the daily rate of going balanced from all the observations, and by making a small miscalculation in projecting that daily error from either December 22 or January 28 to the time of the eclipse, Lewis's “corrected” times for the end of total darkness and end of eclipse are about 1 minute 45 seconds too slow. His error in projecting the daily rate of going to the time of eclipse is equivalent to moving his longitude about 26 minutes (about 21½ miles) west.

As noted, the net effect of Lewis's errors puts his averaged longitude for Fort Mandan 87 miles too far east. Lewis felt that the only reliable times that he had obtained for the eclipse were for the end of total darkness and end of eclipse; in this he was correct. But when his chronometer times are adjusted to local mean times, then subtracted from their respective Greenwich mean times, they yield an average longitude for Fort Mandan of 101° 30' W. This is some 13½ minutes—about 10½ miles—west of the actual longitude. For a longitude derived from a lunar eclipse, especially under such difficult observing conditions, this
We Proceeded On November 2001 is pretty good. Lewis did all right on that cold night at Fort Mandan. If only his math had been better.14

Robert N. Bergantino lives in Butte, Montana, where he is a hydrologist and cartographer for the Montana Bureau of Mines and Geology. A long-time member of the Foundation, he was honored in 1992 with its Appreciation Award and in 1998 with its Distinguished Service Award.

### Notes


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**Calculations for the Total Eclipse of the Moon, January 14-15, 1805**

<table>
<thead>
<tr>
<th>Greenwich</th>
<th>Equation of Greenwich Time</th>
<th>Fort Mandan</th>
<th>Chronometer Corrected*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Astronomical of Apparent Time</td>
<td>Mean Time</td>
<td>Fort Mandan Chronometer Time, Civil Chrono Time</td>
<td></td>
</tr>
<tr>
<td>January 14</td>
<td>(+)</td>
<td>January 15</td>
<td></td>
</tr>
<tr>
<td>Midnight</td>
<td>12h 00m 00s</td>
<td>09m 39.0s</td>
<td>00h 09m 39.0s</td>
</tr>
<tr>
<td>Beginning of the Eclipse</td>
<td>18h 42m</td>
<td>09m 45.0s</td>
<td>06h 52m</td>
</tr>
<tr>
<td>Beginning of Total Darkness</td>
<td>19h 40m</td>
<td>09m 45.8s</td>
<td>07h 50m</td>
</tr>
<tr>
<td>Middle of the Eclipse</td>
<td>20h 29½m</td>
<td>09m 46.4s</td>
<td>08h 39½m</td>
</tr>
<tr>
<td>End of Total Darkness</td>
<td>21h 19m</td>
<td>09m 47.3s</td>
<td>09h 29m</td>
</tr>
<tr>
<td>End of the Eclipse</td>
<td>22h 17m</td>
<td>09m 48.2s</td>
<td>10h 27m</td>
</tr>
<tr>
<td>Noon</td>
<td>24h 00m 00s</td>
<td>09m 49.7s</td>
<td>12h 09m 49.7s</td>
</tr>
</tbody>
</table>

Fort Mandan Chrono Time, Astronomical Time, Civil Chrono Time January 14 January 15 January 15

| | | | 
|---|---|---|---|
| | 12h 00m 00s | 00h 00m 00s | 01h 01m 29.2s |
| | 12h 28m 05s | 00h 28m 05s | 01h 30m |
| | 12h 57m 24s | 00h 57m 24s | 01h 59m |
| | 13h 41m 30s | 01h 41m 30s | 02h 43m |
| | 14h 39m 10s | 02h 39m 10s | 03h 41m |
| | 24h 00m 00s | 12h 00m 00s | 13h 01m 51.1s |

Greenwich Civil Mean Time 15 January 15 January 15

| | | | 
|---|---|---|---|
| | 07h 50m | 01h 30m | 95° 00′ |
| | 08h 39½m | 01h 59m | 100° 07′/ˌ |
| | 09h 29 | 02h 43m | 101° 30′ |
| | 10h 27m | 03h 41m | 101° 30′ |

Longitude from End of Total Darkness and End of Eclipse

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>101° 16½′ W</td>
<td>101° 30′ W</td>
</tr>
</tbody>
</table>

The Nautical Almanac and Astronomical Ephemeris for the Year 1805 gives the Greenwich apparent times for phases of the eclipse only to the nearest minute or fraction thereof; therefore, the equivalent Fort Mandan corrected times shown here rounded to that same degree of accuracy. The longitude derived from Lewis’s observation of the eclipse actually should be written 101° 30′ ± 7 ½′ W, because, mathematically, the result cannot be more accurate than that. This is because the times for the elements of the eclipse are given only to the nearest half second, and this converts to 7 ½′ of longitude. Therefore the longitude derived can only be said to lie somewhere between 101° 22½′ and 101° 37½′ W.

* The times listed under “Fort Mandan Corrected Chrono(meter) Time” for the phases of the eclipse were determined from a statistical procedure (called a least-squares fit) that allows one to find the best-fitting straight line through a series of data points. This line (which was fit through the chronometer’s error on mean time for the equal altitudes observations of January 15, 20, and 28) had a slope of -42.68s per day. In other words: the chronometer was losing 42.68 seconds per day. The correlation factor for this fit is 0.9999, with 1.0000 being a perfect fit.

** At 47° 16′ 54″ latitude, an arc of 13½′ of longitude equals 10.6 miles.
Between November 20, 1803, and January 13, 1805, the captains made more than 70 meridian solar observations at 52 places (for latitude) and more than 20 lunar observations at 16 places (for longitude). They calculated most of their meridian solar observations but made no calculations of longitude from their lunar observations. Lewis's first recorded attempt at a celestial observation (equal altitudes) was at Fort Massac, on November 15, 1803. His first successful observation (also equal altitudes) was on November 16 at the mouth of the Ohio. Clark moved into Camp Dubois on December 12.

While en route to Fort Mandan they twice calculated longitude using other, simpler methods—at St. Charles, Missouri, on May 18, and at Fish Camp (also known as White Catfish Camp), near present Homer, Nebraska, which the explorers reached on August 17. They estimated the longitude at St. Charles by means of the difference in “adjusted” chronometer time between the two places to determine their distance from Camp Dubois, whose longitude they knew.

The longitude at Fish Camp was almost certainly based on dead reckoning—that is, using daily records of the courses and distances traveled to extrapolate from a point of known longitude (in this case, Camp Dubois). Clark placed Fish Camp’s longitude at 99° 45’ 00” W. The captains carried copies of several maps made by fur trader John Evans about five years before. Evans showed Fort Charles, the site of a trading post he established a few miles east of the future Fish Camp, at longitude 100° 10’ W, so we know Clark could not have based his longitude on Evans’s. The author’s calculations show the longitude of Fort Charles at 96° 00’ 23” W and the longitude of Fish Camp at 96° 23’ 54” W. At the approximate latitude of Fish Camp (42° N), one minute of longitude equals 0.858 mile, so Clark placed it too far west by about 172 miles.

For more on the location of Fish Camp, see Gary E. Moulton, ed., The Journals of the Lewis & Clark Expedition, 12 volumes, (Lincoln: University of Nebraska Press, 1984-99), Vol. 2, p. 488n. Moulton, citing Map 27 of the Missouri River Commission, gives the longitude of Fish Camp as 96° 25’ W. See also Martin Plamondon, Lewis and Clark Trail Maps: A Cartographic Reconstruction, Vol. 1 (Pullman: University of Washington Press, 2000), Map 78, p. 102, which appears to locate Fish Camp at 96° 25’ 54” W. The Missouri River in this area is subject to intense meandering, and parts of Lewis and Clark’s water route between Omaha, Nebraska, and Sioux City, Iowa, are now as much as seven miles from the current river levees.

At least one of the maps carried by Lewis and Clark showed the mouth of the Columbia at approximately 123° 55’ W, which is seven minutes east of its actual position of about 124° 02’ W as measured midway between the tip of Cape Disappointment and the tip of Clatsop Spit. See Moulton, Vol. 1 (Atlas), map 32a. This was British mariner George Vancouver’s reading of 1792, which Lewis mentions in a letter of May 29, 1823, to Jefferson. See Donald Jackson, Letters of the Lewis and Clark Expedition with Related Documents, 1783-1854, 2 vols. (Urbana: University of Illinois Press, 1978), Vol. 1, p. 53.

Arlin J. Large, “Fort Mandan’s Dancing Longitude,” We Proceeded On, February 1987, p. 14. Large cites Alexander Mackenzie, Voyages from Montreal on the River St. Laurence through the Continent of North America to the Frozen and Pacific Oceans (Rutland, Vt.: Charles E. Tuttle Co., 1971 reprint of original 1801 edition), p. lvii. As Large points out, Thompson, an exceptionally skilled navigator, had taken the position of the Mandan villages at Knife River (located across the Missouri from Fort Mandan and about 3 miles west, or upstream) in January 1798 and had fixed them at latitude 47° 17’ 22” N and longitude 101° 14’ 24” W. But the captains were unaware of these coordinates, which were not published until after the return of the Lewis and Clark Expedition, so they went by the longitude of 101° 25’ supplied by Mackenzie. See also Guy Meriwether Benson, Exploring the West from Monticello: A Perspective in Maps from Columbus to Lewis and Clark (Charlottesville: University of Virginia Library, 1995), pp. 64-5.


Evans’s map did not explicitly state the longitude of the Mandan villages, but it could be inferred. It showed the villages to be 17° 33’ west of St. Louis and 7° 23’ west of Fort Charles, a trading post farther downriver (footnote 2). Lewis knew the approximate longitudes of St. Louis and Fort Charles and from them could extrapolate the longitude of the Mandan villages.

This was an indirect method of finding local apparent noon. In principle, it is possible to obtain local apparent noon directly by observing the sun and recording when it reaches its zenith, but as a practical matter the equal-altitudes method is better. It is easier to get precise readings when the sun is going up and down earlier and later in the day because its apparent motion then is much faster than at noon. The readings are then averaged to find the clock time of local apparent noon.

Moulton, Vol. 3, p. 273. All quotations or references to journal entries in the ensuing text are from Moulton, Vol. 3, by date, unless otherwise indicated. The temperature is from the captains’ weather log (Moulton, pp. 281-82).

Lewis’s equal-altitudes observation of January 15, in fact, was fairly reliable. The chronometer error recalculated from Lewis’s observation that day is 1 hour, 1 minute, 57.3 seconds slow; the error determined by the least-squares fit of chronometer errors between January 15 and 28 is 1 hour, 2 minutes, 1.6 seconds slow. Also, the times that the sun should have been at the altitude observed by Lewis can be computed from sun elements contained in the 1805 almanac and from the known coordinates of Fort Mandan; from these we can determine that Lewis’s chronometer error at noon on the 15th was 1 hour, 1 minute, 59.5 seconds slow. For more detail, see calculation tables, below.

Lewis left no record of how he obtained chronometer error, but it was an exercise he did a number of times over the course of the expedition. Sometimes the chronometer error he derived and ones the author has calculated using Lewis’s data are very close, but at other times they differ significantly. However he actually did it, he should have followed this sequence: (1) average the average times of the forenoon and the afternoon observations to find the averages of both; (2) subtract the averaged time of the forenoon observation from the averaged time of the afternoon observation to obtain the elapsed time between ob-
servations; (3) apply a correction to the midtime for the change in declination that occurred during the elapsed time; (4) subtract the corrected midtime from 12 hours 00 minutes 00 seconds to find the error on local apparent time; (5) correct the equation of time (the difference between apparent time and mean time) for his approximate longitude; (6) add the corrected equation of time to the chronometer time of local apparent noon to determine the chronometer time of local mean noon; and (7) subtract the corrected chronometer midtime from the local mean time of noon to find the chronometer error on local mean time.

Note on Step 3: The correction for change in declination is an essential part of the calculations because the sun’s declination is changing constantly except at the solstices; this change can increase or decrease the length of an equal-altitudes observation by more than 30 seconds, depending upon the observer’s latitude, the length of time between the forenoon and afternoon observations, and the rate of declination change. During the interval of 5 hours and 23 minutes between the forenoon and afternoon observations on January 15, the sun’s declination became more northerly by 2° 31′, adding 22 seconds to the time of observation. These extra 21 seconds were not chronometer error, and half that amount had to be subtracted from the midtime of the observation.

Note on Step 5: The equation of time at local apparent noon is an essential part of the calculations because the sun’s declination is changing constantly except at the solstices; this change can increase or decrease the length of an equal-altitudes observation by more than 30 seconds, depending upon the observer’s latitude, the length of time between the forenoon and afternoon observations, and the rate of declination change. During the interval of 5 hours and 23 minutes between the forenoon and afternoon observations on January 15, the sun’s declination became more northerly by 2° 31′, adding 22 seconds to the time of observation. These extra 21 seconds were not chronometer error, and half that amount had to be subtracted from the midtime of the observation.

Lewis’s equal-altitudes observation of the 20th was also good. He probably rejected it because the chronometer error didn’t seem to fit. It didn’t fit because Lewis’s math was bad, not his observation.

If Lewis had correctly calculated the chronometer error on mean time for January 20, plotted the chronometer error on mean time for all observations between December 22 and 28 January 28 (to evaluate their trend), then derived a daily rate of going for his chronometer that best fit the errors, he would have found that his chronometer was losing about 42.7 seconds per day at the time of the eclipse, not 51.2 seconds. Then, if he had used the daily rate of going of -42.7 seconds per day, he should have derived an adjusted time of 2 hour 43 minutes 15 seconds for the end of total darkness and 3 hours 40 minutes 57 seconds for end of eclipse.

At the latitude of Fort Mandan, 1 degree (60 seconds) of longitude equals about 47 statute miles.

It is interesting to note that Fort Mandan is shown at about 101° W longitude on the Lewis and Clark map of 1805 and at about 100° 45′ W on Clark’s post-expeditionary maps. Why was Fort Mandan placed at different longitudes on the two maps? It’s possible that Clark mistrusted Lewis’s longitude, yet didn’t want to accept David Thompson’s. The longitudes shown on the expedition’s maps are not an average of Thompson’s and Lewis’s but are much closer to that obtained by Thompson. It’s also interesting that Jefferson never had one of his mathematician friends make this easy computation or check Lewis’s results. For more on this, see Large, p. 16.

| CHRONOMETER SLOW ON LOCAL MEAN TIME, DECEMBER 22, 1804 - JANUARY 28, 1805 |
|---|---|---|---|---|
| 22 Dec 0h 39m 37.6s | 0h 39m 44.1s | 0h 44m 57.1s | 0h 45m 38.8s | 0h 40m 10.6s |
| 15 Jan 1h 01m 57.7s | 1h 01m 57.3s | 1h 02m 01.6s | 1h 02m 14.5s | 1h 00m 57.2s |
| 20 Jan 1h 15m 20.3s | 1h 05m 41.9s | 1h 05m 35.0s | 1h 05m 41.9s | 1h 05m 16.9s |
| 28 Jan 1h 11m 12.2s | 1h 11m 13.8s | 1h 11m 16.5s | 1h 11m 13.8s | 1h 12m 12.4s |

| CHRONOMETER’S DAILY LOSS ON LOCAL MEAN TIME, DECEMBER 22, 1804 - JANUARY 28, 1805 |
|---|---|
| 0h 00m 55.5s average of observations on December 22 and January 15. |
| 0h 00m 51.07s average of observations on December 22 and January 28, only. |
| 0h 00m 42.68s least-squares fit of observations on January 15, 20, and 28. |

| COMPARISON OF LONGITUDES DERIVED AT DIFFERENT RATES OF GOING |
|---|---|---|
| End of Total Darkness (top), End of Eclipse (bottom) |
| Lewis at 51.2s/day | Actual at 51.2s/day | Actual at 42.7s/day |
| GMT LMT LON GMT LMT LON GMT LMT LON |
| (9h29m-2h41m29s) x 15 = 101° 53′ (9h29m-2h41m17s) x15 = 101° 56′ (9h29m-2h43m15s) x 15 = 101° 26′ |
| (10h27m-3h39m13s) x 15=101° 57′ (10h27m-3h38m59s) x15 =102° 00′ (10h27m-3h40m57s) x 15 = 101° 31′ |
In “Fort Mandan’s Dancing Longitude,” an article published in the February 1987 WPO, Arlen J. Large examined the longitude values computed by Lewis and Clark during their winter encampment of 1804-05. Little has been written about the values they recorded for latitude at this location, perhaps because (unlike their findings for longitude) they were within four to six miles of the probable site of Fort Mandan. But as Large points out, Lewis and Clark “were men who prided themselves on getting the details right,” and we now know that their coordinates for latitude would have been even closer to the mark if Lewis hadn’t made a systematic error in computing them.

Latitude is an east-west line on the globe whose location is measured in degrees, minutes, and seconds north or south from the equator. Longitude is a north-south line whose location is measured east or west from Greenwich, England. A particular location’s geographical coordinates are where its lines of latitude and longitude intersect. Unlike longitude, latitude is fairly easy to derive.

It is typically computed from a reading of the sun’s meridian altitude—that is, the angle between the horizon and the sun at its highest point in the sky. This method had been known for centuries, and well before Lewis and Clark’s day it had become the mariner’s standard way of determining latitude. Lewis made a meridian observation of the sun on November 11, 1804, nine days after he and Clark had selected the site for Fort Mandan. His journal entry for that day records that from the observation he deduced a latitude of 47° 21’ 32.8” N.

The major difference between a celestial measurement at sea and one on land is that the sea has a true horizon and land does not. A land-based navigator, therefore, must use an artificial horizon. Lewis and Clark carried several types of artificial horizons and used them routinely.

Whether an altitude is taken from a real or artificial horizon, several corrections must be made to the reading before latitude can be computed. One key correction concerns the zero reading of the sextant. Lewis and Clark called this...
We proceeded on November 2001.

The index error, or I.E. (in modern terminology it is known as the index correction, or I.C.). The sextant used by Lewis had an index error of minus 8 minutes, 45 seconds. This meant that the actual angle from the horizon of an observed celestial body was 8 minutes and 45 seconds less than indicated on his sextant’s graduated arc. Lewis would have factored index error into all his calculations.

Lewis’s determination of Fort Mandan’s latitude was based on an altitude measurement of the sun’s upper limb. His journal entry for November 11, 1804, states that from this measurement he “deduced” a latitude of 47° 21’ 32.8” N, but he gives no details of how he accomplished this. However, the authors were able to reconstruct his calculations. Lewis’s steps are outlined in the first part of the accompanying table (opposite).

Lewis recorded his raw meridian altitude as 51 degrees, 4 minutes, 52 seconds. An observer shooting the sun with a sextant and artificial horizon sees, one on top of another, two images—the sun itself and its reflection [illustration, p. 27]. The measured angle must be divided by two. When Lewis did this he arrived at a value of 25 degrees, 32 minutes, 26 seconds. He then subtracted the index error of 8 minutes, 45 seconds, giving him an angle of 25 degrees, 23 minutes, 41 seconds.

Continuing his calculations, Lewis next had to take into account three variables. One was refraction. This is the bending of light by the atmosphere, which causes celestial objects to appear higher in the sky than they really are. Another was disc size. Because the earth’s orbit around the sun is slightly elliptical, the distance between the two bodies varies over the course of the year, which in turn affects the apparent diameter of the sun’s disc. The third variable was parallax. This is the change in a viewer’s perspective of an object from the surface, rather than at the center, of the earth. Lewis used data from two navigational aids, the Nautical Almanac and Tables Requisite, to correct for these variables. These corrections gave him a true solar altitude of 25 degrees, 5 minutes, 36.1 seconds.

To complete his calculations, Lewis would have followed standard procedure for so-called “latitude reduction” from a solar altitude. This involves subtracting the solar altitude from 90 degrees, then adding or subtracting correction figures for the sun’s declination. The latitude derived, 47° 21’ 30.4” N, is within 2.4 seconds of Lewis’s 47° 21’ 32.8” N. Lewis’s latitude is a little more than 5.4 statute miles from our estimate of the probable location of Fort Mandan. That estimate—47° 16’ 50.0” N—is an average of the latitude estimates of three authorities on the subject.4

Lewis’s mistake.

In the initial steps shown in the accompanying table, Lewis recorded a measured angle of 51 degrees, 4 minutes, 52 seconds. Because the angle was shot using an artificial horizon, he divided it by two, then subtracted the index error. His mistake was in the sequence of steps—if using an artificial horizon, one must subtract the index error from the measured angle before dividing the angle by two. In the section headed “Revised initial steps (what Lewis should have done),” we have correctly reordered the se-
We then followed standard procedures to arrive at the latitude value of 47° 17' 07.5". This is only .33 statute miles from our estimate of Fort Mandan's location.

Lewis also shot a meridian altitude at Fort Mandan on January 26. By following the same procedures as we did for the November 11 shot, we arrived at a latitude just under .5 statute miles from the fort’s. Taken together, the accuracy of these two latitudes is remarkable and proof of Lewis's skill with a sextant.

So why did Lewis make such a seemingly simple error in his latitude calculations? One reason may have been the abbreviated period he had to train with Andrew Ellicott, the nation's leading surveyor. He and mathematician Robert Patterson were Lewis's chief instructor in

Re-creating Lewis’s Fort Mandan latitude for November 11, 1804

<table>
<thead>
<tr>
<th>ITEM</th>
<th>VALUE</th>
<th>COMMENTS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Initial steps (what Lewis did):</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Measured angle</td>
<td>51° 04’ 52.0&quot;</td>
<td>Meridian altitude, sun’s upper limb</td>
</tr>
<tr>
<td>Measured angle / 2</td>
<td>25° 32’ 26.0&quot;</td>
<td>Measured angle divided by 2</td>
</tr>
<tr>
<td>Index error</td>
<td>- 8’ 45.0&quot;</td>
<td>Correction for index error</td>
</tr>
<tr>
<td>Apparent angle</td>
<td>25° 23’ 41.0&quot;</td>
<td></td>
</tr>
<tr>
<td>Refraction (negative)</td>
<td>- 1° 59.6&quot;</td>
<td>Correction from Table I, Tables Requisite⁴</td>
</tr>
<tr>
<td>Sun’s semi-diameter (negative)</td>
<td>- 16’ 13.3&quot;</td>
<td>From Nautical Almanac for November 11, 1804²</td>
</tr>
<tr>
<td>Parallax in sun’s altitude (positive)</td>
<td>08.8&quot;</td>
<td>Correction from Table III, Tables Requisite ³</td>
</tr>
<tr>
<td>Observed angle</td>
<td>25° 05’ 36.1&quot;</td>
<td>Sun’s true altitude</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Final steps (what Lewis did):</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Observed angle</td>
<td>89° 59’ 60.0&quot;</td>
<td>Equals 90°</td>
</tr>
<tr>
<td>zenith distance</td>
<td>64° 54’ 23.9&quot;</td>
<td>Subtract sun’s true altitude</td>
</tr>
<tr>
<td>Sun’s declination (November 11)</td>
<td>- 17° 28’ 16.0&quot;</td>
<td>Subtract for south declination per Nautical Almanac.</td>
</tr>
<tr>
<td>Sun’s declination (additional)</td>
<td>- 04° 37.5&quot;</td>
<td>Subtract declination increment for longitude 101° 25’ W.³</td>
</tr>
<tr>
<td>Latitude (north)</td>
<td>47° 21’ 30.4&quot;</td>
<td>Deduced from this observation</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Revised initial steps (what Lewis should have done):</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Measured angle</td>
<td>51° 04’ 52.0&quot;</td>
<td>Meridian altitude, sun’s upper limb</td>
</tr>
<tr>
<td>Index error (negative)</td>
<td>- 8’ 45.0&quot;</td>
<td>Correction for index error</td>
</tr>
<tr>
<td>True measured angle</td>
<td>50° 56’07.0&quot;</td>
<td></td>
</tr>
<tr>
<td>True measured angle / 2</td>
<td>25° 28’ 03.5&quot;</td>
<td>Equals apparent angle</td>
</tr>
<tr>
<td>Refraction (negative)</td>
<td>- 1° 59.2&quot;</td>
<td>Correction from Table I, Tables Requisite⁴</td>
</tr>
<tr>
<td>Sun’s semi-diameter (negative)</td>
<td>- 16’ 13.3&quot;</td>
<td>From Nautical Almanac for November 11, 1804²</td>
</tr>
<tr>
<td>Parallax in sun’s altitude (positive)</td>
<td>08.8&quot;</td>
<td>Correction from Table III, Tables Requisite ³</td>
</tr>
<tr>
<td>Observed angle</td>
<td>25° 09’ 59.0&quot;</td>
<td>Sun’s true altitude</td>
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<td>Deduced from this observation</td>
</tr>
</tbody>
</table>

Notes

⁴Nevil Maskelyn, Tables requisite to be used with the Nautical Ephemeris, for finding the latitude and longitude at sea, published by the Commissioners of Longitude, 3rd ed., 1802. Lewis and Clark carried some edition of this work. This edition was the most recently published prior to their departure.

⁵Arlen J. Large, “Fort Mandan’s Dancing Longitude,” We Proceeded On, February 1987, p. 15.
celestial navigation. It’s possible to imagine either Ellicott or Patterson telling him, “The computation of an artificial horizon sight is the same as for a regular, natural-horizon sight, except for dividing the measured angle by two,” without emphasizing the necessity of starting the divide-by-two and sight-reduction process after application of the index-error correction.

Why, then, didn’t this discrepancy show up during the practice reductions that Lewis must have done under Ellicott’s tutelage? At the time, Lewis had yet to acquire the sextant he took on the expedition, so he would have practiced using his instructor’s instrument. Ellicott’s journals reveal that his sextant typically had little or no index error, so it is possible that Lewis didn’t need to enter a correction during his practice reductions. Another reason may lie with the navigational references Lewis carried on the expedition. They were for marine navigation—that is, navigation at sea, where a natural horizon obviates any need for an artificial one. None of the references treated artificial horizons, and the sight-reduction examples in Lewis’s copy of Tables Requisite did not even show the step for index-error correction.10

Whatever the reason for it, Lewis’s procedural error in no way detracts from his navigational achievements under difficult field conditions and the care both he and Clark took in recording data. The fact that their positions for both latitude and longitude can be accurately reconstructed from journal entries is yet one more tribute to them. They got (almost) all the details right.11

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NOTES


3Gary E. Moulton, ed., The Journals of the Lewis and Clark Expedition, Vol. 3 (Lincoln: University of Nebraska Press, 1987), p. 233. All quotations or references to journal entries in the ensuing text are from Moulton, by date, unless otherwise indicated.

4Lewis shot the sun at what he called “Point of Observation No. 51.” He was vague about its location relative to Fort Mandan itself, but it must have been close. The authors’ estimated latitude of 47°16’50.0” N is an average of latitude values attributed to (a) Robert Bergantino, as discussed in Richard S. Preston, “The Accuracy of the Astronomical Observations of Lewis and Clark,” Proceedings of the American Philosophical Society, Vol. 144, No. 2, pp. 168-191; (b) Mike Scholl of the North Dakota Lewis and Clark Bicentennial Foundation, private communication; and (c) Martin Plamondon II, Lewis and Clark Trail Maps: A Cartographic Reconstruction, Vol. 1, Map 151, p. 175.


6Lewis, making the same mistake in sequence as he did on November 11, arrived at a deduced latitude of 47°21’47” N. His measured angle was 51 degrees, 4 minutes, 52 seconds.

7Lewis shot one other meridian altitude at Fort Mandan, on January 13, but his measured angle of 43 degrees, 18 minutes, 30 seconds utilized a less accurate type of artificial horizon, and we did not compute it. In his observations of November 11 and January 26, Lewis employed an artificial horizon that was essentially a shallow tray filled with water, an inherently self-leveling medium. This was the artificial horizon Lewis preferred, but he could only use it if the temperature was above freezing. On January 13 the temperature was below freezing, forcing him to use a glass horizon leveled with a bubble device similar to a carpenter’s level. In his journal entry for November 11, Lewis does not specifically state the type of artificial horizon he used, but according to his weather diary (Moulton, p. 248) the temperature at sunrise that day was 28 degrees, and it must have been above freezing by the time he set up for his observation.

8Stephen E. Ambrose, Undaunted Courage (New York: Simon & Schuster, 1996), pp. 86-87. Lewis arrived in Lancaster, Pennsylvania, where Ellicott lived, on April 19, 1803, and he was ready to depart by May 7. During his two weeks there he was busy equipping and provisioning the expedition in addition to learning what he could from Ellicott.


10Donald D. Jackson, “Some Books Carried by Lewis and Clark,” Missouri Historical Society Bulletin, Vol. XVI, No. 1, October 1959, p. 24. In addition to the Nautical Almanac and Tables Requisite, the expedition also had a copy of Patrick Kelly’s Practical Introduction to Spherics and Nautical Astronomy. The first edition of the latter was published in 1796; the expedition carried some edition of this work.

11In addition to Lewis’s mistake in sequencing the step for index correction, his initial observation for the sun’s angular distance may have been slightly off. A physicist who has reconstructed Lewis’s longitude calculations has noted systematic errors in his longitude readings which may have resulted from a visual bias. See Preston, pp. 186-88.

This article pertains only to the sextant readings. The other astronomical-measurement instrument carried, the octant or Hadley’s quadrant, has other unique characteristics the authors have analyzed and expect to discuss in a future article, which will also deal with the longitude of Fort Mandan derived from a lunar eclipse. A review of that event shows that Lewis in his sight reduction incorrectly used mean time rather than apparent time. The article will discuss why he might have done so.
Sacagawea’s story blends facts and folk tradition

Sacagawea Speaks: Beyond the Shining Mountains with Lewis and Clark
Joyce Badgley Hunsaker
Globe Pequot Press
151 pages / $27.95 hardcover

Sacagawea, the most romanticized member of the Corps of Discovery, inspires an outpouring of books comparable to spring runoff on the Lochsa. In Sacagawea Speaks: Beyond the Shining Mountains with Lewis and Clark, Joyce Badgley Hunsaker gives us a lovely coffee-table quality portrait of the young Shoshone presented as her personal account of the expedition. The Sacagawea story unfortunately has lent itself to literary license that has resulted in sensationalized portraits of her that cannot be rationalized by reference to credible historical evidence. She left no journal of her own, and journal entries referring to her are limited. Thus she has become a convenient tabula rasa for many an author’s fantasies and speculations.

Hunsaker avoids the obvious pitfalls and offers a convincing mainstream treatment of the Shoshone teenager’s role in the expedition. Sacagawea Speaks is two books in one. The first is a spriightly narrative that follows the convention of tying expedition vignettes to journal excerpts, a storyteller’s chronology written on the level of young readers’ historical fiction.

In the absence of much first-hand evidence of how Sacagawea experienced events or what she thought, readers must suspend their disbelief. It is credible that she may have cried out something like “Brother! Brother!” when she first grasped Cameahwait’s identity, less so that she actually won-when she first grasped Cameahwait’s identity, less so that she actually wondered why Lewis’s beloved companion Seaman did not end up on the menu. Hunsaker’s prose, while occasionally a bit imaginative, generally follows the story faithfully and is not overwrought.

The second part of the book, which includes a timeline, well-crafted endnotes, and detailed biographies of the corps, takes a more factual tack. These sections will reward the mature reader who possesses a seasoned familiarity with the expedition.

In one aspect of the story—the circumstances of Sacagawea’s death—Hunsaker is too neutral. Her biographical rendering indicates that this is in contention, but her timeline may sow confusion. A brief entry from 1812 quotes factor John Luttig’s brief account of Sacagawea’s death at Fort Manuel. However, a more detailed ac-

An obsidian knife and beaded sheath — a detail from Joyce Badgley Hunsaker’s Sacagawea Speaks.

count from 1884, with a photograph of her purported gravestone, concludes the timeline with her death at the Wind River Reservation. Even readers who carefully peruse the entire volume may not quite appreciate the degree to which historians discount the latter version.

“Visionary enchantment”

The book revels in the splendor of its wilderness photography, with a panorama of the Little Camas Prairie in bloom and other “seens of visionary enchantment” that evoke the work of Sam Abell and David Muench. Frothy mountain streams and mist-en-shrouded trees make one hunger to be opening a tent flap at dawn to put the coffee on. Wildlife sketches contribute to a richly textured graphic presentation that is a visual feast.

Trail artifacts depicted compare with exhibits of relics and reconstructions found in interpretive centers that have sprung up along the trail. This would make an indispensable source book for a Hollywood property mistress, costumer, or cinematographer. An extensive Shoshone vocabulary, however, is a well-meaning but gratuitous flourish. Two things cannot be learned without a live instructor—to dance and to speak a language.

John L. Allen suggests in the collection of essays Voyages of Discovery (edited by James Ronda) that the approach of the Lewis and Clark bicentennial may foster a convergence of the “folk” and “literate elite” images of the expedition. Perhaps this could enrich the story of Sacagawea. However, the wholesome image of the Shoshone girl that graces the dollar coin reminds us of one of our best-loved folk heroines without enlarging our sophistication about her life and role.

On the other hand, one of the most carefully researched contemporary scholarly studies, Donna J. Kessler’s The Making of Sacagawea: A Euro-American Legend, is distinctly inhospitable to the folk tradition. Kessler sharply critiques traditional portrayals as flattering Euro-American cultural needs and biases. She articulates a desire for a new Native American heroine, “a tribal chairwoman in blue jeans,” a career choice not available to the deer-skin-clad Shoshone and a phrase that substitutes one cliché for another.

During the bicentennial, Americans will choose their own version of the truth. They may permit themselves to be weaned from the “Sacajawea” pronunciation and the fiction that she was the expedition’s guide. They are unlikely to surrender their vision of her essential decency and good character. In times increasingly characterized by uncivil behavior, Americans deeply need to believe that, when Luttig inscribed her epitaph as “a good and the best woman in the fort,” he had it right.

—Dennis M. O’Connell
Lewis and Clark in the heart of the Rockies

Across the Snowy Ranges: The Lewis and Clark Expedition in Idaho and Western Montana

James R. Fazio
Woodland Press
284 pages / $29.95 hardcover

Once, when I asked Stephen Ambrose the best advice he ever received about writing, he told me of the professor in graduate school who said to him, “Read all of Shakespeare and note how he uses his verbs.”

Ambrose’s skills as a storyteller are due in large measure to his active voice and engaging manner. The same can be said of at least two other Lewis and Clark scholars, James Ronda and John Logan Allen. Now we have James Fazio to add to the list. From the introduction to Across the Snowy Ranges to the final paragraphs, his prose is gripping, clear, and concise. It conveys a sense of immediacy based on his experience along the Lolo Trail. I’ve extensively traveled that trail myself and have read and reread the journal accounts of it, but Fazio’s book taught me things I didn’t know. It sets the standard for all future “segment histories” of the Lewis and Clark Trail.

The book’s 9x11-inch format does justice to the text as well as to the excellent maps by Steve F. Russell and the marvelous color photographs by Mike Venso. A concise introduction summarizes the expedition and its purposes. The narrative, which is divided into two sections—outbound and homeward bound—totaling eight chapters, tells the reader the whereabouts of the two captains (who were often separated) on each day. The narrative runs from August 12, 1805 (when Lewis crossed Lemhi Pass) to October 10 (when they reached the junction of the Clearwater and Snake rivers) and from May 5, 1806 (when they returned to the land of the Nez Perce) to July 2 (when they arrived at Traveler’s Rest). The photo captions are complemented by quotes from the journals describing the scene as it appeared to the explorers. Sidebars on a range of topics—the naming of Sacagawea, the protection of the Glade Creek campsite, a publishing history of the Lewis and Clark journals, peace medals, and other matters—are superb mini-essays in their own right.

In the chapter “A Puzzle Wrapped in a Mystery: Over Lost Trail Pass,” Fazio offers insights into the naming of Lost Trail Pass (long-held assumptions that the name refers to Lewis and Clark’s problems there are questionable), its connections to other nearby passes, and where along the pass the party may have camped on September 3, 1805. Compounding the mystery is a 13-day gap in Lewis’s journal during that period. Fazio is particularly acute when writing about the expedition’s interactions with Native Americans and emphasizes the crucial role played by the Nez Perce—a role acknowledged by a grateful Lewis, who wrote that the tribe deserved “immortal honor” for its life-saving hospitality.

Informed by the author’s deep personal knowledge of the land and journals, Fazio’s narrative gave me a sense of looking over the shoulders of the explorers as they camped, tended to their daily tasks, and struggled with the snow, freezing cold, and lack of game. Yet Across the Snowy Ranges is also a practical guide that can be used by anyone following the trail.

I was struck by the fine editing job done by the publisher. I found only one error: in the introduction, the date for the keelboat’s departure from Fort Mandan to St. Louis should be April 7, 1805, instead of April 5. Small stuff indeed.

I recommend Across the Snowy Ranges to any Lewis and Clark enthusiast, scholar, or armchair traveler and to anyone who enjoys a story well told in texts, maps, and photographs. It is available for $29.95 from Woodland Press, 310 N. Main St., Moscow, ID 83843 (208-882-4767, www.woodlandgifts.com).

—Robert K. Doerk, Jr.

The L&C saga in new songs by Kindra Ankney

Great things come in small packages. This applies equally well to both the CD Songs of the Journey and to its artistic creator, Kindra Ankney. Though she is small in stature, Ankney’s creative energy shines brightly throughout her multidisciplinary and multigenerational works.

While being home-schooled, her son, Jamin, and daughter, Emily, became fascinated with the saga of the Corps of Discovery. Of course, simply reading the story was not enough, so Ankney and her children completed hands-on educational projects such as gathering, steaming, and grinding acorns to make pancakes, making tallow candles, jerking buffalo meat, and pressing wildflowers.

Still having more to say and do on

—Kindra Ankney
this topic, she penned words and music to 15 songs, all inspired by passages and events from the journals. The songs are geared to families—for listening, enjoying, and learning together. To share her creative message, Ankney contacted the renowned Bobby Horton, who is well known for his Civil War-era music and his work with filmmaker Ken Burns on numerous documentaries. Horton was impressed with Ankney’s words and melodies and agreed to arrange, perform, record, and mix her songs. In the process, he used 18 different period instruments including a bodhran (Irish drum), uilleann pipes, hammer dulcimer, tin whistles, fiddle, harpsichord, and a deer-toe rattle that Ankney fashioned just for the occasion.

The songs are full of facts from the journals, which, mixed with the emotional aspects of the music, become easy to absorb and retain. The songs dwell on feelings, hope, and dreams. I especially love the chorus from *Uncommon Camaraderie*:

> They had an uncommon camaraderie, 
> a blending of skills, 
> complementing temperaments and persevering wills; 
> a shared spirit of adventure built this ideal team — 
> capable resourcefulness, 
> and mutual esteem.

Other songs span the extent of the journey covering topics such as *Seaman, Captain Lewis’s Dog, Sacagawea, Fort Mandan, Bitterroot Mountains, Fort Clatsop, and Back Home*. My favorites were the lively tunes of *Cruzzatte’s Fiddle, Oh, Joy!, and Back Home*, but I think children will particularly enjoy *The List*, which humorously details a number of the animals encountered by the corps.

In addition to being a talented teacher and songwriter, Ankney is an accomplished artist. The CD and its cover feature a couple of her wonderful pen-and-ink drawings. As a companion to her audio CD, she is now working on an illustrated book that will, she says, “cite the quotes upon
which the songs are based and tell the ‘between-the-lines’ story that the songs leave out.”

Songs of the Journey can be purchased for $15 through Edge-of-the-Woods Publishing, POB 8251, Yakima, WA 98908. Washington State residents should add 7.6 percent sales tax.
—Jay Rasmussen

This kids’ book teaches while it entertains

Amidst the spate of young readers’ books focusing on the diverse personalities of the expedition—Saca-gawea, York, even Seaman—parents and educators understandably may yearn for a treatment that puts the whole story between two covers. Janis Herbert has done it with Lewis and Clark for Kids: Their Journey of Discovery with 21 Activities (Chicago Review Press, 160 pages, $14.95 paper).

Don’t be put off by the subtitle; this is no connect-the-dots vacation amusement book. The activities are meaningful—latitude and longitude exercises; preserving plants; drying fruit for the trail; Native American dance, instruments, and regalia; trail signs; and sign language. The book’s real strength is a comprehensive text thoroughly illustrated with artwork and photographs.

The artwork draws on the best of Karl Bodmer, George Catlin, Edgar S. Paxson, Charles M. Russell, and others to present a richly decorated introduction to expedition history, trail scenery and ethnology. The book’s narrative, tied to key dates, offers a readable entrée to the expedition for the newcomer with a thoughtful focus on tribal relations. Detailed sidebars cover everything from biographies of Jefferson, Lewis, and Clark to taxonomy, Lakota tribal divisions, mammoth bones, and Welsh Indians. This is a fine resource that can be revisited with a youngster either at home or on the trail.

—Dennis M. O’Connell
New leadership; Foundation awards; wish list; Corps II; L&C in other pubs

Jane Henley, a resident of Charlottesville, Virginia, and a collateral descendant of Meriwether Lewis, assumed the Foundation presidency at the August annual meeting in Pierre, South Dakota.

A retired school teacher and a native of Charleston, West Virginia, Henley and her husband, Page, a retired corporate attorney, have attended every annual meeting since joining the Foundation in 1993. She helped establish the Home Front Chapter and was chief organizer of the 1995 annual meeting in Charlottesville. Henley was also the prime mover in creating a foundation to restore and maintain the graveyard at Locust Hill, Meriwether Lewis’s boyhood home in Albemarle County, Virginia.

She recalls visiting the graveyard, which holds the remains of Lewis’s mother, Lucy, and his sister, Jane Lewis Anderson, shortly after she and Page moved to Charlottesville eight years ago. “It was terribly overgrown, and with just the remnants of a stone wall. I could almost hear my mother’s memory tweaking me, saying, ‘Do something about that graveyard.’”

Henley contacted other Lewis relatives, as well as descendants of other families buried at Locust Hill, and raised the necessary funds to restore the graveyard in time for the 1995 Foundation meeting. The 50 or so members of “the Graveyard Group,” as she calls it, hold a reunion picnic at the site every September.

Given her kinship, it’s not surprising that Henley feels especially close to Lewis and Clark, and she is thrilled to be heading the organization charged with preserving the legacy of her great-great-great-grand uncle and his co-commander. She welcomes hearing from Foundation members. To reach Henley e-mail her at MLewisNut@aol.com.

OTHER OFFICERS
Besides Henley, Foundation officers for 2001–02 include president-elect Larry Epstein, of Cut Bank, Montana; vice-president Ron Laycock, of Benson, Minnesota; secretary Jane Schmoyer-Weber, of Great Falls, Montana; and treasurer Steve Lee, of Colton, Washington. Appointed to three-year terms as directors were Gordon Julich, of Blue Springs, Missouri; Hal Stearns, of Wayne, Nebraska; and Dark Rain Thom, of Bloomington, Indiana. Sueann Hottois, of Clarkston, Washington, was appointed to a one-year term, replacing Laycock.

KUDOS
The aforementioned Ron Laycock is this year’s winner of the Foundation’s Meritorious Achievement Award. Laycock, who attended his first annual meeting in 1989, in 1993 became leader of the Chapter Liaison Team. At the time the Foundation had nine chapters. That number has since expanded to 32—in no small measure thanks to the man known as “the Johnny Appleseed of the chapters.”

Laycock is also a past chair of the National Lewis and Clark Trail Coordinating Committee.

Joe Mussulman, a resident of Lolo, Montana, and an emeritus professor of music at the University of Montana, received the 2001 Meritorious Achievement Award for the Web site Discovering Lewis & Clark (www.lewis-clark.org), which he founded in 1993 and has developed to the point where it now contains some 1,200 html pages and boasts more than 26,000 hits a day. As Mussulman told a recent interviewer, the site focuses “on persistent issues, core values, and changing visions” of the Lewis and Clark story. Updated regularly and with some of the nation’s leading Lewis and Clark scholars writing for it, the site has become a primary resource for students of the Corps of Discovery.

This year’s Youth Achievement Award goes to Kim Michael’s second-grade classes at Fiske Elementary School, in Lexington, Massachusetts. The students completed a range of Lewis and Clark-related projects, including designing their own commemorative Sacagawea coins and writing essays justifying why she deserved the honor; drafting a reply from Clark to Lewis’s invitation to join the expedition; and creating a PowerPoint presentation and a Jeopardy! game based on what they had learned about the explorers.

DIMMING DOLLAR
Speaking of the Sacagawea coin, it appears that the official one isn’t meeting the hopes that the U.S. Mint had for it. A recent item in The New York Times reports that the coin “is not weighing down too many pockets so far” and that most of the 800 million placed in circulation “are going into collections and dresser drawers rather than being spent freely.”

This despite marketing efforts like convincing the International House of Pancakes to rename its Silver Dollar Pancake the Golden Dollar Pancake. “The mint is hoping that the dollar coin will win further acceptance as cities begin accepting it in parking meters and highways authorities allow its use at toll booths.”

THE CAPTAINS ON BROADWAY
Former LCTHF treasurer Jerry Garrett, of St. Louis, has written to tell us that a song in the hit Broadway show The Producers has the following lines:

We can do it.

I’m sure you’re well aware …

As they crossed the Delaware, What did Lewis say to Clark What did Washington say to Tenzing As they struggled toward Everest’s peak? What did Lewis say to Clarkston? What did Sir Edmund say to Tenzing? What did Washington say to histroops As they crossed the Delaware, I’m sure you’re well aware ... What’d they say? We can do it.

CHRISTMAS LIST
Executive director Cari Karns has put together a wish list of items the Foundation needs. “We may be dreaming big,” she says, “but we would surely love to see the following in our stocking on Christmas morning.” For the office: a plain-paper fax machine, new member-
ship/fund-raising software, and a two-drawer locking file cabinet. For the library: a slide scanner and a map-display case. New or used is fine. Those in the holiday spirit can reach Cari at 1-888-701-3434.

**CORPS OF DISCOVERY II**
The National Park Service and other federal agencies are planning a “traveling education center” that will criss-cross the country during the three years of the Lewis and Clark Bicentennial. “Corps of Discovery II: 200 Years to the Future” will start off in Charlottesville, Virginia, in January 2003 and finish in St. Louis in 2006. In between, plans call for it to visit some 200 communities along the Lewis and Clark Trail and in Florida, Texas, California, and other states far from the explorers’ path. Says Gerard A. Baker, the NPS official supervising the project, “Through a combination of mobile museum exhibits, live interpretation, use of the Internet, and distance-learning video, Corps II will reach millions of people.” Corps II’s Web site is www.nps.gov/lecl\welcome.htm. Baker, who works out of NPS offices in Omaha, Nebraska, can be reached at gerard_baker@nps.gov (402-221-7296).

**L&C AND THE U.S. ARMY**
The L&C Expedition was a military endeavor manned largely by soldiers, and the U.S. Army, Army Reserve, and National Guard are putting together a traveling exhibit to honor captains Meriwether Lewis and William Clark and the enlisted members of the Corps of Discovery. The 6,000-square-foot exhibit, titled “Beyond Lewis and Clark,” will visit Virginia, Washington State, and Kansas before taking up permanent residence at the Frontier Army Museum at Fort Leavenworth, Kansas. Lt. Col. Sherman Fleek, who is overseeing the exhibit, notes too that in 2004, as part of the Lewis and Clark bicentennial, the National Guard will host a nationwide relay run from Virginia to Oregon. Much of the route will be on or near the explorer’s trail, 80 percent of which is owned or managed by the U.S. Army Corps of Engineers.

**L&C ART EXHIBIT**
The Lewis and Clark Bicentennial Association of Clatsop County, Oregon, and the Fort Clatsop Historical Association sponsor the Journey’s End National Art Exhibition, an annual show that uses original works to interpret the history of exploration in the Pacific Northwest. The show’s theme for 2002 is the Corps of Discovery. Accepted art will be exhibited next March 8-10 at the Columbia River Maritime Museum, in Astoria, Oregon. The deadline for receipt of slides, fees, and entry forms is January 4. For further details check the Web site www.journeysend2005@yahoo.com or write journey’s End National Art Exhibition, POB 2005, Astoria, OR 97103.

**L&C IN OTHER PUBLICATIONS**
From time to time, WPO will report on recent articles about Lewis and Clark in other publications. Here is a current list, along with information on how to reach the publishers.

- “The Lewis and Clark Expedition’s Ties to Pennsylvania,” by Frank Muhly. Pennsylvania Heritage, Summer 2001. 717-
We Proceeded On November 2001

787-2407. (miomalley@state.pa.us.)
• “Proceeding on to the Lewis & Clark airgun,” by Robert D. Beeman. Airgun Review, No. 6. The author can be reached at 1600 Sweetwater Spring Road, Healdsburg, CA 95448-9415. (dr-airgun@ap.net.)

CHAPTER NEWS

Four chapters have recently joined the Foundation. They are the Sakakawea Chapter, in Bismarck, North Dakota; the Sacajawea Chapter, in Salmon, Idaho; the Mouth of the Platte Chapter, in Council Bluffs, Iowa; and the Blackfoot River Chapter, in Missoula, Montana.

Efforts by the Headwaters Chapter, in Bozeman, may have helped stop, or at least delay, plans by Montana Rail Link, the state’s railroad utility, to park up to six diesel-electric locomotives on a side track at Trident, just north of Headwaters State Primitive Park, near Three Forks, to feed power to a nearby electrical substation. The last word, according to president R. G. Montgomery, is that the project is now on hold because “electricity apparently is still too cheap to justify their use.”

CHAPTER NEWS

Bright yellow shirts to the contrary, this is not the Lewis and Clark Bowling Team but members of the Falls of the Ohio Chapter gathered in Pierre. They are organizing the 2002 annual meeting, to be held in Louisville next July 28-31. Front: Ash Padya, Linda Robertson, Phyllis Yeager, Dani Cummins, and Chuck Parish. Rear: John Minta, Jerry Robertson, Jim Keith, and Bill Smith.
The U.S. Senate and House of Representatives Lewis and Clark Bicentennial Congressional Caucuses were formed in 1998 to coordinate the congressional response to the bicentennial of the Corps of Discovery (1803-1806). Since then, these caucuses have united as the bipartisan and bicameral Lewis and Clark Bicentennial Congressional Caucus and membership has more than doubled—the caucus now comprises 73 members representing 21 states.

Caucus members have supported legislation related to the bicentennial and have participated in joint quarterly briefings with federal, state, and tribal representatives and with the National Council of the Lewis and Clark Bicentennial. The briefings allow participants to share information and discuss issues about programs and projects.


The caucus helps inform and involve members of Congress about the significance of the Lewis and Clark Expedition to our nation’s history. It acts as a unified voice in Congress to help coordinate and provide resources. The caucus will remain in existence through the end of the bicentennial, in 2006. Information about the caucus is posted at www.lewisandclark200.org and can also be obtained by contacting those below:

- Michelle L. Watson
  Lewis & Clark Bicentennial Caucus
  2184 Rayburn Building
  Washington, DC 20515
  202-225-5675 / fax 202-225-5686
  Omaha: 402-514-9315
  michelle_watson@nps.gov

- Mike Oliver
  Lewis & Clark Bicentennial Caucus
  208 N. Montana Ave., Ste. 202A
  Helena, MT 59601
  406-449-5401 / fax 406-449-5462
  mike_oliver@burns.senate.gov

- Craig “Rocky” Rockwell
  Congressional Liaison
  846 Main Street
  Lewiston, ID 83501
  208-743-0792 / fax 208-746-7275
  craig.s.rockwell@usace.army.mil
Bicentennial Council outlines major events

The National Council of the Lewis and Clark Bicentennial has approved 10 national heritage events for the Lewis and Clark Bicentennial. Dates, places, and contacts:

- Spring, 2004: Three Flags Ceremony/Expedition Departure—St. Louis, Missouri, and Hartford/Wood River, Illinois. Timothy G. O’Rourke, 314-516-6884; tg_orourke@umsl.edu. Marilyn Hurst, 217-524-2998; mhurst@commerce.state.il.us.
- July 30-August 3, 2004: Tribal Council—Omaha, Nebraska. Ron Hull, 402-472-9333, ext. 315; rhull@unlnotes.unl.edu.
- Late Fall, 2004: Circle of Cultures, Time of Renewal and Exchange—Bismarck, North Dakota. Kristie Frieze, 877-462-8535; kfrieze@fortmandan.org. Rachael Retterath, 701-328-2532; rrettera@state.nd.us.

For more information, see www.lewisandclark200.org.