Type: Book Chapter

Appendix B: The Problem of Establishing Distances

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Source: *The Geography of Book of Mormon Events: A Source Book*
Published by: Provo, UT; FARMS, 1990
Page(s): 392-397

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In the Book of Mormon no mention is made of any formal unit measure of distance traveled, equivalent to our "miles." Yet in order to construct a map, we must utilize some unit of distance in order to separate locations by proportionate intervals. The only unit available in the text is "a day's journey." How can we determine the mileage represented by such a journey in Nephite terms?

The only way is to suppose that Book of Mormon peoples moved at rates similar to what other technologically pre-modern peoples did. We are required, then, to examine the historical and ethnographic literature on rates of travel. From that examination we can hope to establish at least a range of rates to help us arrive at estimates of some controlling distances between at least some Book of Mormon lands and cities.

A little thought tells us that variations in travel speed will occur according to several classes of considerations:

- Make-up of the party (a designated messenger vs. a large company, a party of soldiers vs. a set of families, etc.)
- Environment (as, forested mountains vs. grassy plains, known trails vs. unguided wandering, stormy weather vs. dry, oppressive heat vs. benign temperature, intervals between spots where overnighting was obligatory due to water limitations or the like)
- Burdens (whether herds, provisions, arms, and so on are carried—as with a small reconnaissance party vs. colonists)
- Psychology (e.g., fleeing pursuers vs. routine deployment of an army)

Realizing that variations in rates will occur due to these factors, let us see what we can learn about the upper and lower limits in rate of travel from a wide variety of actual cases. (Unless otherwise indicated, numbers represent trail miles, not straight line distances.)

Individuals:

Mohave Indians of California. About 75 years ago one of them made a trip of 100 miles, then returned after a short rest (as calculated by Heizer, 8.3 miles per hour). Another Mohave, hired to make a journey, traveled 21 miles in 3.5 hours (6.0 miles per hour), yet this feat was considered unexceptional. (Robert F. Heizer, Physical Capabilities of the California Indians, *Masterkey* 45, July-Sept. 1971, pages 109-113.)

The following are all from Tom Osler and Ed Dodd, *Ultra-Marathoning, the Next Challenge. The Authoritative History and Training Guide for Races Beyond the Marathon.* World Publications: Mountain View, Calif., 1979):

In 1788 Foster Powell covered 100 miles in 22 hours and in 1806 Captain Barclay went 100 miles in 19 hours (5.3 miles per hour). In 1813 Jonas Cattel,

aged 55, won a wager by running from Woodbury, New Jersey, to Cape May, New Jersey, 80 miles, in one day. He then returned to Woodbury the same day (page xvi).

Edward Weston, age 35, traveled 400 miles in four days and 23 hours in New York City in 1871 (3.4 miles per hour). The same year he became the first man in modern times to walk 500 miles in six days (page 7), then on December 14 he covered 115 miles, the next day 75, and the next 80 (3.8 miles per hour) (pages 8-10).

In 1888 G. Littlewood went over 623 miles in six days (144 hours) at Madison Square Garden, an average of 108 miles per day (4.4 miles per hour) (page 290).

As of 1979 the record for 100 miles was held by Don Ritchie who covered the distance in 11 hours and 30 minutes in 1977 (8.7 miles per hour). The record for the greatest distance covered in 24 hours was set in 1973 by Ron Bentley. He went 161 miles in 24 hours (6.7 miles per hour) (page 282).

An old man in lowland Tabasco took three days to go 60 miles, rested a day, then returned to his home in three more days (20 miles per day). (Miguel Covarrubias, *Mexico South: The Isthmus of Tehuantepec*, New York: Knopf, 1947, page 89.)

The running lamas of Tibet could pace in a kind of trance for as much as 24 hours without stopping. (A. David Neel, in Margaret Mead and N. Lamas, *Primitive Heritage*, New York, 1953, pages 407-412.) This gives us no distance independently, but a modest estimate of even three miles per hour would yield a total of 72 miles.

The same logic applies in another case. Sahagun wrote of a people of prehispanic Mexico that, "The Toltecs were tall, of larger body than those who now live . . . which means they could run an entire day without tiring." (Bernardino de Sahagun, *Historia de Las Cosas de Nueva España*, Vol. II, México, 1946, page 281, Book X, Chap. XXIX.) (E. Anderson and C. Dibble translate this as "those who walked the whole day without tiring." *Florentine Codex*, Book 3, University of Utah Press: Salt Lake City, 1952, page 13.) The implication is that the distance would be unusual compared with the normal case.

Small Groups:

Small groups of Mohave Indian could cover nearly 100 miles per day. (Heizer, cited above.)

A Balinese family including two wives and two children walked 50 miles in ten hours (part way through steep hills) (five miles per hour). (Jane Belo, The Balinese Temper, *Character and Personality* 4, 1935, pages 122-123.)

The following two paragraphs are from Richard E. W. Adams, Routes of Communication in Mesoamerica: The Northern Guatemalan Highlands and the Peten. In, Thomas A. Lee, Jr., and Carlos Navarrete, eds. Mesoamerican

Communication Routes and Cultural Contacts. *Brigham Young University New World Archaeological Foundation Papers*, No. 40, 1978, pages 27-35:

In highland Guatemala, crossing mountain ranges and broken terrain, merchants carrying a load of goods on their back can travel up to 1.9 miles per hour. In lowland rain forest on unimproved trail full of obstacles, they can go 1.9 to 2.2 miles per hour or up to twice that with no load. If ridges and swamps intervene, the rate is cut to two-thirds (pages 27-32).

On a river with no portages, a canoe can go downstream at five or six miles per hour or upstream at two (page 30).

Traveler "Kamar Al-Shimas" reported from the Coatzacoalcos river in the Isthmus of Tehuantepec that canoes could go downstream 50 miles between daylight and sunset. Upstream the rate for poling a canoe was 15 miles per day for a freight-loaded large vessel or 30 for a small one. (*The Mexican Southland*, Benton Review Shop: Benton, Indiana, 1922, page 149.)

In the Alta Verapaz (mountainous Guatemala) a man alone, on foot, takes six hours for a trip that requires seven hours on a horse, and with additional animals along, ten hours. (Richard E. W. Adams, *The Ceramic Chronology of the Southern Maya*. Second Preliminary Report, duplicated, National Science Foundation Grant GS 610, 1966.)

In central (mountainous) Guatemala, Feldman arrived at these times and distances for merchant travel:

The average rate from Chichicastenango to various destinations was 14 miles per day. From Coban and two other places to seven different destinations averaged ten and one-half miles per day. (Lawrence H. Feldman, Moving Merchandise in Protohistoric Central Quauhtemallan. In Thomas A. Lee, Jr. and Carlos Navarrete, eds., 1978, cited above, page 12.)

In Chiapas, travelers crossing the mountains above Tapachula in the 1940's, afoot or riding on animals over bad road, did about 19 miles per day. (Leo Waibel, *La Sierra Madre de Chiapas*, Sociedad de Geografía y Estadística de México: México, 1946, page 216.)

Two men driving a herd of pigs through mountainous Guatemala traveled 70 rugged trail miles in eight days—less than nine miles per day (the animals were equipped with rawhide sandals to protect their feet!) (Felix Webster McBryde, Cultural and Historical Geography of Southwest Guatemala, *Smithsonian Institution, Institute of Social Anthropology, Publication* No. 4, 1945, page 39.)

Moderate sized groups:

Across the water-logged base of the Yucatan peninsula, Cortez and his troops averaged a little more than ten miles per day (having to construct many bridges). (R. E. W. Adams, 1978, cited above, page 33).

The Tulteca people under Hueman, retreating from their enemies as described by Ixtlilxochitl, made dawn-to-dusk marches of between 15 and 24

miles. (Fernando de Alba Ixtlilxochitl, *Obras Historicas*, México, 1952, Vol. 1, page 24.)

FAR rebel guerrillas in the Sierra de Las Minas of eastern Guatemala in 1967 took 20 days to go 51 (beeline) miles along the most rugged mountain range in Guatemala, walking for ten or eleven hours per day (fear of government air attacks may have held them under cover to a degree). That comes to two and a half direct miles per day, although the ground miles must have been several times that. (Uruguayan Interviews Guatemalan Rebel Leaders, in *Political and Sociological Translations on Latin America*, No. 198, 12 Oct. 1967, U. S. Dept. of Commerce, Clearinghouse for Federal Scientific and Technical Information, Joint Publications Research Service, Washington, D.C.)

Emmanuel Anati (summarizing in *Biblical Archaeology Review* 12, May-June 1986, page 22; at length in his book *Har Karkom*, Jaca Book: Milan, 1984, in Italian) justifies his conclusion that the eleven day journey of the Israelites from Mount Horeb (Sinai) to Kadesh-Barnea (Deut. 1:2) traveled a total of less than 19 miles on a straight line, according to his correlation of the Exodus. He points out that only certain camps offered water for the travelers, at intervals of 7, 15, 13, 7, etc., kilometers. Supposing that the Israelites had no choice but to camp at those spots, he calculates their total ground distance as 77 miles— seven per day.

Mormon pioneers in 1847 averaged around eleven miles per day across the Great Plains.

Conclusion: Multiplying examples would probably not change the picture noticeably. My conclusion is that the cited examples yield these plausible ranges for a day's travel:

> Individual: 9 to 100 miles
> Small group: 9 to 70 miles
> Moderate-sized group: 9 to 25 miles

And under extreme conditions (e.g., fear, flowing adrenaline) the upper limits could be raised. Obviously the lower limits could also be brought down if a leisurely pace is indicated. (Again, keep in mind that these are ground miles; their relation to beeline mileage is very much dependent upon the nature of the terrain.)

Under particular Book of Mormon conditions, I consider these to be sensible examples:

- Alma and his group of families with herds, fleeing from pursuers, go from Mormon through mountainous country to Helam, slowing down after two days en route: 20 trail miles per day at first, then 15 per day; on the order of 70 miles on a straight-line .
- Ammon's group seeking the Zeniffites travels 40 days from Zarahemla up to Nephi through mountainous wilderness, wandering due to lack of route knowledge: four or five trail miles per day.

- It was a day and a half's travel for "a (presumably lone) Nephite" across the narrow neck of land which they fortified: up to five miles per hour, that is, up to 180 miles, on the basis of rate alone. [But on the additional basis of use of the word "narrow," a figure approaching 180 miles is absurd; 100 seems not absurd.]

Obviously, other people might reach different mileages based on their judgment about where within the allowable ranges they think the text-reported rate falls, but the order of magnitude, if not the details, of my examples must be right. That is, for example, it would be completely unreasonable to suppose that Alma's people moved herds and children through the mountains at as much as 15 miles per day *on a straight line*, thus Helam could not possibly be as much as 120 miles from Mormon, we can be absolutely sure. Nor could the distance be as slight as 40 miles, or the hot-footing pursuers would likely have caught up with them.

By this kind of handling of text examples, we can establish very reasonable estimates for key distances on a map of Book of Mormon events. The analyses in Part 3 and the map in Part 8 are based on such estimates, made as consistent with each other as possible.