. From the long and uninterrupted friendship and confidence which has subsisted between us I feel no hesitation in making to you the following communication under the fulest impression that it will be held by you inviolably secret untill I see you, or you shall hear again from me.

During the last session of Congress a law was passed . . . intiled "An Act making an appropriation for extending the external commerce of the United States." The object of this Act . . . was to give the sanction of the government to exploreing the interior of the continent of North America, or that part of it bordering on the Missourie & Columbia Rivers. This enterprise has been confided to me by the President, and in consequence since the begining of March I have been engaged in making the necessary preparations for the tour, these arrangements being now nearly completed, I shall set out for Pittsburgh. . . . My plan: it is to descend the Ohio in a keeled boat of about ten tons burthen, from Pittsburgh to it's mouth, thence up the Mississippi to the mouth of the Missourie, and up that river as far as it's navigation is practicable with a boat of this discription, there to prepare canoes of bark or raw-hides, and proceed to it's source, and if

practicable pass over to the waters of the Columbia or Origan River and by descending it reach the Western Ocean; the mouth of this river lies about one hundred and forty miles South of Nootka-Sound, at which place there is a considerable European Tradeing establishment, and from which it will be easy to obtain a passage to the United States by way of the East-Indies in some of the trading vessels that visit Nootka Sound anually, provided it should be thought more expedient to do so, than to return by the rout I had pursued in expectations are at this time formed by our Government that the whole of that immense

my outward bound journey . . . . You must know in the first place that very sanguine country wartered by the Mississippi and it's tributary streams, Missourie inclusive, will be the property of the U. States in less than 12 Months from this date: but here let me again impress you with the necessity of keeping this matter a perfect secret. In such a state of things therefore as we have every reason to hope, you will readily concieve the importance to the U. States of an early friendly and intimate acquaintance with the tribes that inhabit that country, that they should be early impressed with a just idea of the rising importance of the U. States and of her friendly dispositions towards them, as also her desire to become usefull to them by furnishing them through her citizens with such articles by way of barter as may be desired by them or usefull to them. The other objects of this mission are scientific, and of course not less interesting to the U. States than to the world generally, such is the ascertaining by celestial observation the geography of the country through which I shall pass; the names of the nations who inhabit it, the extent and limits of their several possessions. their relation with other tribes and nations; their language, traditions, and monuments; their ordinary occupations in fishing, hunting, war, arts, and the implements

for their food, clothing and domestic accommodation; the diseases prevalent among them and the remidies they use; the articles of commerce they may need, or furnish, and to what extent; the soil and face of the country; it's growth and vegetable productions, its animals the miniral productions of every discription; and in short to collect the best possible information relative to whatever the country may afford as a tribute to general science.

was used in the national survey My Instruments for celestial observation are an excellent set and my supply of Courtesy of the Peabody Library Indian presents is sufficiently ample. The Johns Hopkins University

• 1 Mariner's Compass & 2

pole chain 1 Sett of plotting instruments

 3 Thermometers • 1 Cheap portable Microscope

1 Pocket Compass

 1 brass Scale one foot in · 6 Magnetic needles in small

straight silver or brass cases opening on the side with hinges. • 1 Instrument for measuring

made of tape with feet & inches marked on it... • 2 Hydrometers

 1 Theodolite • 1 Sett of planespheres

in 2 Vol:

Books

Maps

1787 Jesse Ramsden. Theodolite

Charts

Blank Vocabularies

1 Pair large brass money scales

with two setts of weights the one

of Troy the other of Averds.

Meriwether Lewis, 1774-1809,

and William Clark, 1769-1838:

Commissioned by Thomas Jefferson to

1806. They did not find the fabled

"northwest passage," but they compiled

exhaustive scientific information about

Thwaites, R.G., ed. Original Journal

of the Lewis and Clark Expedition,

1804-1806. New York: Arno Press,

1969, vol. 7, pp. 228-9, 231, 237.

the regions they visited.

Writing paper

2 Artificial Horizons

• 1 Patent log 6 papers of Ink powder

4 Metal Pens brass or silver

 1 Set of Small Slates & pencils ndiana ain't in sight." 2 Creyons

"Yes, of course I do." Sealing wax one bundle "What's the color got to do with it?" • 1 Miller's edition of Lineus

pink down here, if you can. No, sir; it's green.'

watch. When we left St. Louis it was four in the afternoon by my watch and this clock, and than half an hour of setting by the Grinnage clock now, and I'm away out—more than four hours and a half out. You see, that meant that we was closing up on the longitude of

and over land to the Pacific, returning in in Africa...

Clemens, Samuel L. (Mark Twain). Tom Sawyer Abroad. New York: Harper and Brothers, 1878,

1878 Tom Sawyer Abroad

o be doing nothing but just hang in the air and stand still. The houses got smaller and smaller, and the city pulled itself together, closer and closer, and the men and wagons got to looking like ants and bugs crawling around, and the streets like threads and cracks; and then it all kind of melted together, and there wasn't any city any more; it was only a big scar on the earth, and it seemed to me a ody could see up the river and down the river about a thousand miles, though of course it wasn't so much. By and by the earth was a ball—just a round ball, of a dull color, with shiny stripes wriggling and winding around over it, which was rivers. The Widder Douglas always told me the earth was round like a ball, but I never took any stock in a lot of them superstitions o' hers, and of course I paid no attention to that one, because I could see self that the world was the shape of a plate, and flat . . . .

"Because if we was going so fast we ought to be past Illinois, oughtn't we?"

"Indiana pink? Why, what a lie!"

"It ain't no lie; I've seen it on the map, and it's pink."

"These clocks. They're chronometers. You always read about them in sea voyages. One of them is keeping Grinnage time, and the other is keeping St. Louis time, like my it was ten at night by this Grinnage clock, Well, at this time of the year the sun sets at about seven o'clock. Now I noticed the time yesterday evening when the sun went down, and it was half-past five o'clock by the Grinnage clock, and half past 11 A.M. by my watch and the other clock. You see, the sun rose and set by my watch in St. Louis, and the Grinnage clock was six hours fast; but we've come so far east that it comes within less explore the west, Lewis and Clark set off

Ireland, and would strike it before long if we was p'inted right—which we wasn't. No, sir, from St. Louis in 1804 traveling by boat we've been a-wandering—wandering 'way down south of east, and it's my opinion we are

There was one thing that kept bothering me, and by and by I says: "Tom, didn't we start east?"

"How fast have we been going?" "Well, you heard what the professor said when he was raging around. Sometimes, he said, we was making fifty miles an hour, sometimes ninety, sometimes a hundred. "Well, then, it's just as I reckoned. The professor lied."

"Well, we ain't."

"What's the reason we ain't?" "I know by the color. We're right over Illinois yet. And you can see for yourself that

"I wonder what's the matter with you, Huck. You know by the color?"

"It's got everything to do with it. Illinois is green, Indiana is pink. You show me any

Mark Twain (Samuel L. Clemens), 1835-1910: American humorist and journalist. Twain's Tom Sawyer Abroad continues the adventures of Tom Sawyer and Huck Finn as they take a balloon flight in the company of an eccentric professor.

1893 A country as a map

"That's another thing we've learned from *your* Nation," said Mein Herr, "map-making. But we've carried it much further than *you*. What do you consider the *largest* map that would be really useful?"

"About six inches to the mile."

"Only six inches!" exclaimed Mein Herr. "We very soon got to six *yards* to the mile. Then we tried a *hundred* yards to the mile. And then came the grandest idea of all! We actually made a map of the country, on the scale of a mile to the mile!"

"Have you used it much?" I enquired.

"It has never been spread out, yet," said Mein Herr: "the farmers objected: they said it would cover the whole country and shut out the sunlight! So now we use the country itself, as its own map, and I assure you it does nearly as well." Lewis Carroll, (Charles Lutwidge Dotson), 1832-1898: English writer and

mathematician. His two most famous books were Alice's Adventures in Wonderland (1865) and Through the Looking Glass (1872). Lewis Carroll. Sylvie and Bruno Concluded. London: Macmillan and Co., 1893, p. 169

1902 A passion for maps Now when I was a little chap I had a passion for maps. I would look for hours at South America, or that looked particularly

Africa, or Australia, and lose myself in all the glories of exploration. At that time there were many blank spaces on the earth, and when I saw one inviting on a map (but they al look like that) I would put my finger on it and say, "When I grow up I will go there."

Joseph Conrad 1857-1924: A Polish writer who, after a career in the British Navy, chose to live in England and write in English. His travels on a steamer on the Congo River were the basis for the Heart of Darkness (1902). Conrad, Joseph. Heart of Darkness and the Secret

Sharer. New York: New American Library, 1950

Shackleton's trip to Antarctica

November 18 [1913]. It is possible that we have reached the windless area around the Pole, for the Barrier is a dead, smooth, white plain, weird beyond description, and having no land in sight, we feel such tiny specks in the immensity around us... It seems as though we were in some other world, and yet the things that concern us most for the moment are trivial, such as split lips and big appetites...All the time we are moving south to our wished-for goal, and each day we feel that another gain has been made. We did 15 miles 500 yards today.

January 6 [1914]. This must be our last outward march with the sledge and camp equipment. Tomorrow we must leave camp with some food, and push as far south as possible, and then plant the flag. . . . Blowing hard tonight, I would fail to explain my feelings if I tried to write them down, now that the end has come. There is only one thing that lightens the disappointment, and that is the feeling that we have done all we could. It is the forces of nature that have prevented us

from going right through. I cannot write more. **January 7.** A blinding, shrieking blizzard all day, with the temperature ranging from 60° to 70° of frost. It has been impossible to leave the tent, which is now snowed up on the lee side. We have been lying in our bags all day, only warm at food time, with fine snow making through the walls of the worn tent and covering our bags. We are greatly cramped. Adams is suffering from cramp every now and then. We are eating our valuable food without

**January 8.** Again all day in our bags, suffering considerably physically from cold hands and feet, and from hunger, but more mentally, for we cannot get on south, and we simply lie here shivering. Every now and then one of our party's feet go, and the unfortunate beggar has to take his leg out of the sleepingbag and have his frozen foot nursed into life again by placing it inside the shirt, against the skin of his almost equally unfortunate

January 9. Our last day outwards. We have shot our bolt, and the tale is latitude 88° 23' South, longitude 162° East. The wind eased down at 1 a.m., and at 2 a.m. were up and had breakfast. At 4 a.m. started south, with the Queen's Union Jack, a brass cylinder containing stamps and documents to place at the furthest south point, camera, glasses and compass. At 9 a.m. we were in 88°23' South, half running and half walking over a surface much hardened by the recent blizzard. It was strange for us to go along without the nightmare of a sledge dragging behind us. We hoisted her Majesty's flag and the other Union

Jack afterwards, and took possession of the plateau in the name of her Majesty. While the Union Jack blew out stiffly in the icy gale that cut us to the bone, we looked south with our powerful glasses, but could see nothing but the dead white snow plain. There was no break in the plateau as it extended towards the Pole, and we feel sure that the goal we have failed to reach lies on this plain. We stayed only a few minutes, and then, taking the Queen's flag and eating our scanty meal as we went, we hurried back and reached our camp about 3 p.m. We were so dead tired that we only did two hours' march in the afternoon and camped at 5:30 p.m. The temperature was minus 19° Fahr. Fortunately for us, our tracks were not obliterated by the blizzard; indeed, they stood

up, making a trail easily followed. Homeward bound at last. Whatever regrets may be, we have done our best. Ernest Henry Shackleton 1874-1922: This British explorer went to Antarctica with Scott in 1901 and reached the south magnetic pole in 1909.

> On his third expedition in 1914 his ship, the Endurance, was caught in pack ice and crushed, stranding the men. They crossed the open ocean in a small boat, and were eventually rescued by a Chilean ship in 1916. Shackleton, E.H. The Heart of the Antarctic, Philadelphia: J.B. Lippincott Co. 1909, v. 1. pp. 283, 341, 343.



Mapping the ocean floor The drawing assembled by Tharp in 1952 of the first six transatlantic profiles using echo-sounding records of Atlantis I and some other early vessels, showed a prominent valley at the crest of the Mid-Atlantic Ridge. . . . This central valley also coincided with the earthquake epicentres if one drew a circle of error about them. Notwithstanding this divergence of accuracy Heezen recognized this correlation of a central valley and earthquakes as a valid one . . . . Using earthquake epicentres where there were no soundings, plotting of the position of the valley was continued about the globe. The extension of the valley into the narrow Gulf of Aden and southward into the Rift Valley of East Africa finally convinced Heezen in mid-1953 that the Mid-Oceanic Rift Valley was a globeencircling, tensional feature throughout its 70,000 kilometres length. . . . The presence of an expanding ridge in mid-ocean favoured the concept of continental

The general concept that the earth is a shrinking globe was widely held in the 1940's . . . Heezen's evidence for tensional features in the oceans and the work of Carey . . . on land combined to demolish the shrinking earth hypothesis . The theory of plate tectonics, in which the addition of mantle material to the crust at the crest of the Mid-Oceanic Rift Valley is balanced by the subduction of crustal material into the trenches, is presently the most favoured explanation of ontinental drift of rigid plates on a globe of constant volume.

In 1952 Heezen and Tharp decided to make a map of the North Atlantic Ocean floor. . . . By then Heezen had been on enough cruises to have the structural outline of the Atlantic well in mind. He seized a piece of paper and within an hour or so drew in the topography. . . . The physiographic diagram was completed five years later with the actual soundings and profiles. All mapping proceeded with the following principles. First, there is only one proper way to sketch or to contour the ocean floor and that is to present it as it actually exists as it would be seen if all the water were drained away. But there will never be enough tracks to do this. Thus, hypotheses of ocean floor structure must be used to supplement the often meager data and only the use of correct hypotheses will result in maps closely approximating nature. Second, what data exist in the several disciplines must all be put at one scale. Third, sketching proceeds from the shoreline seawards and then from the mid-ocean crest landwards as the policy was to go from the known to the unknown, from the relatively well surveyed areas toward unsurveyed areas. The sketching technique was well suited to portraying sea floor topography since it was very demanding where profiles were available but flexible where there were no data . . .

Marie Tharp and Bruce Heezen, scientists at Columbia University's Lamont-Doherty Observatory, mapped the bottoms of the world oceans. Tharp, Marie. "Mapping the Ocean Floor—1947 to 1977," in Scrutton, R.A., and Talwani, M. The Ocean Floor. New York: John Wiley & Sons, Ltd., 1982, pp. 19-31. 1969 First man on the moon

I set to work on the navigation experiments, the purpose of which in essence was to find some way to adjust man's natural inclination to navigate from reference points on earth to some system of exact navigation in space. . . In the early 1960's, when the Apollo program was not yet in existence, Dr. Richard Batten, a professor of astronautics at MIT, and one of my thesis advisers, presented some theories on travel in space. These were recalled years later and reapplied to the Apollo program. A plan was developed whereby we could make measurements between a sta and a landmark on earth—or the horizon of the earth—and as you measured this one angle over and over again and fed the information to the computer along with many other star sightings, nearly exact knowledge of the spacecraft's course could be maintained. The readings were done by taking sextant sightings This system gained much credence in the Apollo program, and I was pleased to be part of it.

As the programs expanded and the confidence in earth-bound tracking grew, the subject of on-board navigation sightings fed int the computer became the topic for a Black Friday meeting. . Previously a computer program automatically instructed the astronauts on how to leave a lunar orbit for a return to earth in the absence of earthbound tracking data. Should communication with the earth be permanently halted, the computer on board the spacecraft would take over and compute the maneuver in case of such an emergency. The program itself was complicated and tended to crowd the computer's bank of information. . . One Black Friday this computer program was thrown out. It was called "Return to Earth." If the eventuality ever arose, man could do the job based on information on his maneuver pads.

The voyage to the moon was conducted within nearly half a second of the flight plan. Of all the various midcourse corrections it was possible to make en route to and from the moon, we had used only two. The training and preparation was such that even the unfamiliar surface of the moon was very nearly as we had been led to expect. I realized I wasn't in the simulator and it was a good bit more real, but virtually nothing was unexpected, the extensive studies and preparations were that good.

Edwin A. "Buzz" Aldrin, Jr., and Neil Armstrong, astronauts aboard Apollo 11 were the first Americans to walk on the Moon, on July 24, 1969. Aldrin, Jr., E. A., and Warga, W. Return to Earth. New York: Random House, 1973, pp. 198, 203, 241.

1971 Moon-noon panorama spun below us every two hours as we orbited the moon. We were looking down at some strange territory when it was what we call moon-noon. With the sun directly overhead, it was 250 degrees F. I don't think we could survive that, even in the Lunar Module. But we didn't have to, because we were scheduled to land in the early morning and leave before noon. Although we planned to spend three days on the surface of the moon, this was easy because these were "earth" days. One moon day is equal to twenty-eight earth

> spend three days, and get off before 9 a.m. in moon terms. James B. Irwin, an astronaut aboard Apollo 5 landed on the Moon on August 7, 1971. He spent 19 hours out of the lunar module exploring the terrain. Irwin, J.B. To Rule the Night—The Nashville: Broadman Press, 1973, p. 54.

days. So we could land in early light,

was supposed to be: . . . a 'road-runner' or one of those rumpled, angry-looking lizards with ruffs around their necks. All I do know is that the man in blue made the most lifelike lizard you could ever hope to imagine. He was male and female, seducer and seduced. He was glutton, he was cuckold, he was weary traveller. He would claw his lizard-

old man?'

He would lift his lower lid to cover the iris, and flick out his lizard-tongue. . .

the real Lizard song, but a 'false front', or The Songlines sketch performed for strangers. The real song It was during his time as a school-teacher that would have named each waterhole the Lizard Arkady learned of the labyrinth of invisible Man drank from, each tree he cut a spear pathways which meander all over Australia from, each cave he slept in, covering the and are known to Europeans as 'Dreamingwhole long distance of the way. . . . tracks' or 'Songlines;' to the Aboriginals as Arkady and I sat mulling over this story the 'Footprints of the Ancestors' or the 'Way of an antipodean Helen. The distance from of the Law'.

here to Port Augusta, as the crow flew, Aboriginal Creation myths tell of the was roughly 1,100 miles, about twice the legendary totemic beings who had wandered distance—so we calculated—from Troy to over the continent in the Dreamtime, singing Ithaca. We tried to imagine an Odyssey with out the name of everything that crossed their a verse for every twist and turn of the hero's path—birds, animals, plants, rocks, waterholes—and so singing the world into I looked at the Milky Way and said, 'You existence... might was well count the stars.'...

We sat in silence until Arkady, judging Regardless of the words, it seems the the moment, turned to Alan and asked quietly melodic contour of the song describes the in English, 'So what's the story of this place, nature of the land over which the song passes. So, if the Lizard Man were dragging his

Alan gazed into the fire without twitch heels across the salt-pans of Lake Eyre, you a muscle. The skin stretched taut over his could expect a succession of long flats, cheekbones and shone. Then, almost like Chopin's 'Funeral March'. If he were imperceptibly, he tilted his head towards the skipping up and down the MacDonnell man in blue, who got to his feet and began to carpments, you'd have a series of arpeggios mime (with words of pidgin thrown in) the and glissandos, like Liszt's 'Hungarian travels of the Lizard Ancestor. It was a song of how the lizard and his Certain phrases, certain

lovely young wife had walked from northern combinations of musical notes, are Australia to the Southern Sea, and of how a thought to describe the action of southerner had seduced the wife and sent him the Ancestor's feet . . . . An home with a substitute. expert songman, by listening I don't know what species of lizard he to their order of succession, would count how many

times his hero crossed a river, or scaled a ridge and be able to calculate where, and how far along, a Songline he was... said, 'is a map reference? feet sideways, then freeze and cock his head. memory bank for finding one's

'So a musical phrase', I

'Music', said Arkady, 'is a

Chatwin, Bruce. The Songlines. New York: Viking

way about the world.'

Penguin Books, 1987, pp. 2, 105.

The performance had lasted not more than three minutes. . . . What we had witnessed he [Arkady] said, was not of course 1991 Maps and reality

. To portray meaningful relationships for a complex, threedimensional world on a flat sheet of paper or a video screen, a map must distort reality. As a scale model, the map must use symbols that almost always are proportionally much bigger or thicker than the features they represent. To avoid hiding critical information in a fog of detail, the map must offer a selective, incomplete view of reality. There's no escape from the cartographic paradox: to present a useful and truthful picture.

an accurate map must tell white lies. . . Map users generally are a trusting lot: they understand the need to distort geometry and supress features, and they believe the cartographer really does know where to draw the line, figuratively as well as literally. As with many things beyond their full understanding, they readily entrust mapmaking to a priesthood of technically competent designers and drafters working for government agencies and commercial firms. Yet cartographers are not licensed, and many mapmakers competent in commercial art or the use of computer workstations have never studied cartography. Map users seldom, if ever, question

these authorities, and they often fail to appreciate the map's

power as a tool of deliberate falsification or subtle propaganda

Monmonier, Mark. How to Lie with Maps. Chicago: University of Chicago Press,

military campaign or a vacation, a ispute over property boundaries or a claim staked by a mining nterprise, dreams of a slave epublic or the movement of the

92 Maps invite action

Exploration, conquest,

V \_\_occupation, exploitation,

aps invite action.

administration, and organization—

action seems always inflicted upon

the bare outlines of a map, and the

scalpel toward a hidden lesion of

action can take many forms: a

Hall, Steven S. Mapping the Next Millenium—The Discovery of New Geographies. New York: Random House, 1992, p. 383.

the brain.

1992 The art and science of maps

. . every map is the sum not only of the cartographer's skills, but of the nany explorers who win the territory in the first place. Thus the map is both aesthetic and informational, as individual as any work of art but also communal and consensual, the product of cultural values (especially the value of exploration itself) and accumulated wisdoms. And perhaps in that moment the germ of an idea unconsciously took root, the idea of the map as an object that straddles the worlds of art and science, one of the few bridges

inking the two cultures. Hall, Steven S. Mapping the Next Millenium—The Discovery of New Geographies. New York: Random House, 1992, p. xii.

1991—The surface of Venus. Synthetic aperture radar mosaics created from data obtained by the Magellan spacecraft.

Courtesy of the National Aeronautics and Space Administration