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## Mapping The Marias The Interface Of Native And Scientific Cartographies

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# MAPPING THE MARIAS

## THE INTERFACE OF NATIVE AND SCIENTIFIC CARTOGRAPHIES

BARBARA BELYEA

In early June 1805, as they traveled up the Missouri toward the continental divide, Meriwether Lewis and William Clark came to a fork where two rivers of apparently comparable width and force flowed together. The captains paused at this junction, unable to decide which river was the “main stream” of the Missouri and which was the tributary. They were determined to fulfill Thomas Jefferson’s instructions as exactly as possible: “to explore the Missouri river, & such principal stream of it, as, by it’s course and communication with the waters of the Pacific ocean . . . may offer

the most direct & practicable water communication across this continent.”<sup>1</sup> Punctilious to a fault, the captains interpreted this mandate narrowly: for them this order meant following the Missouri itself to its source, where a portage across the continental divide would lead to the Columbia watershed, a pattern that would mirror the upper Missouri and flow west to the sea. After nine days of reconnaissance, they decided that the river approaching them from the southwest should be declared the Missouri. Lewis named the other river Marias, and called it one of the Missouri’s “most interesting branc[h]es.”<sup>2</sup>

The days of observation and definition at the Missouri/Marias confluence exemplify the survey work to which Lewis, Clark, and contemporary European explorers were committed. All were field agents in a larger process of scientific classification by which “unknown” regions of the earth were mapped and described. But as Lewis and Clark moved west across the North American continent, their contact with Native informants revealed spatial and topographical concepts at variance with their own. Native geographical knowledge was not simply sketchy, provisional

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information that scientific survey could confirm, correct, or supersede.

#### HISTORIES OF THE LEWIS AND CLARK EXPEDITION

Historians of the Lewis and Clark expedition have been accepting and uncritical of the captains' mandate and what they achieved. In 1952 Bernard DeVoto praised expedition members as heroes because "they had filled out the map" and had pursued "scientific objectives" during two years of hardships, dangers, and adventures. Specifically, DeVoto called the Missouri/Marias decision "a remarkable act of the mind [that] must be conceded a distinguished place in the history of thought. It is the basic method of science."<sup>3</sup> More than twenty years later, John Logan Allen contrasted Clark's field surveys with earlier geographical "lore" gleaned from speculative cartography and "sketchy native data." In *Passage Through the Garden*, published in 1975, Allen considers the expedition leaders to have been "a pair of trained and intelligent observers [who] gathered and analyzed geographical information in what can only be described as a scientific method." Allen echoes De Voto in calling the decision at the Marias "a brilliant piece of deduction from a fuzzy set of facts [that] illustrates . . . the competence and intelligence of its commanders."<sup>4</sup> In a complementary work published within a few years of *Passage Through the Garden*, Paul Russell Cutright established Lewis and Clark as "pioneering naturalists" who charted flora and fauna according to Linnaean categories.<sup>5</sup> Although James P. Ronda's studies of the expedition's contact with Native groups have tempered earlier interpretations of the captains' success, Ronda continues to see the expedition as a scientific breakthrough and Clark as mastering not only European cartographic skills but those of Native mapping.<sup>6</sup> Gary E. Moulton's recent re-edition of the expedition's journals and maps praises the captains' science and specifically endorses Allen's account of the decision at the Marias.<sup>7</sup>

Without exception, the captains' reasoning at the Missouri/Marias junction has been admired as characteristic of the expedition's scientific achievement.

The expedition's mapping procedures are of particular interest in understanding the problem facing Lewis and Clark at the Missouri/Marias junction. These procedures are described and judged within a geographical context clearly outlined in *Passage Through the Garden*. Allen suggests a progressive shift from the hearsay of Natives and traders, to speculative mapping, and finally to scientific geography:

There are really three ways of knowing about areas geographically: a system of coherent knowledge based on accurate data and long acquaintance, a system of more or less coherent knowledge based on simple logical and theoretical constructions, or a system which is largely incoherent and based on desires, ambitions, long-standing myths and traditions, or pure rumor and fantasy. . . . The captains [Lewis and Clark] would replace conjecture and speculation, wild reasonings of theoretical and logical frameworks, with scientific observation. They would fill in many blank spaces on the maps of the Northwest with facts recorded and verified rather than guessed at or hoped for.<sup>8</sup>

Allen's progression, rather confusingly presented in reverse order, is to be understood as three levels of geographical knowledge ranging from the least reliable ("desires, ambitions . . . myths and traditions, . . . rumor and fantasy") to logical deduction ("more or less coherent . . . theoretical constructions") to field survey ("accurate data and long acquaintance . . . scientific observation"). The captains' job was to replace the first two levels, inherited from Native "lore" and earlier maps, with the third. This process of discovery separated Lewis and Clark from "lesser men and less capable explorers." As the captains ventured beyond the lower Missouri, "from an area . . . actually

well known into one . . . less known (in a real or empirical sense),” they found themselves in the frontier region of speculative cartography, faced with inadequate “data” and obliged to replace this reported knowledge with their own observations.<sup>9</sup> The three-step progression can be reduced to “two kinds of geographical knowledge”:

The first is “real knowledge,” or actual information obtained through active commercial, diplomatic, military, or scholarly enterprises or from the accounts of travelers and observers, evaluated in the light of what is presently accepted as geographical reality. The second and more important kind of knowledge is “perceived knowledge,” or lore which is evaluated on the basis of accuracy as it is understood by the explorers themselves.<sup>10</sup>

“Real knowledge” was gathered from official European and American sources; “perceived knowledge” was based on fur-trade and Native reports. “Real knowledge” was confirmed by Lewis and Clark during their expedition; “perceived knowledge,” though “more important” to the explorers themselves, was replaced by the captains’ “field operations.” Thus the process of discovery is that by which “invented geography is perceived as real until proven unreal by exploration and observation.”<sup>11</sup> In defining the achievement of Lewis and Clark, Allen maintains a distinction that has become a tradition in histories of the expedition. “What is presently accepted as geographical reality” quickly loses its tentative quality, and becomes simply “reality,” as the expedition’s “actual observations” are set against “myths . . . traditions . . . rumor . . . conjecture and speculation.” Specifically, Allen categorizes Native contributions to “geographical lore” as different in kind from the contribution of “capable explorers” such as Lewis and Clark.

Like Allen, Warren Heckrotte has studied the map sources of the expedition’s geographical knowledge. Heckrotte is more aware than Allen of the complexity of the map com-

pilations consulted by Lewis and Clark, but, he too defines the captains’ achievement at the Missouri/Marias junction as a triumph of science: “these critical few days in the expedition can stand as the mark where the conjectures of Fidler and Arrowsmith were swept aside and replaced by accurate factual detail.”<sup>12</sup> Thus, although the expedition’s enduring achievement was political, historians have followed Jefferson’s lead; to fellow Americans and foreign diplomats alike, the US president promoted the venture as a scientific investigation. Paraphrasing his instructions to Lewis three years before, he announced to Congress in 1806 that Lewis and Clark had “traced the Missouri nearly to its source, descended the Columbia to the Pacific ocean, ascertained with accuracy the geography of that interesting communication across our continent, [and] learnt the character of the country . . .”<sup>13</sup>

#### LEWIS AND CLARK AS SCIENTIFIC OBSERVERS

As scientific observers, Lewis and Clark were provided with instruments, manuals, blank tables, base maps, and questionnaires that determined objects worthy of note, the categories of their inscription, and the standards by which they would be evaluated. The captains’ instruments were far from “crude and unreliable,” as Moulton maintains: Lewis and Clark were as well equipped as any contemporary surveyors working on the British Ordnance Survey or on Napoleon’s map of Egypt.<sup>14</sup> The scientific categories of their enquiry were inherited from the Royal Society in London, reinforced by Jefferson’s connections with the Académie des Sciences in Paris, and specifically suggested by members of the American Philosophical Society in Philadelphia. The overland expedition was vaguely imitative of the voyages of Cook and Vancouver, but Jefferson saw a closer model for his project in the fur trade opportunist Alexander Mackenzie. The trader’s record of his transcontinental crossing, published in 1801, was well

received in scientific circles despite his ignorance of botany and his shaky surveying skills.<sup>15</sup> Like Mackenzie's venture, but in contrast to the British maritime voyages, the American expedition would not include trained scientists. Observations taken and specimens collected would be handed over to experts on the expedition's return. Jefferson's acknowledgment that Lewis was not "regularly educated" tends to be overlooked in most recent histories of the expedition, as it was by Lewis himself. The president's former secretary assured a future reading public that he and Clark could provide "accurate information" on the geography, mineralogy, botany, and zoology of the trans-Mississippi West—despite inconclusive astronomical observations, uncatalogued biological collections, and years of delay in publishing any account of the western "tour."<sup>16</sup>

Whatever the proven level of their accomplishment, both Lewis and Clark aspired to scientific discovery and subscribed to the aims and biases of contemporary empirical investigation. Clark's previous training and Lewis's crash course in surveying ensured that their maps would be based on route traverses confirmed by astronomical observations and would be drawn according to European cartographic convention. But as Lewis and Clark filled in blanks of their tables and base maps, both leaders were constrained as much as empowered by the disciplines and concerns they were representing in the field. Even Lewis's landscape descriptions drew on a standardized vocabulary of the picturesque, and the expedition's scientific records were equally reflective of prescribed ways of seeing.<sup>17</sup>

The choice point at the Marias demonstrates the way in which Lewis and Clark operated within a network of scientific investigation, analysis, and interpretation that dictated what routes they selected and what they observed. Only partial, provisional assimilation of Native mapping was possible or desirable; instead explorers of the western interior attempted to make foreign knowledge comply with their own aims and categories. When

they asked leading questions, tried to copy Native relief maps onto the flat pages of their notebooks, and failed to record the dialogue and gestures that were integral aspects of this transmission of knowledge, they reduced indigenous maps to isolated, poorly grasped details to be inserted into their own geographical images. The price of such assimilation was destruction of the integrity, and on many occasions the sense, of Native maps. Indigenous cartography has to be understood as providing (for its Native users) a complete, efficient geographical notation, not merely crude sketches from which (in the view of non-Native users) essential features are missing or expressed in odd ways. Native mapping challenges us to regard scientific geography in relative terms—to admit that all geographies are "conceptual" rather than "actual," imposed on rather than inherent in the landforms they describe.<sup>18</sup> The nine days of indecision at the Marias illustrate the conflict between the captains' loyalty to scientific mapping and their simultaneous recognition that their own base maps were confusing and misleading. The reason for confusion at this point is more specific than the discovery process of replacing "lore" with "actual observations" that Allen outlines. Lewis and Clark were trying to locate Native landmarks on a map that represented several earlier stages of assimilation of Native "information."

When they set out from Fort Mandan in the spring of 1805, Lewis and Clark apparently took with them a copy of Aaron Arrowsmith's *Map Exhibiting all the New Discoveries in the Interior Parts of North America . . . Additions to 1802*. Although Nicholas King's map of the West had been commissioned for the expedition in 1803, and although it shows, in Allen's words, "enough differences . . . to suggest that Arrowsmith's representation of the Northwest was not evaluated as the best available without some reservations," there is no record in the journals of Lewis and Clark that they ever consulted King's map in the field.<sup>19</sup> The captains would appear to have chosen a faulty Arrowsmith map over King's improved

version. Allen offers no explanation for this curious discrepancy. An answer might be found in the map's complex publication history, of which Allen seems unaware.<sup>20</sup> Allen refers to two versions of the *Map Exhibiting all the New Discoveries*: the original issue dated 1795, and "a revision of the 1795 map . . . published in 1802," and provides illustrations for both in his book. Unfortunately, his illustration of the "1795 map" is not of the original first state but of its fourth state, dated 1796, watermarked 1798 and published no earlier than 1799. In any case, both of the Arrowsmith maps referred to in Jefferson's pre-expeditionary correspondence are to be understood as the "Additions to 1802." One of these served as King's base map; the other was purchased in June 1803 and is likely the Arrowsmith map that Lewis carried with him. What Allen does not explain is that the *Map Exhibiting all the New Discoveries . . . Additions to 1802* exists in two versions, a first issue (the fifth state of the map), which came out early in 1802, and a second issue (the sixth state), which could not have appeared until the last weeks of 1802 or early in 1803. Heckrotte argues conclusively that King used the first issue dated 1802 as his base map, less convincingly that Lewis and Clark carried another copy of the first issue with them.<sup>21</sup> But the captains' reliance on Arrowsmith rather than King might be explained by the purchase, in June 1803, of a very recent update, easily recognized as such by Jefferson, Albert Gallatin, and Lewis, all of whom had studied the first issue carefully—the purchase, in other words, of the second issue dated 1802 (the sixth state).

Also indicative of the captains' prior knowledge of the upper Missouri is Clark's own map drawn at Fort Mandan. During the winter of 1804-05, descriptions and maps furnished by traders and Native leaders had supplemented and in some instances modified the Arrowsmith/King picture. As Anne Godlewska points out in her study of the contemporary Napoleonic survey of Egypt, map compilations provided "information of varied nature and quality" in a single image; elements from many

sources were selected, rationalized, and transformed to fit the purpose, projection, and conventional detail of the composite map under construction.<sup>22</sup>

As they headed west from the Great Bend, the captains reviewed the pattern of tributaries that the British cartographer had drawn to represent the upper Missouri and compared it once again with Native landmarks they had learned about at Fort Mandan. Prominent on Clark's map drawn during the winter of 1804-05 is the north branch of the Missouri and its tributary, copied from Arrowsmith and called by "the Indians . . . the River which scolds at all others." Hidatsa visitors to the fort had also told them that farther upstream, close to the continental divide, they would pass a series of falls and come to a division of the Missouri into three tributary forks. Two cartographic conventions can be seen in uneasy alliance on the maps that Lewis and Clark consulted and produced. The European scientific convention, featuring precise location on an astronomical grid, is made up of what Moulton calls "actual observations"; the Native convention is more or less assimilated into the scientific convention and appears as a swath of reported, unverified details bordering the blank space of the West.<sup>23</sup> Hesitating at the Missouri/Marias junction, "examining [their] maps," the captains tried to rationalize imperfectly assimilated details from their Native informants with their scientifically authorized image of the western interior. The long pause at the Marias, maintains Allen, was due to "the failure of the Indians to mention the outliers of the Rockies or to tell them about the Marias River."<sup>24</sup> Just as plausibly, it was due to the captains' failure to understand the cartographic image of the upper Missouri that Mandans and Hidatsas had presented to them. At any rate, Lewis and Clark continued their efforts to rationalize Native and scientific geographies: they looked for Native landmarks above the Marias, and they tried to fit these into a topographical scheme inherited from European mapping.

## THE "TRUE GENUINE MISSOURI"

We can pause here with Lewis and Clark, weighing their decision. The captains were convinced that the watershed portage they sought lay at or very near the source of the "true genuine Missouri." They had passed the south branch and the "River which scolds at all others," both of which their informants at Fort Mandan had described; now they were looking out for the great falls.<sup>25</sup> Clark's route maps show the Marias as a smaller river flowing into the larger Missouri but widening considerably at its entrance into the main stream. The captains had not anticipated a river flowing from the northwest, muddy like the lower Missouri, swollen with runoff so that it was a considerable size: an unexpected river that cast doubt on the identity of the others they had already passed.<sup>26</sup> Nonplussed, Lewis and Clark spread out their most authoritative reference, the one in which they invested the greatest faith: they consulted Arrowsmith.

The Arrowsmith map seemed worthy of the captains' confidence because it showed the recent explorations of Peter Fidler, a Hudson's Bay Company surveyor who had wintered with a Peigan band along the front ranges of the Rockies in 1792-93 and who had supplied the British cartographer with information about the upper Missouri. Lewis and Clark were prepared to believe the findings of a fellow observer in the field; moreover, the second issue dated 1802 (if this is the one they carried) provided names for all of the Missouri's mountain tributaries. The two American leaders assumed that the Missouri as charted on Arrowsmith's map was derived from Fidler's own surveys, but they could not identify the mysterious river from the northwest in Arrowsmith's depiction of the watershed. When they were faced with the uncharted, unexpected river, they felt obliged to discount the Arrowsmith representation of the Missouri watershed and to doubt Fidler's "varacity."<sup>27</sup> Instead they chose to believe Native accounts of the upper Missouri over Arrowsmith's representation of Fidler's reports, and Lewis's discovery

of the great falls on the ninth day of their investigation confirmed this choice. Ronda points out that "despite misunderstandings about the identity of the Marias River, . . . the Indians' information proved not only accurate but invaluable." Allen, on the other hand, qualifies the advice offered by Mandans and Hidatsas as "sketchy native data," concluding that "their [the captains'] estimation of the accuracy of their [the Native informants'] data was excessive."<sup>28</sup>

Lewis and Clark themselves, and historians ever since, have considered the decision at the Marias as having a purely scientific importance: it was grounded in the logic of the "main stream" and the mountain portage of their instructions. Since the captains were following the Missouri to its source, since the Missouri was said to have its source in the Rocky Mountains, and since the southwest fork was without the turbidity that betrayed a long course through the prairies, therefore the river from the southwest was the Missouri and the other must be a tributary that might or might not originate as a mountain stream. Allen suggests that by this point in the journey Lewis and Clark were demonstrating "a growing ability . . . to differentiate between the geography as it had been imagined . . . and the geography as it actually was." Moulton supports Allen's interpretation: "the captains' keen geographic intuition led them to distinguish correctly between the Marias and Missouri rivers. More than a week's worth of investigation at the rivers' confluence proved the leaders correct."<sup>29</sup> No change of method; ultimately no challenge to science. According to Allen and Moulton, the captains were "correct" because they discerned the Missouri watershed pattern "as it actually was."

CONVENTIONS OF REPRESENTING  
WATERSHEDS

In preferring to emphasize field observation rather than the explorers' declared faith in Native directions,<sup>30</sup> Allen and Moulton remain loyal to the empirical axioms that dictated the

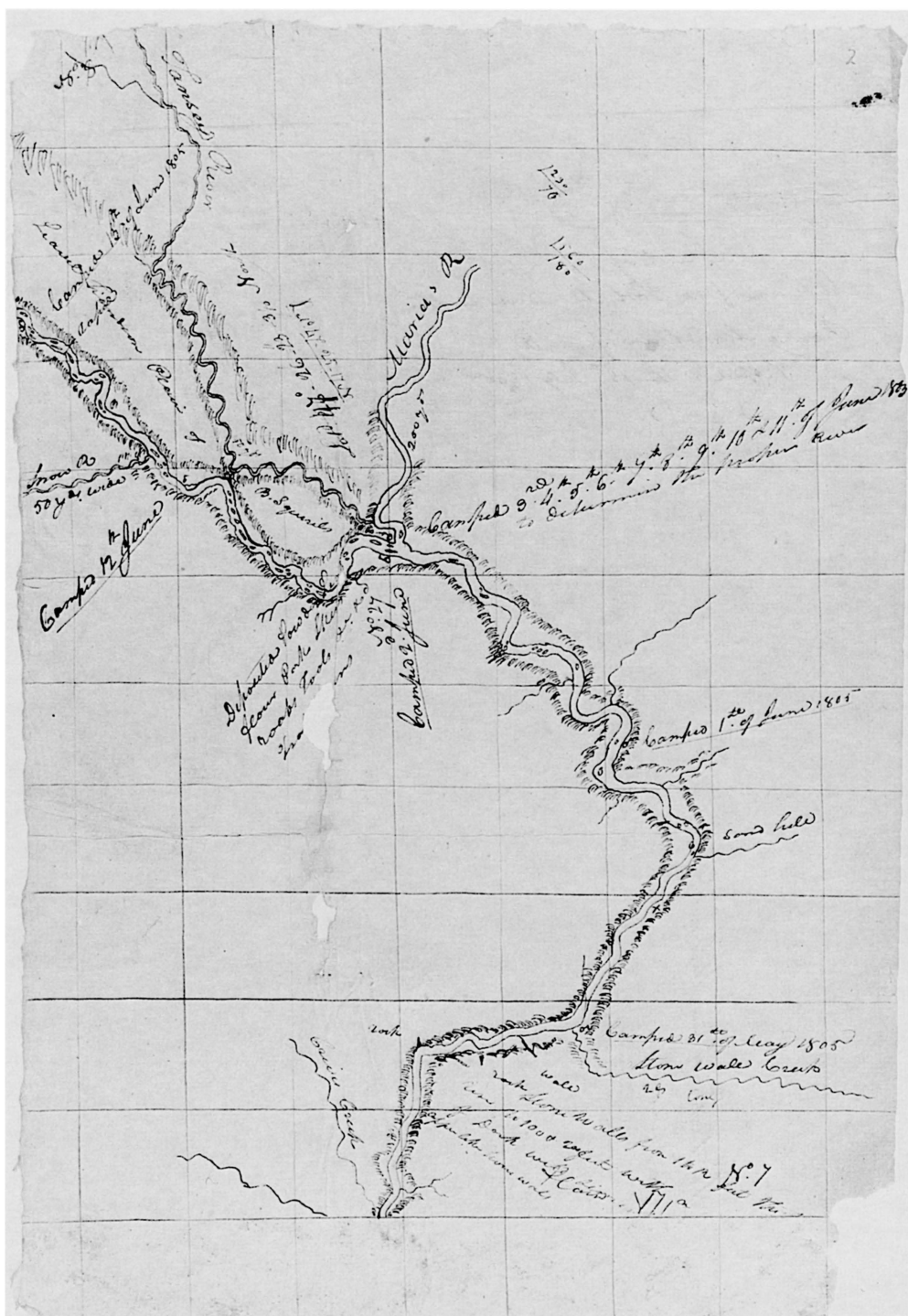


FIG. 1. William Clark Route Map 1805: "Sketch of the Missouri from Fort Mandan to the Rocky Mountains—from the 7th April to 15th July, 1805" (section). Courtesy of Yale Collection of Western Americana, The Beinecke Rare Book and Manuscript Library, Yale University.



expedition's choices and evaluated its discoveries. But the captains did not simply progress from "conjecture and speculation" to proof by field observation. Instead they rejected the details of Arrowsmith's Missouri in favor of the details provided by their Native informants. At the same time, they continued to adhere to the pattern of the Missouri that Arrowsmith had suggested. As Allen himself admits of the expedition's geographical understanding generally, though not of its cartography, "the strength of a preconception . . . allowed [Lewis and Clark] to diminish, in their assessments of the region, those features of the western environment which did not match the pre-exploratory image."<sup>31</sup> The expedition leaders' preconceptions included not only the shapes and functions of geographical features, such as mountains and rivers, but also their cartographic notation. The captains did not perceive the Missouri watershed "as it actually was" but as it was scientifically represented on authoritative maps: they identified the stream they saw before them by matching it with the pattern of flow and drainage according to which river systems were imaged/imagined in European cartography. Allen summarizes the conception of the Missouri that Lewis and Clark arrived at during the winter at Fort Mandan:

three major channels were understood as funneling the waters of the mountains into the Missouri system. The southern reaches of the farther West were drained by the Yellowstone . . . The central portions of the region were tapped by the Missouri itself, the river described by the Indians as leading to the waters of the Columbia. And through the northern sections of the territory west of the Mandans ran the Milk River, the channel "through which, those small streams, on the E side of the Rocky mountains laid down by Mr. Fidler, pass to the Missouri."

Allen adds, "This was a crucial rearrangement of the alignment of the Missouri and its tribu-

tary streams . . . [a] refinement of earlier lore."<sup>32</sup> But the "rearrangement" was simply a variation on the watershed theme. Science conceived of rivers in terms of watersheds, each river gathering volume from a number of smaller streams and flowing down to another river or the sea. Map signs were established on the basis of generally held geographical concepts such as those in John Playfair's popular *Illustrations of the Huttonian Theory of the Earth*, published in 1802. In describing rivers that "descend over the most rapid slope"—rivers that are "most subject to irregular or temporary increase and diminution"—Playfair reiterates the concept of a system that divides and subdivides in a proliferation of smaller and smaller streams. "When we trace up rivers and their branches toward their source, we come at last to rivulets, that run only in time of rain," he remarks, emphasizing the watershed or collection basin as the operating principle of this pattern. Even small rivulets, Playfair argues (following James Hutton's geological theory), can carve deep valleys by the force of their sudden descent. Playfair states "this great fact" in italics: "*rivers have, in general, hollowed out their valleys.*"<sup>33</sup> This pattern of rivers and valleys was implicit in Jefferson's instructions to Lewis:

Beginning at the mouth of the Missouri, you will take <careful> observations of latitude and longitude, at all remarkable points on the river, & especially at the mouths of rivers, at rapids, at islands, & other places . . . The interesting points of the portage between the heads of the Missouri, & of the water offering the best communication with the Pacific ocean, should also be fixed by observation.<sup>34</sup>

Lewis and Clark imposed this scientific sense of a watershed system on the Missouri and Columbia rivers they were sent to explore. Clark's maps reflect his application of the river pattern of scientific cartography. Lewis also relied on this scientific model in his "Summary view of the Rivers and Creeks" written

at Fort Mandan during the winter of 1804-05. The explorers' image of the upper Missouri is not, as Allen claims, remarkable for a shift in the kind of "data" it assembles or for failing to make "basic distinctions" between mountain streams and prairie rivers,<sup>35</sup> so much as it is remarkable for the imposition of an unchanging river pattern inherited from European cartography onto rivers both observed and unexplored. All of the descriptions in the "Summary view" repeat the distinction between "main stream" and tributaries that is fundamental to the scientific river pattern. An example is the notice of the Cheyenne River, which the expedition had passed in October 1804,

The Northern branch of this river penetrates the Black hills, and passes through a high broken well timbered country to its source, the Southern fork takes its rise in the Black hills, on their E side, and passes through a broken country covered with timber . . . then entering an open fertile and level country it continues its rout to the Missouri.<sup>36</sup>

As Playfair does, Lewis traces a river from mouth to source and/or from source to mouth indiscriminately, but either way, the river is defined and named by its nature at the mouth. Toward the source, it proliferates into smaller streams; these small streams and any lower affluents are tributaries of the main river. Each of the tributaries "falls" or "discharges" or "disembogues" into this "main stream."

Lewis's descriptions of rivers yet unexplored follow the same scientific model. During the winter at Fort Mandan, Lewis questioned resident Mandans and visiting Hidatsas to ascertain "the subsequent discription of [the Missouri], and its subsidiary streams . . . their connection with each other, and their relative positions." Whatever the Native informants' responses, Lewis recorded their descriptions as further examples of the usual pattern. Thus the Yellowstone River, at its

source a mountain stream, closely resembles the Cheyenne, a river of the plains:

from its source it takes its course for many miles through broken ranges of the Rocky mountains . . . after leaving the Rocky mountains it descends into a country more level, tho' still broken, fertile and well timbered . . . the river [then] enters an open level and fertile country through which it continues its rout to the Missouri.<sup>37</sup>

For his description of the Yellowstone, Lewis combined his own observation of rivers entering the Missouri below Fort Mandan with application of the "logical and theoretical construction" of a river system advocated by contemporary science, and reliance on Native reports of the "Mee'-ah'-zah, or *Yellowstone river*" upstream from the fort. Similarly, Lewis's description of the Milk River below the Marias owes its detail to Hidatsa reports, but its design to careful perusal of Arrowsmith's map.

. . . a river falls in on the N. side called by the Minetares *Ah-mâh-tâh, ru-shush-sheer* or the river which scolds at all others. this river they state to be of considerable size, and from its position and the direction which they give it, we believe it to be the channel through which, those small streams, on the E side of the Rocky Mountain, laid down by Mr. Fidler, pas to the Missouri . . .<sup>38</sup>

Trying, as Fidler had done three years before, to picture what Native visitors to Fort Mandan told him in terms that he could understand, Lewis imagined several rivers marked on Fidler's map as affluents of the larger "River which scolds at all others," which emptied in turn into the Missouri. Native images of the river were disregarded and only certain details retained, to be inserted into the explorers' scientific conception of a region they had not yet visited.

Consulting Arrowsmith's map at the Missouri/Marias junction, Lewis and Clark tried to balance the Native information they had been given at Fort Mandan with a European source that drew on Fidler's reports. Heckrotte explains the American explorers' repeatedly voiced doubt of Fidler's surveying abilities by referring to the successive states of the map: the first three issues had noted the extent of Fidler's survey in 1792-93, but this note, removed as of the fourth issue, "could leave a reader of the map with the impression that Fidler had travelled as far south as Bear's Tooth, shown on later states as the source of the Missouri's south branch."<sup>39</sup> Heckrotte is too generous: the 1802 states still clearly show Fidler's route to the Rocky Mountains in 1792 and his return the following year. Nor was the pattern of the upper Missouri and its tributaries, marked by the dotted lines that conventionally signified conjecture, to be understood as anything more than a hypothetical connection of the mountain sources to the surveyed lower river. King had understood the hypothetical nature of this image; on his map, the dotted lines are reinforced by the indication "Conjectural," in very large letters. Quite simply, Lewis and Clark misread the Arrowsmith map. What they found deceptive was the familiarity of Arrowsmith's Missouri—the "main stream," the proliferating tributaries, the scientifically acceptable pattern of a river system. This pattern was so plausible that the captains ignored the indication of Fidler's route, overlooked the dotted lines, and doubted the surveyor's "varacity."<sup>40</sup>

Apparently Lewis and Clark were not aware of Fidler's own reliance on Native visitors. Fidler's information about the Missouri River was not first-hand; it was derived instead from Native geographical knowledge. There is some confusion among historians over the source and nature of this knowledge. During the winter of 1802, Fidler solicited five maps from "Blackfoot" and "Fall Indian" (Siksika and Atsina) visitors to his trading post on the South Saskatchewan River. Fidler's copies of these Native maps survive.<sup>41</sup> Every commentator

except Heckrotte has leapt to the conclusion that Arrowsmith's image of the Missouri is based on the Native maps Fidler had collected a few months before. Heckrotte notes that as early as the fourth state, dated 1796 but probably issued in 1799, "new information on the geography south of 50° must have come from the Indians, through Fidler, since there is no record of any explorations to these regions." Only the second issue dated 1802 (the sixth state) could have incorporated details from the five Native maps that Fidler solicited. Heckrotte remarks that the sixth state "corrects and adds to the information which served as the basis for the Rocky Mountain region south of 50° on the two previous issues."<sup>42</sup>

In fact, transmission of Fidler's own surveys and Native geographical knowledge to Arrowsmith extended over a period of several years. The Native maps drawn for Fidler in 1801 and 1802 by Ackomokki, Kioocus, Ackoweeak (three "Blackfoot chiefs") and an unnamed "Fall Indian" were the last stage of this transmission. Fidler copied them into his own journals, and also redrew one of them, Ackomokki's 1801 map, as a separate sheet. The stages of drawing another map of his route to the Rockies ten years earlier are noted in Fidler's journal entries for March 1802. In July of that year, he sent both maps with a covering letter to the Hudson's Bay Company's board of directors:

The enclosed is a Map of my Journey from Buckingham House to the Rocky Mountain in the Years 1792 a 3; in Six sheets. There is also an extra Sheet and half annexed to the above, shewing the Rivers and other remarkable places to the Missisury river, which is taken solely from Indian information.<sup>43</sup>

Fidler's "Maps & Papers" arrived in London in late October 1802. Alexander Lean, the HBC Governor, forwarded them to Arrowsmith, writing of the transfer to Sir Joseph Banks, president of the Royal Society, and to

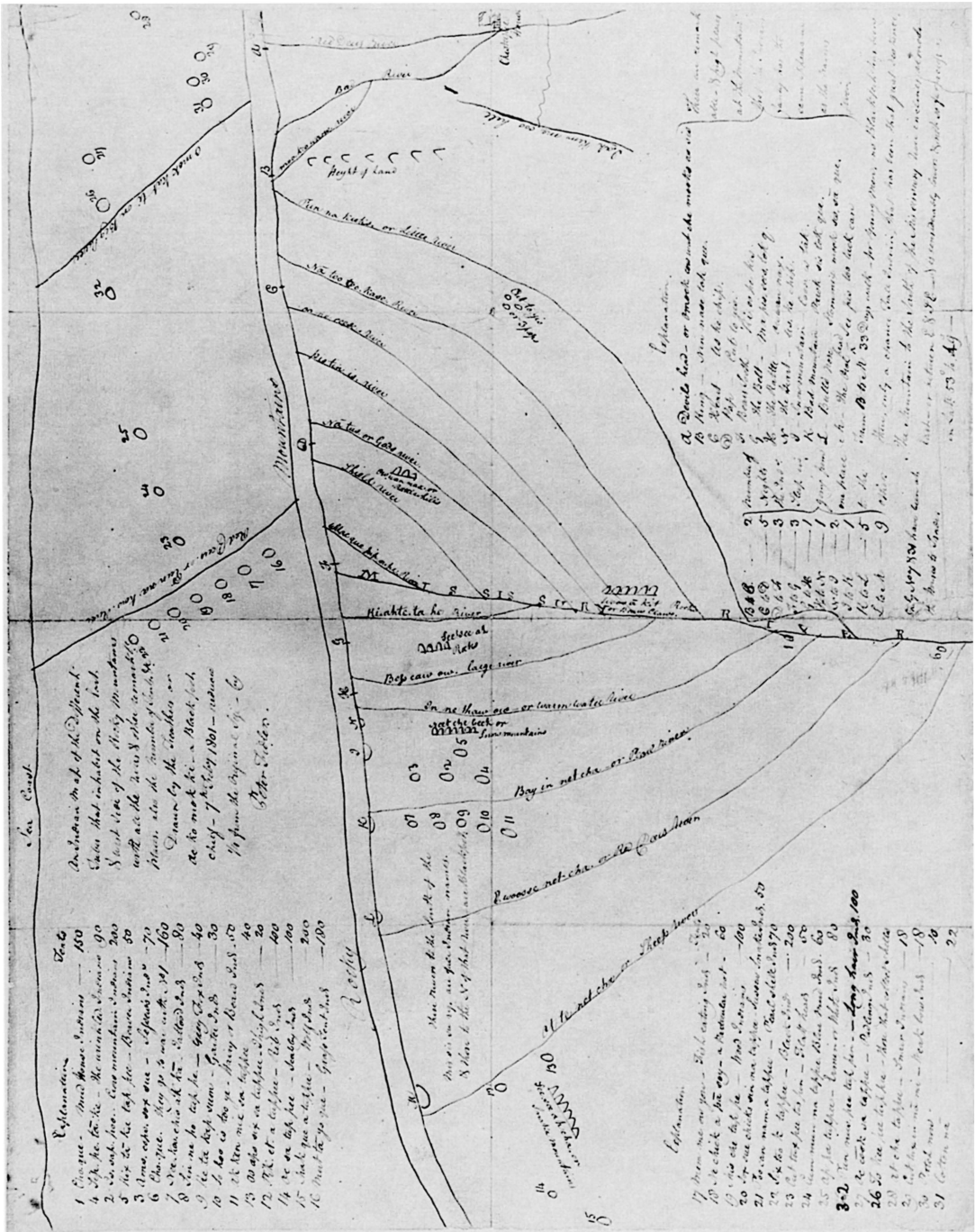


FIG. 2. Ackomokki 1801: "An Indian map of the Different Tribes that inhabit on the East & West Side of the Rocky Mountains with all the rivers & other remarkbl. places, also the number of Tents etc. Drown by the Feathers or Ac ko mok ki—a Black foot chief—7<sup>th</sup> Feb<sup>r</sup>. 1801—reduced 1/4 from the Original Size—by Peter Fidler." HBCA G.1/25 (N4157). Courtesy of Hudson's Bay Company Archives, Provincial Archives of Manitoba.



FIG. 3. Arrowsmith 1802: Aaron Arrowsmith. Map Exhibiting all the New Discoveries in the Interior Parts of North America, Inscribed by Permission to the Honorable Governor and Company of Adventurers of England Trading into Hudson's Bay, In Testimony of their liberal Communications. 1795. *Additions to 1802*. (detail). Courtesy of the National Archives of Canada NMC 19687.

Alexander Dalrymple, the Admiralty's hydrographer, both of whom were well known for their interest in exploration.<sup>44</sup> Arrowsmith seems to have used Fidler's two maps, received some time between late October and mid-December 1802, for the second issue dated 1802 (the sixth state) of his *Map Exhibiting all the New Discoveries*.

In sending his two maps to Lean in 1802, Fidler was anxious to correct and supplement an earlier report on the sources of the Missouri that he claims to have sent to the HBC Committee seven years before.

You will perceive some little difference betwixt this Map [drawn in 1802] and my former one; which I think I sent to your Honours in the Year 1795; but this [1802 map] is much the most compleat and exact of the two . . . I have put down the Rivers &c in the Indian Names, which is black feet & have translated all that I was capable of into English in the Indian map.<sup>45</sup>

The first three states of Arrowsmith's map, dated 1795 and 1796, show Fidler's journey with the Peigan band and do not extend the

Rocky Mountains south of the farthest point of his survey.<sup>46</sup> The fourth state extends the Rockies south to the Bear's Tooth and shows eight streams flowing east from the mountains. Fidler's 1802 letter seems to contrast the maps he sent to London at that time with the image of the Rockies shown on the first three states of Arrowsmith's map. These source streams reappeared on the fifth state, the first issue dated 1802, but now they were connected by dotted lines with the Missouri River at the Mandan villages. The second issue dated 1802 omits the northernmost tributary, but the pattern of the watershed, together with the kind of Native information solicited and assimilated, remains the same. Thus the cartographic image of the Missouri that Lewis and Clark attributed to Fidler was not based on the English trader's own survey, as the expedition leaders thought, nor, as historians have since claimed, was it based uniquely on the Native maps that Fidler had solicited in 1801 and 1802. Moreover, the authorship of the conjectural watershed patterns is in doubt: possibly Fidler drew the dotted lines, possibly Arrowsmith himself.

By his own admission in his letter of July 1802, however, Fidler's copying of the Native maps had already begun the process of assimilation of Native "information" into the theoretical framework of aims, acceptable details, and conventional signs that defined European scientific cartography. The maps Fidler solicited underwent three transformations: Fidler's transcription of the originals, Fidler's correlation, rationalization, and insertion of their images onto his own maps, and Arrowsmith's incorporation of Fidler's image into his series of updates. By these accommodations, Native knowledge of the upper Missouri, however and whenever acquired, was transformed into a scientifically plausible river system inscribed on an authoritative European map. At the same time, Fidler's own copying and re-copying of the five maps he solicited in 1801-02 (as well as many others during his fur-trade career) may well indicate

his tacit recognition that Native mapmakers were drawing more than he could interpret and incorporate into his own cartographic image.<sup>47</sup> The most he would acknowledge was that Ackomokki's map, forwarded with his own in 1802,

conveys much information where European documents fail, and on some occasions are of much use, especially as they shew that such & such Rivers & other remarkable places are, tho' they are utterly unacquainted with any proportion in drawing them.<sup>48</sup>

The ephemeral nature of the originals, like the maps made for Clark at Fort Mandan—"rough maps [drawn] in the dirt," and "rude drawings on animal skins or stick scratches in the dirt" according to Allen and Moulton<sup>49</sup>—points not to their insufficiency but to the way these maps were preserved and communicated. They were given graphic realization only in the context of specific situations, drawn from memory, accompanied by speech and gesture. Neither Fidler nor Clark made more than a cursory note that such conversations had taken place; their copies of Native maps are uncommented visual transcripts of an exchange that must have been much richer.

Of Fidler's copies of the maps drawn for him in 1801 and 1802, Ackomokki's first map (forwarded to London), the undated "Fall Indian" map, and a plan of journeys drawn by Kioocus in 1802 share largely unmodified conventions of Native cartography.<sup>50</sup> River routes are drawn as straight or gently curved (not wavy) lines that connect with the central line of the Missouri. The trellis pattern on these Native maps is unlike the scientific model described by Playfair and visualized by European cartographers. All of the river lines are given equal importance; all connect with the bar of the Rockies without the diminishing proliferation that is characteristic of rivers on the Arrowsmith and King maps. This is

because the lines on the Native maps depict not only water channels but the avenues or obstacles these rivers become for travelers moving east-west or north-south respectively. The even, firm lines indicate all the rivers as access roads into the mountains or fords along the front ranges; none of the rivers is privileged over the others. The central line of the Missouri River may indicate its importance as the subject of the maps in so far as they are responses to Fidler's request for knowledge about the Missouri.<sup>51</sup> Scientific cartography intrudes even on Fidler's copies. The rivers of Ackoweeak's map, though still in a trellis pattern, are drawn in the regularly undulating lines that were sometimes used for unknown coasts and rivers on European maps and that appear on Clark's transcripts of Native maps.<sup>52</sup> On both of Ackomokki's maps, the upper Saskatchewan assumes a tributary pattern, and Ackomokki's second image also shows tributaries of the Missouri.

Like Fidler, Clark requested and collected maps from Native leaders he consulted. And like Fidler's, Clark's copies of Native maps are hybrids that initiate the process of reformulation and assimilation in which Arrowsmith's published images also played shifting, repeatedly modified parts. An early example survives from the captains' outward journey, drawn by the Mandan chief Sheheke in January 1805. The Native trellis pattern persists on Clark's copy, but the explorer has transcribed each of these rivers as a regularly undulating line, a compromise between Native design and European convention that is repeated many times on his 1810 map. It is interesting to note, on the maps he requested west of the divide, the importance assumed by the Clark Fork river ("Clark's River"), which was transferred to Clark's composite maps drawn in late 1806 and in 1810. The course of "Clark's River" arcs from the Rocky Mountains to its junction with the Columbia: one river is not immediately identifiable as the tributary of the other. The original of this strange arc can be found on a Nez Perce map drawn for Clark in May 1806.<sup>53</sup>

#### PRECONCEPTIONS AND WAYS OF SEEING

But so insistent an intrusion as the arc of "Clark's River" remains exceptional in Clark's cartography. Similarly, there were moments such as the pause at the Missouri/Marias junction when Lewis and Clark were driven to suspect the insufficiency of their own understanding, but such moments did not last. "Actual observations" were used to fill in blanks, not to revise conventional images. It is difficult to appreciate just how wide a gap there must have been between the Native people's way of seeing water- and landforms, and the explorers' insistence on their own standard geographical patterns. Like Fidler and Lewis, like Arrowsmith, like Allen and Moulton, we tend to assume that our perception of geographic patterns is a direct understanding of natural phenomena—that we are accurately seeing what is there. A hint of this bias comes from explorers' tendency to rename geographical features, and historians' acceptance of these names as the "real" ones. Lewis identified the "River which scolds at all others" with the river he had named for its "peculiar whiteness"; according to Allen, this was "the Milk River of reality."<sup>54</sup> We need to remember that Lewis and Clark came west laden with scientific baggage, the chief elements of which were not their instruments but their preconceptions: their "logical and theoretical constructions," to use Allen's phrase again. We have inherited this way of seeing, as demonstrated by our scientifically correct topographical maps and geographical information systems. But the Native cartographers that Fidler engaged were under no constraint to depict the upper Missouri as a watershed. Instead their maps show the Missouri as a web of equal streams, a series of fords, a multiplicity of access routes to the mountains. The logic of the captains' choice at the Marias occasioned the expedition's long detour past the Missouri's great falls to its three forks, across Lemhi Pass, and north along the Bitterroot trail. Yet shorter, easier routes could have been found by following well-worn Native trails to the

buffalo. The captains' reliance on scientific geography actually slowed their progress, and for good reason: although they had great faith in details of Native "information" gained at Fort Mandan, they were less curious about the patterns of Native geographical knowledge.

A more "remarkable act of the mind" than that of Lewis and Clark is left for us to accomplish: to realize that river shapes and "connection with other rivers" are not limited to the watershed pattern we unthinkingly accept. This is very hard to do, since our vocabulary of rivers (*source, branch, mainstream, affluent, tributary, watershed*) reflects the hegemonic model of empirical science. We do not have appropriate words to describe or explain what is traced on the maps Fidler and Clark solicited. But we can at least acknowledge that Native maps were not simply "rude drawings," as Moulton calls them—sketchy, approximate, crude designs that European and American explorers felt obliged to revise, pulverize into "data" and insert into their own "correct" geography.<sup>55</sup> The captains' dilemma at the Missouri/Marias junction was the dilemma of all exploration, and especially of frontier cartography: the coexistence of two cultural verities—that of the Native inhabitants, and the explorers' own. In the end, one kind of knowledge could not be integrated, rationalized, reduced to the other, despite the partial inclusion of details learned from Native informants on scientific maps that the explorers carried with them. Lewis suspected Fidler's "varacity" when the periphery of Arrowsmith's map became his own center of interest. The captains were intent on replacing both Native knowledge and "erroneous" constructions with their own "actual observations," according to the progression outlined by Allen. But as we have seen, their mapping simply continued the patchwork compilation that had produced the Arrowsmith 1802 update and Clark's own Fort Mandan map. On his return Clark continued the same process of combining his own surveys with reports from Native informants and traders, selected and rationalized to conform with scientifically acceptable ideas and

patterns. His great map of the West, drawn in 1810, was engraved by Samuel Lewis and published in 1814 with the Biddle/Allen text. Arrowsmith was to extend the process by one more stage when he selectively copied information from the Samuel Lewis map onto his next update of the *Map Exhibiting all the New Discoveries*.

With Arrowsmith's 1814 update, the process of scientific enquiry that had prompted the Lewis and Clark expedition came full circle. As he had Fidler's maps, Arrowsmith gave Clark's work the *imprimatur* of scientific authority and made it available for yet further correction in the field. In their journals Fidler, Lewis, and Clark expressed a qualified awareness of and confidence in Native knowledge; on their maps, whatever the Native visitors to Fort Mandan had said about the Missouri upstream, whatever they had drawn, pointed to, and named was transformed out of recognition or rejected in favor of a "correct" scientific view. At best we can reconstruct this cultural frontier as a tentative, fragmented, one-sided account of the explorers' attempt to assimilate this knowledge into their own image of the West. The other voice of the dialogue is missing, and that absence is our loss.

#### NOTES

I would like to thank Edward H. Dahl, early cartography specialist at the National Archives of Canada, for guidance in working through the states of Arrowsmith's map, and Theodore Binnema, department of history at the University of Alberta, for very helpful suggestions.

1. Thomas Jefferson, Instructions to Lewis (20 June 1803), in *Letters of the Lewis and Clark Expedition*, ed. Donald Jackson (Urbana: University of Illinois Press, 1962), p. 61.

2. Meriwether Lewis and William Clark (2-8 June 1805) in *Journals of the Lewis and Clark Expedition*, ed. Gary E. Moulton, 13 vols. (Lincoln: University of Nebraska Press, 1983-98): 4: 242, 246-47, 265-66: Here are the high points of Lewis's account: "we came too . . . opposite to the entrance of a very considerable river . . . An interesting question was now to be determined; which of these



rivers was the Missouri . . . to mistake the stream at this period of the season . . . would not only lose us the whole of this season but . . . might defeat the expedition altogether. convinced we were that the utmost circumspection and caution was necessary in deciding on the stream to be taken. . . . The whole of my party to a man except myself were fully persuaded that this river [flowing from the northwest] was the Missouri . . . I determined to give it a name and . . . called it Maria's River . . . it is a noble river . . . one of the most interesting branches of the Missouri in a commercial point of view." In the following discussion, a few phrases from these entries are quoted without further acknowledgment.

3. Bernard De Voto, *The Course of Empire* (Boston: Houghton Mifflin, 1952), pp. 422-553 (quoted passages, pp. 553, 482). De Voto waxes eloquent on difficulties and uncertainties of the route, hostile Indians, and the manliness of the Corps of Discovery: "Men who by guts and skill had mastered the farthest wilderness, they must have had a way of standing and a look in their eyes" (541). De Voto also mentions, but does not elaborate on, the expedition's scientific aspect: "A great deal of its fruitfulness stemmed from the scientific objectives set for it . . . by Jefferson in consultation with [members] of the American Philosophical Society" (426). Lewis and Clark have always been seen as heroes: heroism is a continuous thread in the soberest scholarly texts. The shift in emphasis from adventure to science can first be seen in William H. Goetzmann, *Exploration and Empire* (New York: Knopf, 1966), pp. 3-8, 24-29. Goetzmann suggests that "Lewis and Clark might almost be considered a logical extension of the American Philosophical Society," contending that "the most important fact about the Lewis and Clark expedition . . . is the degree to which it was 'programmed,' or planned in advance, down to the smallest detail by Jefferson and his scientific associates in Philadelphia" (5). Another thread that can be traced in historical commentary on the expedition is that of its imperial mission.

4. John L. Allen, "Lewis and Clark on the Upper Missouri: Decision at the Marias," *Montana* 21 (Summer 1971): 3-17; John Logan Allen, *Passage Through the Garden* (Urbana: University of Illinois Press, 1975). The quoted passages are from Allen, "Lewis and Clark on the Upper Missouri," p. 15, and *Passage Through the Garden*, pp. 261, 241, 210, and 89.

5. Paul Russell Cutright, *Lewis and Clark: Pioneering Naturalists* (Urbana: University of Illinois Press, 1979).

6. James P. Ronda, *Lewis and Clark among the Indians* (Lincoln: University of Nebraska Press, 1984); James P. Ronda, "'A Chart in his Way':

Indian Cartography and the Lewis and Clark Expedition," in *Mapping the North American Plains*, ed. Frederick C. Luebke, Frances W. Kaye and Gary E. Moulton, (Norman: University of Oklahoma Press in association with the Center for Great Plains Studies at University of Nebraska-Lincoln, 1987); James P. Ronda, "Exploring the Explorers: Great Plains People and the Lewis and Clark Expedition," *Great Plains Quarterly* 13, no. 1 (1993): 81-90; James P. Ronda, "Dreams and Discoveries: Exploring the American West, 1760-1815," *William and Mary Quarterly* 46, no. 1 (1989): 145-62; James P. Ronda, "A Knowledge of Distant Parts: The Shaping of the Lewis and Clark Expedition," *Montana* 41, no. 4 (1991): 4-18. The article on Native cartography ("A Chart in his Way") is of greatest interest here; in it Ronda claims that "despite arbitrary symbols not part of their learning and lore, and despite divergent ways of understanding the physical world, Lewis and Clark did succeed in gaining important information from Indian maps" (87).

7. In his introduction to the *Journals*, Moulton confirms the emphasis of recent historians on the scientific achievement of Lewis and Clark: "[Lewis and Clark] were to observe the whole range of natural history and ethnology of the area, and the possible resources for future settlers. Jefferson expected a great deal of two infantry officers, but they met the challenge. Lewis, a student of plants and animals since boyhood, made significant additions to zoological and botanical knowledge . . . Only in recent decades have his contributions been fully appreciated" (*Journals*, ed. Moulton [note 2 above] 2: 5). In his introduction to the *Atlas*, Moulton's praise of Clark's mapping skills is generous: "One is . . . amazed at his drafting capabilities. . . . [His 1810 map] was the beginning of a new generation of maps—maps that would accurately portray the American West because they were based on actual field sightings and acute topographic inference" (*Journals*, ed. Moulton [note 2 above] 1: 4, 13). Moulton acknowledges his reliance on Allen's *Passage Through the Garden*, and in a note to the Missouri/Marias sequence, he states that "the episode at the Marias is ably covered" in Allen's article, "Lewis and Clark at the Upper Missouri" (*Journals*, ed. Moulton [note 2 above] 4: 253 n. 7). See also Gary E. Moulton, "On Reading Lewis and Clark: The Last Twenty Years," *Montana* 38, no. 3 (1988): 28-39; Moulton's review of recent studies of the expedition claims that "among specialized books about the trail, John L. Allen's *Passage Through the Garden* will remain a classic" (35). Historians of the Lewis and Clark expedition have built on each other's work, so that although there have been shifts in emphasis, especially to acknowledge Native assistance, there has been no radical break or

opposition over the last four decades. Each contribution adds to or extends previous arguments.

8. Allen, *Passage Through the Garden* (note 4 above), p. 180.

9. *Ibid.*, p. 254.

10. *Ibid.*, p. 253.

11. *Ibid.*, pp. 253, 225.

12. Warren Heckrotte, "Aaron Arrowsmith's Map of North America and the Lewis and Clark Expedition, *The Map Collector* 39 (Summer 1987): 16.

13. Thomas Jefferson, Annual Message to Congress, revised draft (2 December 1806), in *Letters*, ed. Jackson, (note 1 above), p. 352.

14. Moulton, Introduction to the *Atlas* (*Journals*, ed. Moulton [note 2 above] 1: 4); Silvio A. Bedini, "The Scientific Instruments of the Lewis and Clark Expedition," in *Mapping the North American Plains* (note 6 above), pp. 93-110. Cf. Anne Godlewska, "The Napoleonic Survey of Egypt," *Cartographica* 25, nos. 1 and 2 (1988): 17-28, and J. S. O. Jelly, "Early Methods of Topographical Survey," in *A History of the Ordnance Survey*, ed. W. A. Seymour (Folkestone: Dawson, 1980), pp. 1-17.

15. Philip Turnor, who taught Peter Fidler the elements of surveying and whose work for the Hudson's Bay Company Arrowsmith acknowledged, met Mackenzie returning from the Arctic in 1789 and wondered if the explorer knew exactly where he had been. See Aaron Arrowsmith, *Companion to a Map of the World* (London: George Bigg, 1794), p. 18, and *The Journals of Samuel Hearne and Philip Turnor*, ed. J. B. Tyrrell (Toronto: Champlain Society, 1934), p. 317.

16. Jefferson to Benjamin Smith Barton (27 February 1803), Jefferson to Caspar Wistar (28 February 1803), and Jefferson to Benjamin Rush (28 February 1803); Lewis to the Public, printed in the *National Intelligencer* (14 March 1807), the Conrad Prospectus (1 April 1807) and the Biddle Prospectus (May 1810); cf. [David McKeehan] to Lewis, printed in the *Pittsburgh Gazette* (7 April 1807), Conrad & Co. to Jefferson (13 November 1809), Clark to F. R. Hassler (26 January 1810), Clark to Benjamin Smith Barton (22 May 1810) and Biddle's correspondence (1810-14) in *Letters*, ed. Jackson, pp. 16-19, 385-86, 394-97, 546-48, 468-69, 491-92, 548-49, 494-599. Basing his analysis on Paul Russell Cutright, *A History of the Lewis and Clark Journals* (Norman: University of Oklahoma Press, 1976), Moulton devotes a long section of his introduction (*Journals*, ed. Moulton [note 2 above] 2: 35-42) to the many problems of publication and preservation of the expedition's documents and collections.

17. Lewis himself was dissatisfied with picturesque descriptions, but he could not see western

topography as other than a series of landscapes. At the great falls of the Missouri he noted (13 June 1805): "after wrighting this imperfect discription I again viewed the falls and was so much disgusted with the imperfect idea which it conveyed of the scene that I determind to draw my pen across it and begin agin . . . I wished for the pencil of Salvator Rosa . . . or the pen of Thompson . . ." (*Journals*, ed. Moulton [note 2 above] 4: 285). Cf. Lewis's "Summary view of the Rivers and Creeks" (*Journals*, ed. Moulton [note 2 above] 3: 336-69).

18. Matthew Edney, "Cartography without 'Progress': Reinterpreting the Nature and Historical Development of Mapmaking," *Cartographica* 30, nos. 2 and 3 (1993): 54-68. Edney applies to cartography what Michel Foucault declared characteristic of empirical science generally, in *Les Mots et les choses* (Paris: Gallimard, 1966): 144-45: "l'histoire naturelle n'est pas devenue possible parce qu'on a regardé mieux et de plus près. Au sens strict, on peut dire que l'âge classique s'est ingénié, sinon à voir le moins possible, du moins à restreindre volontairement le champ de son expérience. L'observation, à partir du XVIIe siècle, est une connaissance sensible assortie de conditions systématiquement négatives. Exclusion, bien sûr, duouï-dire . . . privilège presque exclusif de la vue, qui est le sens de l'évidence et de l'étendu." ["Natural history did not become possible because men looked harder and more closely. One might say, strictly speaking, that the classical age used its ingenuity, if not to see as little as possible, at least to restrict deliberately the area of its experience. Observation, from the seventeenth century onward, is a perceptible knowledge furnished with a series of systematically negative conditions. Hearsay is excluded, that goes without saying . . . which leaves sight with an almost exclusive privilege, being the sense by which we perceive extent and establish proof." Michel Foucault, *The Order of Things* (a translation of *Les Mots et les choses*) (New York: Pantheon Books, 1970), pp. 132-33.]

19. Allen, *Passage Through the Garden* (note 4 above), pp. 97-98.

20. Allen, *ibid.*, p. 78, refers to "the group of maps that Gallatin called 'the three maps of Arrowsmith.' Aaron Arrowsmith . . . had produced many maps of North America that were available in the United States, either as separate sheets or as smaller versions included in many of the published works on North American geography. Although it cannot be definitely known just which of Arrowsmith's many maps Gallatin was referring to, it is most likely that at least two of them were the widely circulated 1795 and 1802 editions of the British cartographer's large map of North America." By 1803 Arrowsmith had published six states of *A Map Exhibiting all the New Discoveries in the Interior*

*Parts of North America* as well as the map of North America illustrating Mackenzie's *Voyages from Montreal*. Maps based on Arrowsmith's but drawn by other cartographers (the King 1803 map of North America is a good example) would not be counted as Arrowsmith maps. Heckrotte, "Aaron Arrowsmith's Map" (note 12 above), p. 20, explains Gallatin's "three maps of Arrowsmith" as the three sheets of first issue dated 1802 of the *Map Exhibiting all the New Discoveries*. The second issue dated 1802 comprised six sheets since the map was extended south to N30°.

21. Heckrotte, "Aaron Arrowsmith's Map" (note 12 above), pp. 16-20. Heckrotte's identification of the "River which scolds at all others" with the Marias River (rather than the Milk River) seriously weakens his argument that Lewis and Clark carried the first issue with them.

22. Godlewska, "Napoleonic Survey" (note 14 above), p. 1; see also pp. 13, 36-40. Like Lewis and Clark, who consulted Arrowsmith's and King's composite maps of western North America, at least one of the French surveyors carried D'Anville's "office compilation" of Egypt with him in the field (141), despite the fact that it had been drawn and published in Paris forty years before. Lewis was also prepared to rely on a D'Anville map as one of the sources of King's compilation—see Lewis to Jefferson (29 May 1803) in *Letters*, ed. Jackson (note 1 above), p. 53. The recent, even very recent, updating of Arrowsmith's *Map Exhibiting all the New Discoveries . . . Additions to 1802* would have been seen as affording Lewis and Clark an unusual advantage.

23. Moulton, introduction to the *Atlas (Journals 1)*, ed. Moulton [note 2 above]: 10; Ronda, *Lewis and Clark among the Indians* (note 6 above), pp. 67-132. Allen, *Passage Through the Garden* (note 4 above), p. 312, distinguishes between "the real world of geographical knowledge, as mapped and surveyed" (in that order), and "the fantasy of geographical unknowns."

24. Allen, "Lewis and Clark on the Upper Missouri" (note 4 above), pp. 5-8, and *Passage Through the Garden* (note 4 above), pp. 226-51, 283.

25. The south branch can be identified with the Yellowstone River, the "River which scolds at all others" with the Milk River. Cf. Allen, *Passage Through the Garden* (note 4 above), p. 244.

26. Lewis's journal (3 June 1805) records the captains' uncertainty as they tried to reconcile Arrowsmith's Missouri with what Mandans and Hidatsas had told them over the previous winter: "what astonishes us a little is that the Indians who appeared to be so well acquainted with the geography of this country should not have mentioned this river on wright hand if it be not the Missouri; *the river that scolds at all others*, as they call it if there

is in reallity such an one, ought agreeably to their account, to have fallen in a considerable distance below, and on the other hand if this right-hand or N. fork be the Missouri I am equally astonished at their not mentioning the S. fork . . ." (*Journals*, ed. Moulton (note 2 above) 4: 248).

27. Much quoted, Lewis's journal entries (8-9 June 1805) register the explorers' loss of confidence in Arrowsmith's depiction of the Missouri: "I now began more than ever to suspect the varacity of Mr. Fidler or the correctness of his instruments. for I see that Arrasmith in his late map of N. America has laid down a remarkable mountain in the chain of the Rocky mountains . . . said to be from the discoveries of Mr. Fidler . . . The information of Mr. Fidler incorrect . . . for if he has been along the Eastern side of the rocky mountains as far as even Latd. 47° . . . and saw only rivulets making down from those mountains the presumption is very strong that those little streams do not penetrate the rocky Mountains . . . The Indian information also argued strongly in favor of the South fork . . ." (*Journals*, ed. Moulton [note 2 above] 4: 266-67, 269-70). Cf. Godlewska, "Napoleonic Survey" (note 14 above), who reviews the exactly contemporary attempt of French military officials to standardize government mapping procedures: reliance on previous maps was recommended as long as the user read them critically, always skeptical and on the lookout for error (pp. 39-40). Nicholas Biddle's notes record Clark's criticism of Broughton's survey of the Columbia River mouth: "Vancouver wrong in placing an island off Cape Adams—there is a shoal . . . Haleys bay badly put in Vancouver. The course pretty much as he says of the river." (*Letters*, ed. Jackson [note 1 above], pp. 540-41).

28. Ronda, *Lewis and Clark among the Indians* (note 6 above), p. 129; Moulton, introduction to the *Atlas (Journals, ed. Moulton [note 2 above] 1: 5)*; Allen, *Passage Through the Garden* (note 4 above), pp. 211-14, 231-51. No one would disagree with Allen's statement that "inaccuracies and distortions present in the view from Fort Mandan were there not because of the reliance on concepts drawn from pure conjecture, but because of the deformations that appear in any geographical image, however rationally derived, that is based on less than full information and therefore subject to interpretation and interpolation from the lore that is available" (231). It should be kept in mind, however, that the "information" of Native maps and reports was not only "less than full" but of a different kind from that of the explorers' "geographical image." When Allen refers to "rough maps . . . [drawn] in the dirt floors" (211), and explains the way in which these maps were understood—"Clark incorporated the data of the

Minitari war chief into the 'Map of the Countrey on the Missouries . . .' [Clark's Fort Mandan map]" (214)—the reader infers that Native cartography was crude and valued only for details that were provisionally placed on the explorers' own maps. Ronda, in "A Chart in his Way" (note 6 above), pp. 87-89, recognizes that "beneath those lines, marks, and heaps of sand was a different way of seeing the world," and suggests that Lewis and Clark respected the difference, even went some way towards understanding the other way. But in accepting Lewis's claim that he and Clark learned this "different way" easily enough to employ it convincingly, Ronda perhaps underestimates the extent of the difference and certainly attributes to the explorers a much finer understanding than any historian has so far demonstrated.

29. Allen, *Passage Through the Garden* (note 4 above), pp. 275, 282, and Moulton, "On Reading Lewis and Clark" (note 7 above), p. 35.

30. Cf. Clark's report of Lewis's arrival at the falls, which emphasizes confirmation of Native reports (14 June 1805): "Capt Lewis dates his letter from the Great falls of the Missouri . . . Capt. L. informs the [party?] that those falls; in part answer the discription given of them by the Indians, much higher the Eagles nest which they describe is there; from those Signs he is Convinced of this being the river the Indians call the Missouri" (*Journals*, ed. Moulton [note 2 above] 4: 295, Moulton's interpolation).

31. Allen, *Passage Through the Garden* (note 4 above), p. 225.

32. *Ibid.*, p. 245.

33. John Playfair, *Illustrations of the Huttonian Theory of the Earth* (1802; rpt. New York: Dover, 1956), pp. 350-53. Recommended map signs for rivers and streams can be seen, for example, in the French government's regulations issued to its cartographic departments in 1803-05: see Godlewka, "Napoleonic Survey," (note 14 above), pp. 24-25, 127, 129, who provides tables and illustrations of the ways in which geographical features were to be drawn on maps for the Napoleonic survey of Egypt.

34. Jefferson, Instructions to Lewis (20 June 1803), in *Letters*, ed. Jackson (note 12 above), pp. 61-62 (Jackson's emendation).

35. Cf. Allen, *Passage Through the Garden* (note 4 above), pp. 234, 243: "Combining the best previous knowledge on the area from both written and oral sources with their own firsthand observations, the American explorers came up with a highly realistic picture of the lower reaches of the rivers that flowed into the Missouri between its mouth and the Great Bend. The accuracy of their view declined toward the interior, however. . . . The critical lack, both conceptual and experiential, in

the captains' background was relative familiarity with the basic distinctions between rivers of the plains and those which flowed through the various ranges of the Rockies. Such unfamiliarity was understandable: Lewis and Clark had yet to see a mountain stream, and the Yellowstone was the first river in their image of the trans-Missouri region which was even understood to be a stream which flowed through mountains for great distances before passing out onto the plains."

36. Lewis, "A Summary view of the Rivers and Creeks which discharge them[selves] into the Missouri," in *Journals*, ed. Moulton (note 2 above) 3: 336-369, quoted passage 359. Moulton groups Lewis's "Summary view" and Clark's corresponding table under the title "Affluents of the Missouri" (*Journals*, ed. Moulton 3: 335).

37. *Ibid.*, pp. 363-64.

38. *Ibid.*, p. 365.

39. Heckrotte, "Aaron Arrowsmith's Map" (note 12 above), p. 18.

40. Neither Allen nor Moulton comments on the American explorer's misreading of the cartographic conventions of Arrowsmith's map. This is all the more surprising, since Arrowsmith was unusually scrupulous in noting what had been explored by Europeans and what was reported or conjectural. Cf. Godlewka, "Napoleonic Survey" (note 14 above), pp. 135-36: "A variety of historical sources were used by the compiler. The most valuable were maps by explorers who had visited the region about which information was needed. . . . The compiler used these sources critically and comparatively to fill lacunae left by the fieldwork. It is clear that historical sources were accorded great respect. Indeed, although the compiler claimed that the details about which he was uncertain were drawn on the maps with broken lines, this did not apply to information derived from historical sources. Thus, information must have been considered of sufficient quality in this period to be placed, unacknowledged, on the map alongside and integrated into surveyed data." Despite their indignation concerning Fidler's "varacity," Lewis and Clark themselves participated in cartographic speculation. Allen, *Passage Through the Garden* (note 4 above), p. 242, describes how they "hypothesized the river" they named White Earth: "By amalgamating misconstrued data that had probably been given them regarding other northern tributaries of the Missouri, the captains 'invented' [why quotation marks?] a stream to match their conceptions of idealized [sic] western geography."

41. HBCA G.1/25, B.39/a/2, E.3/2, Hudson's Bay Company Archives, Provincial Archives of Manitoba (PAM). See *A Country So Interesting: the Hudson's Bay Company and Two Centuries of*

*Mapping, 1670-1870*, ed. Richard Ruggles (Kingston and Montreal: McGill-Queen's University Press, 1991), pp. 63-64, 199-200, and plates 19, 20; see also D. W. Moodie and Barry Kaye, "The Ac Ko Mok Ki Map," *Beaver* 307, no.4 (1977): 4-15, and Judith Hudson Beattie, "Indian Maps in the Hudson's Bay Company Archives: A Comparison of Five Area Maps Recorded by Peter Fidler, 1801-1802," *Archivaria* 21 (1985-86): 166-75. Cf. Allen, *Passage Through the Garden* (note 4 above), p. 19: "Peter Fidler . . . apparently followed instructions received from natives during his travels in the Canadian West . . . Fidler's map was available to cartographers of the last few years of the eighteenth century. . . ." Fidler's two maps sent to London in 1802 were not circulated; the HBC made them available only to Arrowsmith. Any subsequent cartographic copying would have been from Arrowsmith's map, not Fidler's.

42. Heckrotte, "Aaron Arrowsmith's Map," pp. 18, 20.

43. Peter Fidler to the HBC London Committee, dated Oxford House, 10 July 1802, HBCA A.11/52, Hudson's Bay Company Archives, PAM.

44. Alexander Lean to Alexander Dalrymple, dated Hudson's Bay House, 17 December 1802; Alexander Lean to Sir Joseph Banks, dated Hudson's Bay House, 17 December 1802, HBCA A.5/4, Hudson's Bay Company Archives, PAM. See also *Saskatchewan Journals and Correspondence*, ed. Alice Johnson (London: Hudson's Bay Record Society, 1967), pp. 319n and 320n.

45. Peter Fidler to the HBC London Committee, dated at Oxford House, 10 July 1802, HBCA A.11/52, Hudson's Bay Company Archives, PAM.

46. Fidler's "running survey" method, using prominent peaks as bearings, is described in his journal of the winter he spent with the Peigan band: see HBCA E.3/2, Hudson's Bay Company Archives, PAM.

47. Fidler continued to solicit Native maps even after the regions they depicted had been surveyed scientifically: see *A Country So Interesting*, ed. Ruggles (note 41 above), pp. 65-66, 201-04, and plates 12, 16, 17, 22, 23.

48. Peter Fidler to the HBC London Committee, dated at Oxford House, 10 July 1802, HBCA A.11/52, Hudson's Bay Company Archives, PAM.

49. Allen, *Passage Through the Garden* (note 4 above), p. 211; Moulton, introduction to the *Atlas (Journals)*, ed. Moulton [note 2 above] 1: 10).

50. For characteristics of North American Native maps and mapping, see G. Malcolm Lewis, "Indian Maps: Their Place in the History of Plains Cartography," in *Mapping the North American Plains*, ed. Luebke (note 6 above), pp. 63-80; "Misinter-

pretation of Amerindian Information as a Source of Error on Euro-American Maps," *Annals of the Association of American Geographers* 77 (1987): 542-63; and "Metrics, Geometrics, Signs, and Language: Sources of Cartographic Miscommunication between Native and Euro-American Cultures in North America," *Cartographica* 30, no. 1 (1993): 98-106. Cf. Barbara Belyea, "Amerindian Maps: The Explorer as Translator," *Journal of Historical Geography* 18, no. 3 (1992): 267-77; Mark Warhus, *Another America* (New York: St Martin's Press, 1997); Barbara Belyea, "Inland Journeys, Native Maps," *Cartographica* 33, no. 2 (1996): 1-16; *The History of Cartography*, ed. J. B. Harley and David Woodward, 6 vols. (Chicago: University of Chicago Press, 1987-), III, forthcoming; and *Cartographic Encounters*, ed. G. Malcolm Lewis (Chicago: University of Chicago Press), forthcoming.

51. See G. Malcolm Lewis, "An Early Map on Skin of the Area Later to Become Indiana and Illinois," *The British Library Journal* 22, no. 1 (Spring 1996): 66-87.

52. Christian Jacob, "Il faut qu'une carte soit ouverte ou fermée: le tracé conjectural," *Revue de la Bibliothèque Nationale* 45 (1992): 39: "Il est certains cas où le tracé se désigne lui-même comme conjectural . . . [Ce] tracé est beaucoup plus simple que celui des régions déjà explorées . . . un contour prospectif, qui anticipe sur l'exploration à venir. La ligne suffit ainsi à créer l'espace qu'elle ne peut représenter." ["It Is Necessary That a Map Be Open or Closed: The Conjectural Drawing." "There is a certain case where a line is designed to show that what it represents is conjectural . . . This line is always more simple than that delineating regions that have already been explored . . . a prospective outline, that anticipates explorations to come. The line suffices, thus, to create the space that it cannot represent." (translation by editor)]

53. See Ronda, "A Chart in his Way" (note 6 above), pp. 83, 88.

54. Allen, *Passage Through the Garden* (note 4 above), p. 244 (my emphasis).

55. Cf. Godlewska, "Napoleonic Survey" (note 14 above), p. 136: "Information from indigenous sources was regarded with suspicion and even hostility by both the compiler and his surveyors [Napoleon's cartographers in Egypt]. Nevertheless it was extensively used, [though] never directly and openly acknowledged. It is conceivable that this pervasive ambiguity toward indigenous sources of information reflects an ideology of cultural superiority . . . perhaps many of the earliest European maps of newly conquered territories ought to be reexamined for influences from indigenous sources and traditions of mapping."