SYNOPSIS. The Lewis and Clark Expedition was the culmination of a series of efforts by Thomas Jefferson to explore the American West. The journey began at Wood River, Illinois, on May 14, 1804, and concluded with the return of the party to St. Louis on September 23, 1806. During its two years, the expedition went up the Missouri River to its sources, crossed the Rockies, wintered on the Oregon coast, and retraced most of its original route back to St. Louis. Lewis and Clark devoted much of their energy along the way to the observation, description, and collection of botanical and zoological specimens. The principal zoological results of this exploration were the discovery of more than 100 new types of animals, the presentation of these finds to the world of Western science, and the stimulation of subsequent exploratory trips into the Louisiana Territory. The most lasting consequences of the expedition were its opening of vast territories to settlement, the introduction of exploitative activities like fur-trapping, and the conversion of large tracts of forest and prairie to farmland.

Is there anything left to say about the Lewis and Clark Expedition? Has any exploration been studied more intensively and extensively? Perhaps the answer to both questions is no, yet what these wilderness-wise explorers achieved between 1804 and 1806 has left a lasting imprint. No symposium on the natural history of the West can neglect their enormous achievement.

The expedition was, to say the least, gigantic in scope. It began in Missouri and Illinois, and passed through parts of the present states of Kansas, Nebraska, Iowa, South Dakota, North Dakota, Montana, Idaho, Oregon, and Washington. This was a huge portion of the upper Louisiana Purchase. The explorers found no Northwest Passage or other easy route to the West Coast. They noted two major mountain ranges, not one, between the Mississippi and the Pacific. They made initial contacts with Indian nations, mapped rivers and mountains, described geographic features previously unknown to western science, and laid the groundwork for future trade routes and commercial connections. They were also botanists on a grand scale. But it is their contributions to zoology that concern us here.

It all began with Thomas Jefferson; most such things did in those days. And the expedition was actually Jefferson’s fourth attempt to have the American West explored. As early as 1783, he had asked George Rogers Clark to conduct an expedition beyond the Mississippi (Jefferson, 1783). Clark declined (G. R. Clark, 1784). Loaded with debts, the 31-year-old hero of the Revolution felt unable to accept the challenge. Furthermore, 1783 found Congress floundering in its worst period of pre-Constiution ineptitude. In all probability, the scheme would have come to nought even if Clark had accepted (Jefferson, 1783).

Jefferson tried again in 1786. This was a rather bizarre, though almost successful, attempt to enter western North America from Asia. The plan originated with John Ledyard, a Connecticut-born explorer, who presented it to Jefferson, then the American Minister to France. Ledyard proposed to travel across Russia and Siberia to the Kamchatka Peninsula (Jefferson, 1788; Gottschalk, 1950, pp. 266–269). Jefferson, aided by Lafayette, was able to raise some money in Paris from Baron de Grimm, the personal emissary of Russian Empress Catherine the Great (Jefferson, 1786; Lafayette, 1786; Ledyard, 1786, 1787a, b). In St. Petersburg, France’s Ambassador to Russia also helped the cause along by requesting permission from the Empress for Ledyard’s trek. The explorer, assuming all was well, sailed to England, collected...
some more money, and landed in St. Petersburg early in 1787. Catherine was not there at the time, but since he had already received money from de Grimm, Ledyard set out, taking it for granted that the Empress had approved his expedition. He had almost reached the Pacific when his error was revealed. Catherine had, in fact, vetoed the whole scheme as soon as she learned of it (Jefferson, 1821). But word of her disapproval did not reach Ledyard until Russian agents picked him up in Siberia, and returned him posthaste to Poland. There he was unceremoniously dumped, thousands of miles from the Pacific he had almost reached.

The third abortive attempt occurred in 1793, while Jefferson was Secretary of State. This plan involved the French botanist and explorer André Michaux. Jefferson prepared a detailed set of instructions (Jefferson, 1793a) and even gained financial backing from so bright a luminary as President Washington (Jefferson, 1793b; Washington, 1793). Interestingly, a role in this expedition was requested by Meriwether Lewis (Fig. 1; Jefferson, 1813). The whole project fell through, however, when Michaux was accused of being a French spy, and sent home (Coues, 1895, I, p. xx, note 3).

With Jefferson’s accession to the Presidency in 1801, his ostensible motivations for western exploration became commercial. Although in his instruction to Michaux (Jefferson, 1793a), Jefferson had indicated a desire to find the shortest and best route to the Pacific, to gain a knowledge of the territory, its people, its products, and its geography, in his secret message to Congress of January 18, 1803, he emphasized the trade potential of the new territory almost exclusively (Jefferson, 1803a). This was the only motivation for such an expedition that the President considered constitutional. But his earlier goals persisted. In a personal letter to his French fellow scientist, Bernard de Lacépède, a zoological agenda appears (Jefferson, 1803b). Among other things, the President hoped a western expedition might find mammoths or giant sloths roaming the Louisiana Territory.

The biological motives emerge even more clearly in a letter to Benjamin Smith Barton in Philadelphia (Jefferson, 1803c). Could Barton prepare notes on botany, zoology, and the Indian languages and history for Lewis? The explorer would spend three weeks in Philadelphia to exchange ideas on these and other matters. Caspar Wistar was also requested to inform Lewis about those areas of natural science where contemporary knowledge most needed supplementation (Jefferson, 1803d). Another request went to Benjamin Rush calling for advice concerning the medical needs of the expedition, as well as suggestions for ways to study sanitary and health conditions among the trans-Mississippi Indians (Jefferson, 1803e). Other scientists were called on to instruct Lewis in the use of instruments for determining geographic position (Elliot, 1803; Jefferson, 1803f). All these scientists spent time with Lewis and, indeed, provided him with most of the semi-formal training he could claim in natural history. Any lingering doubt that Jefferson wanted Lewis to deal with biological
matters is dispelled in the President’s instructions on June 20, 1803 (Coues, 1893, I, pp. xxiii–xxxiii). Lewis is expected to note “the animals of the country generally, especially those not known in the United States”; “the remains and accounts of any which may be deemed rare or extinct”; and “the times of appearance of particular birds, reptiles, or insects.” Moreover, such information was to be checked on the return journey.

Up to this point, we have been dealing with Lewis only. William Clark (Fig. 2) did not enter the story until June 19, 1803, when Lewis invited him to join the expedition as its co-leader (Lewis, 1803). Within a month Clark had accepted (W. Clark, 1803a, b).

Why did this fellow Virginian emerge as Lewis’s choice to share command of the expedition? Probably because Lewis had served under him in the Army, and got along famously with him. Lewis trusted Clark and both possessed frontier backgrounds and experience. Clark had even less formal training in natural history than had Lewis, but both were familiar with the flora and fauna of the eastern United States, and both were excellent frontiersmen, capable of adapting, improvising, and enduring in the face of danger and difficulty. Hindsight proves they were the best possible choices, for they got the expedition safely to the Pacific and back. The fact that they were not professional naturalists was no hindrance to the successful completion of their task (De Voto, 1953, pp. xliii–xliv; Jackson, 1978, I, p. 218, footnote).

One further point to note here is that Jefferson had decided on the expedition months before the actual purchase of Louisiana, before, in fact, there was any thought of acquiring anything but the territory around New Orleans and what was then called West Florida. Jefferson, in enlisting Lewis as his personal secretary (Jefferson, 1801), mentioned that Lewis’s knowledge of the West was a major reason for requesting his services. In December 1802, Spain’s Minister to the United States, the Marques de Casa Yrujo, told his foreign minister that Jefferson had inquired whether an exploratory mission into upper Louisiana would offend His Catholic Majesty (Yrujo, 1802). Yrujo had already replied to the President that such an undertaking would surely be unacceptable to the Spanish government.

Nonetheless, Jefferson sent a secret message to Congress proposing just such an expedition (Jefferson, 1803a), and by the next month, as we have seen, he was writing to his associates in the American Philosophical Society, enlisting their cooperation (Jefferson, 1803c, d, e). Furthermore, Lewis’s British passport was dated February 28, 1803 and his French passport March 1, 1803 (Jackson, 1978, I, pp. 19–20).

Announcement of the Louisiana Purchase did not reach Washington until July 3, 1803. By that time, Lewis was impatiently making his preparations. He had already received his scientific briefings, and it is clear that the expedition would have set out, treaty or not. But the Purchase made possible a larger undertaking. Without it there might have been a four or five-man effort, something like the proposed
Michaux expedition of 1793, but once Louisiana had been procured, the expedition became full-scale, involving about 30 men and, later, one extremely valuable Indian woman.

After his course of instruction in Philadelphia, Lewis spent most of the summer of 1803 acquiring equipment, recruiting personnel, and establishing contacts with Spanish and French officials, many of whom were unaware that the Louisiana Territory had actually passed to the United States.

On May 14, 1804, the expedition set out from Wood River, Illinois, a short distance up the Mississippi from St. Louis (Coues, 1893, I, p. 4). Lewis, who had been finishing up some business in St. Louis, joined the rest of the group by land several days later. On May 18, Lewis shipped Jefferson a collection of mineral and biological odds and ends, including the contents of a bison's stomach and a live horned toad (Lewis, 1804).

Up the Missouri the expedition went, 31 men in three boats. The party was self-supporting, generally well supplied with game by its skilled hunters. Establishing contact with Indian tribes and a number of traders from several European countries, Lewis and Clark led their group as far as the Mandan villages located in the present west central North Dakota. After wintering there, the explorers set out again on April 7, 1805. As they did so, Lewis sent another shipment of specimens to Jefferson. They included pronghorn hides, martin skins, a coyote skeleton, a grizzly bear skin, and, most interesting of all, one live sharp-tailed grouse, a live prairie dog, and four live magpies (Lewis, 1805). Since several of the party returned downriver while the main expedition proceeded up the Missouri, Lewis utilized this opportunity to get his specimens to St. Louis. From there the shipment went to New Orleans. In that city, Governor Claiborne inspected it on August 3, and found the six animals still alive. Claiborne shipped everything to Baltimore via the ship *Comet* (Claiborne, 1805). When these specimens reached the White House on August 12, only the prairie dog and one magpie were still living (Lemaire, 1805). Most of the material, living and preserved, went either to the American Philosophical Society, of which Jefferson was President, or to Charles Willson Peale's museum in Philadelphia (Jefferson, 1805a). But Jefferson held on to everything for about two weeks until he had examined the material himself (Jefferson, 1805b).

On up the Missouri the explorers continued, west through Montana, through the Rockies by a circuitous route, across Idaho and through the Cascade Range of Washington and Oregon, and down the Columbia River to the Pacific. They passed the winter of 1805–1806 at Fort Clatsop, near the present town of Warrenton, Oregon, then headed homeward again on Sunday March 23, 1806, largely retracing the outbound route, except that Lewis and a part of the group took a shortcut in the Idaho and Montana Rockies. The two units of the expedition reunited near the confluence of the Missouri and Little Missouri Rivers on August 12, and the exploration ended triumphantly in St. Louis about noon on Tuesday September 23, 1806 (Lewis, 1806).

All this, of course, tells us nothing about the expedition's hardships, difficulties, and sufferings. It tells us nothing about the death of Sergeant Charles Floyd, the only fatality (Coues, 1893, I, p. 79; DeVoto, 1953, p. 21, footnote). It tells us nothing about Clark's skills as a riverman, Lewis's talents as an Indian negotiator, or the Shoshone woman Sacagawea, whose linguistic skills saved the day on more than one occasion. It ignores the renowned fiddler and boatman Pierre Cruzatte and the dancing feet of Clark's servant York. But we cannot linger over these details, interesting as they are. We must turn our attention to the zoological results of Lewis and Clark's penetration of the newly acquired West.

According to Paul R. Cutright (1969, p. 447), Lewis and Clark discovered 122 new types of animals on their journey, many of which were indeed species not previously catalogued. Sometimes the explorers sent back specimens from which formal descriptions could be constructed. In other cases, they described their finds so minutely that taxonomists could later identify them with specimens that subsequently came to
hand. It is, however, probably unwise to insist too much on the exact number of types that Lewis and Clark introduced to science. In some cases it is not clear whether they had priority of discovery; in other cases their descriptions left nineteenth century taxonomists unable to identify the organisms with certainty. And sometimes the explorers fell considerably short of scientific accuracy.

An example of a particularly clear description is their treatment of the prairie rattler *Crotalus viridis*:

It resembles the rattlesnake of the middle Atlantic states, being about 30 inches long, of a yellowish brown on the back and sides, variegated with a row of oval dark brown spots lying transversely on the back from the neck to the tail, and two other rows of circular spots on the sides along the edges of the scuta; there are 176 scuta on the belly, 17 on the tail . . . (Coues, 1893, I, p. 313).

Their description of wolves, however, is less felicitous, for it confuses a gray color variety of the “large brown wolf” (*Canis lupus*) with the similarly colored coyote:

The wolves are either the large brown wolf or the wolf of the plains, of which last there are two kinds, the large and the small. The large brown wolf inhabits the woody countries on the borders of the Pacific, and the mountains which pass the Columbia river between the great falls and rapids, and resembles in all points that of the United States. The large and small wolves of the plains principally inhabit the open country and the woodlands on their borders. They resemble, both in appearance and habit, those of the Missouri plains (Coues, 1893, III, p. 846).

In calling cormorants ducks (Coues, 1893, III, p. 881), the mountain goat a sheep (Coues, 1893, III, pp. 850–851, note 51), and in asserting that the western grebe (*Aechmophorus occidentalis*) cannot fly (Coues, 1893, III, p. 882), Lewis and Clark were completely in error. But these mistakes were more than counterbalanced by observations like their perception of an elegant adaptive mechanism in the sharp-tailed grouse (*Pedioecetes phasianellus*):

In the winter season this bird is booted to the first joint of the toes; the toes are curiously bordered on their lower edges with narrow hard scales, which are placed very close to each other, and extend horizontally about one-eighth of an inch on each side of the toes, adding much to the broadness of the feet—a security which bounteous nature has furnished them for passing over the snows with more ease; and what is very remarkable, in the summer season these scales drop from the feet (Coues, 1893, III, p. 867).

Most of the descriptions of Lewis and Clark material were done in Philadelphia, where the specimens were sent, and generally under the supervision of the American Philosophical Society. Among those who described and named some of the expedition’s zoological specimens were Alexander Wilson (three species), George Ord (ten species), Constantin Rafinesque (four species), and Thomas Say (four species) (Cutright, 1969, pp. 383–387).

Alexander Wilson described and named Lewis’s woodpecker (*Melanerpes lewis*), Clark’s nutcracker (*Nucifraga columbiana*), and the western tanager (*Piranga ludovicianiana*). Ord catalogued the Columbian ground squirrel (*Spermophilus columbianus*), the prairie dog (*Cynomys ludovicianus*), the bushy tailed wood rat (*Neotoma floridana*), the grizzly bear (*Ursus horribilis*), the ruffed grouse (*Bonasa umbellus*), the Columbian sharp-tailed grouse, the pronghorn (*Antilocapra americana*), the western gray squirrel (*Sciurus griseus*), and the eastern wood rat (*Neotoma floridana*). Rafinesque described the mountain beaver or sewellel (*Aplodontia rufa*), the mule deer (*Dama hemionus*), the Oregon bobcat (*Lynx rufus*), and the swift or kit fox (*Vulpes velox*).

Among other forms first presented to Western science by Lewis and Clark were the white sturgeon (*Acipenser transmontanus*),
the cutthroat and steelhead trout (Salmo clarkii and S. gairdneri), the candlefish or eulachon (Thaleichthys pacificus), the horned toad (Phrynosoma cornutum), the western fence lizard (Sceloporus occidentalis), the mountain quail (Oreortyx pictus), the pinyon jay (Gymnorhinus cyanocephalus), the broad-tailed hummingbird (Selasphorus platycercus), the whistling swan (Olor columbianus), the harbor seal (Phoca vitulina), and the pack rat (Neotoma cinerea).

Cutright compiles a complete listing of discovered forms at the end of each of his chapters, and on pages 424-447 (Cutright, 1969). Jackson formulates a similar list (Jackson, 1978, I, pp. 292-298). It is unnecessary to repeat their work here, but it is important to emphasize the great number of vertebrates, especially birds and mammals, that Lewis and Clark brought to the notice of the zoological world.

More specimens would have been sent back too. Unhappily, a large cache of supplies and specimens left at the Great Falls of the Missouri in the summer of 1805 was ruined by flooding (Coues, 1893, II, p. 393; III, p. 1082; Cutright, 1969, pp. 164, 312). This cache contained everything collected between the time the expedition left Fort Mandan, April 7, 1805, and the excavation of the cache in June of that same year (Coues, 1893, II, pp. 378, 393).

It is interesting to note that, as extensive as the expedition's collection of animal specimens was, it was not gathered continuously in place and time. The greatest part of the collection seems to have been made when the expedition halted for a time. A slow passage near the present Chamberlain, South Dakota, which allowed ample time for exploring along the riverbanks, revealed the white-tailed jackrabbit (Lepus townsendii), the desert cottontail (Sylvilagus audubonii), the pronghorn, the mule deer, the coyote, and black-billed magpie (Pica pica) (Coues, 1893, I, pp. 116–122, notes 42, 46, 47, 51). The long winter stay at Fort Mandan enabled the explorers both to do their own observing and to inspect what their Indian neighbors brought in. Here they added the short-tailed shrew, the northern bobcat (Lynx rufus), and the long-tailed weasel (Mustela frenata) to their list, along with numerous other specimens shipped to Jefferson at the White House (Lewis, 1805).

At a time of great anxiety, while the expedition camped at Marias River in Montana, and the two leaders attempted to decide on their route to the Pacific, they discovered McCown's longspur (Calcarius mccownii) on June 4, 1805 (Cutright, 1969, p. 168), the sage grouse on June 5 (Cutright, 1969, p. 168), and the goldeye (a fish) on June 11 (Cutright, 1969, p. 167). To have observed these forms at such a time was notable indeed, for all attention had to be focused on making the right choice of a way to the West. The wrong decision would have sent the expedition far off course, and would probably have proved fatal to its purpose of reaching the Pacific.

Another significant halt occurred later in June near the Great Falls of the Missouri. The delay there was occasioned by the difficulties of portaging canoes and equipment around the falls. But these problems paid zoological dividends with the discoveries of the Pacific nighthawk (Chordeiles minor), Brewer's blackbird (Euphagus cyanocephalus), the pack rat, the cutthroat trout, the thirteen-lined ground squirrel (Spermophilus tridecemlineatus), the western goldfinch (Spinus tristis), the western meadowlark (Sturnella neglecta), the kit fox (Cutright, 1969, p. 168), the long-billed curlew (Numenius americanus) (Cutright, 1969, p. 134), and the prairie rattler (Cutright, 1969, p. 149).

By far the greatest accumulation of observed species occurred during the long winter stay at Fort Clatsop. This group included aquatic birds like the western grebe, the white-fronted goose (Anser albirostris), the ring-necked duck, the lesser Canada goose (Branta canadensis), the Pacific fulmar (Fulmarus glacialis), the whistling swan (Cutright, 1969, p. 273), and mammals like the mountain beaver, the Roosevelt elk, and Richardson's ground squirrel (Cutright, 1969, pp. 273–274).

Perhaps the most important result of the expedition from the zoologist's point of view is the fact that word of this exploration drew a great variety of people into the
newly opened region. Some of the new arrivals were all to the good. For example (Cutright, 1969, p. 390), John Bradbury, Thomas Nuttall, Titian Peale, Thomas Say, John Townsend, and John James Audubon built on Lewis and Clark foundations as they significantly expanded our knowledge of the wildlife of the new territory. Say accompanied the Long expeditions of 1819 and 1823 (Savage, 1979, pp. 177–182). Nuttall set out in 1818 to explore much of the present states of Arkansas, Louisiana, and Oklahoma (Savage, 1979, pp. 178–179) after having been with the Astorians in 1811 (Savage, 1979, pp. 151–152). In 1834 Nuttall accompanied the second expedition of Nathaniel Jarvis Wyeth. So did ornithologist John Townsend (Savage, 1979, p. 183) of Philadelphia. The names of these naturalists are perpetuated in the common or scientific names of animals from the region Lewis and Clark had earlier explored. Audubon’s mountain sheep, Say’s pine snake, Nuttall’s poor will, Townsend’s chipmunk, Townsend’s mole; *Lepus townsendii* (the white-tailed jackrabbit), *Sylvilagus auduboni* (the desert cottontail), *Sayornis saya* (Say’s phoebe). This nomenclature followed a precedent set by naming various western forms after Lewis or Clark himself (e.g., Clark’s nutcracker and Lewis’s woodpecker).

There was more to the zoological contributions of Lewis, Clark, and their followers than simple nomenclature, however. Cutright (1969, pp. 395–396) points out that their explorations, even when not discovering new species, redefined and expanded the known ranges of many already familiar forms. Their notes describing the relations of various plants and animals to each other were simple but pioneering ecological observations. For example, Clark points out (Osgood, 1964, p. 163) that wolves preyed primarily on the bison that were “too fat or pore [sic] to keep up with the gangue [sic].”

This is an extremely elementary insight, of course, but much less obvious is the following:

The plain country which surrounds this [Spirit] mound has contributed not a little to its bad reputation, the wind driving from every direction over the level ground obliges the insects to seek shelter on its leeward side . . . . The small birds, whose food they are, resort [there] of course in great numbers in quest of subsistence (Coues, 1893, I, p. 87).

Even the concept of federal support for science had its start, though somewhat veiled, in the federal sponsorship of the Lewis and Clark Expedition.

But there were also unfortunate consequences of the great exploration. It must be remembered that its primary, or at least its announced motivations were commercial. The establishment of the fur trade in the northwest unleashed a wave of exploitation that nearly eradicated valuable fur-bearers like the beaver and the sea otter. I would have no way of approximating the number of such animals in the northwest before our explorers reached the Rockies, but the craze for beaver hats in the early nineteenth century brought great profits to the fur trade and near extinction to the beavers. Furthermore, it is only in our own time that the sea otter, bearer of one of the most highly esteemed of all furs, has come back from the brink of extinction.

Most of the prairies Lewis and Clark saw are gone now, replaced mainly by farmland. Much of the former wildlife has vanished too, and innumerable sites of great natural beauty have been altered beyond recognition. Among these lost sites are the Great Falls of the Missouri, which left the explorers open-mouthed in wonder (Coues, 1893, II, p. 365–370; De Voto, 1953, p. 138, note), and the Columbia River Cascades (De Voto, 1953, p. 269, note 2).

These losses are regrettable, but far more tragic was the ensuing conflict between whites and Indians. It had begun before Lewis and Clark’s time, of course, but the expedition unleashed a flood of westward-moving whites who simply overran the Indians and their lands. This caused Lewis, Clark, and Jefferson much grief, for it had been their special care to establish friendly relations with the tribes of the northwest.

The Lewis and Clark Expedition was probably the greatest prespace exploration...
carried out by Americans. It broadened our knowledge and introduced numerous plants and animals to western science. But it also threw irreconcilable cultures into conflict, and permanently altered the land. We must forever lament our failure to reap the benefits of this great exploration without suffering the attendant calamities.

REFERENCES


