1)Joan Didion, "The Santa Anas," (p. 1-3)
https://www.youtube.com/watch?v=ZFiGf-2NlZE
https://youtu.be/zOyBqDSVXsQ?si=TeikOozjYiCB4oEF
https://www.murrieta.k12.ca.us/cms/lib5/CA01000508/Centricity/Domain/1538/The%20Santa%20Anas.pdf

2) Kyle Whyte, "Way Beyond the Lifeboat" (p. 4-10)
https://app.speechify.com/item/8bb8df86-e6eb-4335-acab-614bcc41a91d?page=1

3) Seven Queens of Sindh
-Shabnam Virnami, Don't Fall in Love with those who Wander in Boats
https://youtu.be/P3iiMXKWMXU?si=SBQALQh0aEd79DfK

Post-Class Exercise:

Alexander Von Humboldt and the Discovery of Climate Change
https://www.youtube.com/watch?v=fYrXE_umWCw

This celebratory video on Humboldt's influence on climate science is a good introduction to the status of Humboldt in climate history. Based on your own comparison of Humboldt's climate theory to those of three other towering figures - Ibn Khaldun, Montesquieu and Buffon – how do you define the Humboldt difference?

From Ibn Khaldun to Alexander Humboldt
https://app.speechify.com/item/0359aa66-70b7-49f4-aaf2-39c30f0ff151

1) Ibn Khaldun, The Muqaddimah (1377) (p. 11-16)

2) Montesquieu, The Spirit of Laws (1748) (p. 19-20)

3) Buffon, the Epochs of Nature (1778) (p. 21-34)

4) Alexander Humboldt, Kosmos (1845-58) (p. 35-43)

“The Santa Anas”
Joan Didion

There is something uneasy in the Los Angeles air this afternoon, some unnatural stillness, some tension. What it means is that tonight a Santa Ana will begin to blow, a hot wind from the northeast whining down through the Cajon and San Gorgonio Passes, blowing up sand storms out along Route 66, drying the hills and the nerves to flash point. For a few days now we will see smoke back in the canyons, and hear sirens in the night.

I have neither heard nor read that a Santa Ana is due, but I know it, and almost everyone I have seen today knows it too. We know it because we feel it. The baby frets. The maid sulks. I rekindle a waning argument with the telephone company, then cut my losses and lie down, given over to whatever it is in the air. To live with the Santa Ana is to accept, consciously or unconsciously, a deeply mechanistic view of human behavior.

I recall being told, when I first moved to Los Angeles and was living on an isolated beach, that the Indians would throw themselves into the sea when the bad wind blew. I could see why. The Pacific turned ominously glossy during a Santa Ana period, and one woke in the night troubled not only by the peacocks screaming in the olive trees but by the eerie absence of surf. The heat was surreal. The sky had a yellow cast, the kind of light sometimes called "earthquake weather". My only neighbor would not come out of her house for days, and there were no lights at night, and her husband roamed the place with a machete. One day he would tell me that he had heard a trespasser, the next a rattlesnake.

"On nights like that," Raymond Chandler once wrote about the Santa Ana, "every booze party ends in a fight. Meek little wives feel the edge of the carving knife and study their husbands' necks. Anything can happen." That was the kind of wind it was. I did not know then that there was any basis for the effect it had on all of us, but it turns out to be another of those cases in which science bears out folk wisdom.

The Santa Ana, which is named for one of the canyons it rushers through, is foehn wind, like the foehn of Austria and Switzerland and the hamsin of Israel. There are a number of persistent malevolent winds, perhaps the best know of which are the mistral of France and the Mediterranean sirocco, but a foehn wind has distinct characteristics: it occurs on the leeward slope of a mountain range and, although the air begins as a cold mass, it is warmed as it comes down the mountain and appears finally as a hot dry wind. Whenever and wherever foehn blows, doctors hear about headaches and nausea and allergies, about "nervousness," about "depression."

In Los Angeles some teachers do not attempt to conduct formal classes during a Santa Ana, because the children become unmanageable. In Switzerland the

suicide rate goes up during the foehn, and in the courts of some Swiss cantons the wind is considered a mitigating circumstance for crime. Surgeons are said to watch the wind, because blood does not clot normally during a foehn.

A few years ago an Israeli physicist discovered that not only during such winds, but for the ten or twelve hours which precede them, the air carries an unusually high ratio of positive to negative ions. No one seems to know exactly why that should be; some talk about friction and others suggest solar disturbances. In any case the positive ions are there, and what an excess of positive ions does, in the simplest terms, is make people unhappy. One cannot get much more mechanistic than that.

Easterners commonly complain that there is no "weather" at all in Southern California, that the days and the seasons slip by relentlessly, numbingly bland. That is quite misleading. In fact the climate is characterized by infrequent but violent extremes: two periods of torrential subtropical rains which continue for weeks and wash out the hills and send subdivisions sliding toward the sea; about twenty scattered days a year of the Santa Ana, which, with its incendiary dryness, invariably means fire. At the first prediction of a Santa Ana, the Forest Service flies men and equipment from northern California into the southern forests, and the Los Angeles Fire Department cancels its ordinary non-firefighting routines. The Santa Ana caused Malibu to burn as it did in 1956, and Bel Air in 1961, and Santa Barbara in 1964. In the winter of 1966-67 eleven men were killed fighting a Santa Ana fire that spread through the San Gabriel Mountains.

Just to watch the front-page news out of Los Angeles during a Santa Ana is to get very close to what it is about the place. The longest single Santa Ana period in recent years was in 1957, and it lasted not the usual three or four days but fourteen days, from November 21 until December 4. On the first day 25,000 acres of the San Gabriel Mountains were burning, with gusts reaching 100 miles an hour. In town, the wind reached Force 12, or hurricane force, on the Beaufort Scale; oil derricks were toppled and people ordered off the downtown streets to avoid injury from flying objects. On November 22 the fire in the San Gabriels was out of control. On November 24 six people were killed in automobile accidents, and by the end of the week the Los Angeles Times was keeping a box score of traffic deaths. On November 26 a prominent Pasadena attorney, depressed about money, shot and killed his wife, their two sons and himself. On November 27 a South Gate divorcée, twenty-two, was murdered and thrown from a moving car. On November 30 the San Gabriel fire was still out of control, and the wind in town was blowing eighty miles an hour. On the first day of December four people died violently, and on the third the wind began to break.

It is hard for people who have not lived in Los Angeles to realize how radically the Santa Ana figures in the local imagination. The city burning is Los Angeles's deepest image of itself. Nathaniel West perceived that, in The Day of the Locust, and at the time of the 1965 Watts riots what struck the imagination most indelibly

were the fires. For days one could drive the Harbor Freeway and see the city on fire, just as we had always known it would be in the end.
Los Angeles weather is the weather of catastrophe, of apocalypse, and, just as the reliably long and bitter winters of New England determine the way life is lived there, so the violence and the unpredictability of the Santa Ana affect the entire quality of life in Los Angeles, accentuate its impermanence, its unreliability. The winds shows us how close to the edge we are.

in *Slouching Towards Bethlehem*, 1969, London: Andre Deutch.

Way Beyond the Lifeboat: An Indigenous Allegory of Climate Justice

KYLE WHYTE

Forthcoming. *Climate Futures: Reimagining Global Climate Justice* (University of California Press), edited by Debashish Munshi, Kum-Kum Bhavnani, John Foran, and Priya Kurian. Special thanks to the generous support from the Point Reyes National Seashore Association and the Mesa Refuge through their National Endowment for the Arts grant, "Climate Change at the Western Edge."

> *Inuit culture is based on the ice, the snow and the cold….Therefore when the climate changes and/or warms… Then our right to culture, our right to educate our children on the land, our right to safety, our right to health all become impacted by these rapid changes. In essence our Right to exist as Inuit as we know it is impacted… We are a very adaptable people and yet others tend to think that it is our inability to adapt to the modern world that we are facing these challenges of social and health related issues. Not true…. It is the speed and intensity in which change has occurred and continues to occur that is a big factor why we are having trouble with adapting to certain situations. Climate change is yet another rapid assault on our way of life. It cannot be separated from the first waves of changes and assaults at the very core of the human spirit that has come our way.* Sheila Watt-Cloutier, interviewed by the *Ottawa Citizen* (Robb, 2015)

> *The Treaty Belt is made of two rows of purple wampum beads, and these two rows have the spirit of the Haudenosaunee and the Dutch… the two purple rows depict two vessels travelling down a river. One, a birch-bark canoe, is for the Haudenosaunee and contains our laws, customs, and way of life. The other, a ship, is for the Dutch and contains their laws, customs, and way of life. The purpose of the Treaty is to recognize that each People is to travel down this river together, side-by-side but each in their own vessel. . . . The treaty recognizes that the Haudenosaunee and Dutch share the same river, the river of life. We are to help each other, from time to time, as we travel this river together. We are to take care of this river as all of our survival depends on a healthy river."* James Ransom, brief description of the Haudenosaunee Kaswentha (1999, pp. 27-29)

THE INSIDIOUSNESS OF CLIMATE INJUSTICE

In the first epigraph, Watt-Cloutier says that climate-related risks to her people's health, cultural integrity and economic vitality are intensified through colonial and capitalist domination – "the first waves of changes and assaults". Years of Indigenous testimonies and, more recently, evidence in major scientific reports, bear witness to the relevance of her claim for many Indigenous peoples (Whyte, 2017). The Nisqually Indian Tribe and Quinault Nation, living within the Pacific Northwest region of the U.S., depend on salmon and shellfish for cultural, religious, economic, and nutritional health purposes.

Yet important habitats are becoming further degraded from climatic and non-climatic factors, including warming waters, ocean acidification, and the ramped up shoreline development of U.S. settler populations. Late Nisqually leader Billy Frank Jr. states that "As the salmon disappear, our tribal cultures, communities and economies are threatened as never before" (Treaty Indian Tribes in Western Washington, 2011, p. 6).

Writing from a Potawatomi, North American perspective, I see Indigenous peoples as often perceiving the burdens of climate-related risks through their experiences of already having been deeply harmed by the economic, industrial, and military drivers behind anthropogenic (human-caused) climate change (Callison, 2014; Wildcat, 2009). Historically, U.S. settlers widely displaced, terrorized and polluted Indigenous communities for the sake of profiting from oil and coal development (Grinde & Johansen, 1995; Small, 1994; Weaver, 1996). In 20th century Oklahoma, for example, oil development and settler greed polluted the Sac & Fox Tribe's drinking water and energized the systematic effort – dubbed "the Reign of Terror" – to murder with impunity scores of Osage persons (Grann, 2017; Royster, 1997). Gail Small writes that "Like many Cheyenne, I feel as if I have already lived a lifetime fighting [coal] strip-mining. We live with fear, anger, and urgency. And we long for a better life for our tribe" (Small, 1994). Haunting similarities exist when we make global comparisons across Indigenous peoples, such as the pollution and violence endured by the Ogoni people from the multi-national oil industry and the nation of Nigeria (Saro-Wiwa, 1992).

Fossil fuel industries remain major concerns in recent times. In 2009, 50 people were killed, many Indigenous, in a conflict over the Peruvian government's endorsement of mining and oil drilling in the Amazon (Aquino, 2009). Oil and gas pipelines in North America traverse Indigenous territories without genuine Indigenous consent to the construction or continued operations of these pipelines, including the now notorious construction of the Dakota Access pipeline in Standing Rock Sioux territory (Dhillon & Estes, 2016). Even for Tribes pressured by the U.S. into reliance on fossil fuel industries, such as the Crow Tribe of Indians, the economic dependence has yet to make their members well-off by U.S. standards (Beeler, 2017; Turkewitz, 2017).

In my experiences, most Indigenous peoples have complicated stories to tell about anthropogenic climate change that often start with their being harmed by fossil fuel industries. The stories continue on to discuss how current laws and policies render them more vulnerable to climate change impacts. The relocating Isle de Jean Charles Band of Biloxi-Chitimacha-Choctaw Indians were forced onto a highly vulnerable small island to make way for climate driving industries, including petroleum and industrial agriculture. The U.S. and these industries dramatically engineered the lands and hydrology of the region, which also worked to make the island itself less habitable. The island ecosystem's capacity to support the Band's cultural integrity, economic development and physical and mental health is curtailed due to pollution and loss of wetlands and barrier islands that protect against extreme weather. Now the Band faces climate-related sea level rise. In terms of law and policy, the U.S. still fails to recognize the Band as a politically self-determining sovereign. Federal and local agencies working on regional disaster response planning do not include adequate Indigenous representation or free, prior and informed consent in these decision-making and planning processes (Maldonado, Shearer, Bronen, Peterson, & Lazrus, 2013). It is no longshot to claim that the U.S.' current treatment of the Band and other Indigenous peoples commits human rights violations. The United

Nations (UN) Declaration on the Rights of Indigenous Peoples expresses rights to enjoy the types of goods threatened by climate change and extractive industries, including cultural integrity, economic development, high standards of physical and mental health and political self-determination.

Even strategies for lowering national carbon footprints pose risks to Indigenous peoples and put their human rights in peril, whether through programs of the World Bank, the United Nations or particular nations. Hydropower and forest conservation *still* involve displacement of Indigenous peoples (Beymer-Farris & Bassett, 2012; Cooke, Nordensvard, Saat, Urban, & Siciliano, 2017). Wide-ranging technological solutions, from natural gas transitions to permanent nuclear waste storage to wind power to geoengineering, pose significant risks that include desecration of sacred sites, pollution, violations of free, prior and informed consent, and increased rates of sexual violence through sex trafficking at *man camps* set up to house oil and gas industry workers (Carr & Preston, 2017; Deer, 2015; Dussais, 2014; Eaton, 2017; Endres, 2009).

Public discourses of Indigenous allies, including climate scientists and journalists, can also be problematic when they portray Indigenous vulnerability to climate change without reference to the larger struggles with colonialism and capitalism I have described so far (Cameron, 2012). Such discourses give the impression that Indigenous peoples face risks only because climate change, via bad luck, happens to affect the flora and fauna they depend on. Ignoring colonial and capitalist domination also impacts negatively the attempts of some climate scientists to collaborate with Indigenous peoples to learn about climate change. For Indigenous peoples' knowledge of climate baselines or shifting species ranges can divulge sensitive information about sacred, medicinal or economically valuable species and ecosystems that are still threatened by the actions of settlers, corporations and nations or are not sufficiently protected under current legal frameworks (Williams & Hardison, 2013). Research organizations, with legacies of exploitative research against Indigenous peoples, often still do not create career incentives and educational opportunities to enable scientists to work with their Indigenous collaborators in ways that reduce risks and create mutual benefits.

So far, I have covered a complex landscape of Indigenous climate justice involving colonial and capitalist domination linked to industrialization. Is there a succinct way to convey an Indigenous perspective on climate justice that makes all these connections? Perhaps a story of vessels can be created to describe Indigenous climate justice. Stories of vessels, such as ships, canoes and boats, are often created to describe the relationships among different societies who share land, water and air. Buckminster Fuller's "spaceship earth" flies through space without the possibility of getting more fuel and supplies, illustrating dependence on finite resources (Fuller, 2008). Garrett Hardin described rich countries as lifeboats surrounded by poor people swimming in the surrounding oceans – there is only so much room on the lifeboat for poor people as environmental and economic conditions deteriorate (Hardin, 1974). Martin Luther King, Jr., in an attempt to motivate respect for diversity and justice in the U.S., said the widely quoted phrase "We may have come to these shores on different ships, but we are now all in the same boat".

The second epigraph at the beginning of this chapter features an enduring story of vessels, the Treaty Belt, or *Kaswentha*, between the Haudenosaunee and Dutch from the 1600s, that illustrates their relationship through depicting the politics of sharing a river.

To illustrate the relationship between colonialism, capitalism, industrialization and climate injustice, I have written an allegory of vessels, inspired by the *Kaswentha*, but very different in its telling.

An Indigenous Allegory of Climate Justice

Imagine a world of many vessels floating in a pool of waters under a sky. Humans, animals and plants live on these vessels; some, such as fish, live in the waters too. The vessels are all built very differently based on the histories, geographies, economic statuses, cultures and aspirations for the future of the occupants. One vessel is a birch bark canoe and another is a ship or sail boat. Each vessel is its own amalgamation of many different episodes of collective human and plant/animal lives and histories.

Some vessels will nonetheless be referred to as canoes given it is possible to see the traces of that boat-making style in their construction. To be accurate though, they are more like conglomerations of canoes with smaller boats such as speed boats and zodiacs, each connecting to one another, like a very complicated catamaran with many moving pontoons. Other vessels are large aircraft carriers with massive towers built on top of them; they also have upside-down looking towers built on their ship bottoms that extend deep underwater nearing the pool's floor. Many of the vessels are intricately connected to each other in various relations of interdependence. There are millions of different power lines, bridges, ropes, shuttles and other materials that connect the vessels to each other. Now imagine what this looks like as myriad people and nonhumans regularly move from one vessel to the next.

Aircraft carriers have towers and high-technology equipment on them. Yet aircraft carriers are the descendants of large wooden balloon carriers that were built using the wooden materials of canoes that were destroyed by the ancestors of some of the current aircraft carrier occupants. Glorious paintings of these balloon carriers hang in the aircraft carrier rooms and some of the old furniture in these rooms still has refurbished canoe wood. The watery depths and pool floor below where the early canoes were destroyed furnished many of the resources, such as metals and fossil fuels, that were used to transition from the balloon carriers to the current aircraft carriers. The canoes that avoided being absorbed by aircraft carriers and their ancestor vessels still float in the water. But they are much lower in height than the aircraft carriers. Occupants of the canoes can see what is going on in the water in great detail and observe firsthand trends in water quality and turbulence.

Residents of the aircraft carriers, on the other hand, rarely get close to the water. They observe the water through windows, probes and submarines. Canoes and aircraft carriers are both dependent on the water conditions for the well-being of the people inside them, but the perspectives of the occupants differ based on whether they can experience the waters with an immediacy or whether they must rely on experiencing the waters based on reports from probes sent out by the aircraft carriers. Many of the aircraft carriers have forcibly connected themselves to the canoes. Some people who were born on the canoes now live on the aircraft carriers, bringing with them shards of materials from the canoes that they often have to sell for food. However – and with some exceptions – these persons live on the parts of the aircraft carriers that are most exposed to the water or are more likely to be flooded.

The aircraft carriers often seek to get rid of the canoes when the canoes are in the way of a new addition to the aircraft carrier. They do so by pulling in the canoes, smashing them up against the sides of the aircraft carrier, absorbing any surviving occupants and taking any valuable supplies or shards from the canoes. Sometimes, occupants of aircraft carriers are curious and seek to experience the waters from the vantage points of the canoes. Yet, there is always a risk that too many inquisitive occupants of aircraft carriers can overwhelm a canoe's carrying capacity and supplies, either when the aircraft carrier occupants all try to board the canoe at the same time or when even just a few leap dramatically from an aircraft carrier to a canoe.

The strangest vessels of all are neither canoes nor aircraft carriers. They are not so much water-going vessels as they are giant hovercrafts that float above all the other vessels in the sky. The force of the fans of the hover-engines blows into the waters. Canoes, aircraft carriers, humans, plants and animals go in and out of them like billions of marionettes as the hovercrafts seek to take their materials, and resources from the waters as well as from the floor of the pool. The hovercrafts are massive in scale, spanning across many vessels, often blocking the sun in the sky just as an eclipse does, especially when the hovercrafts get close to each other. The hovercrafts often tie up the canoes like yoyos, smashing them up against the aircraft carriers. Sometimes, they drop stone weights onto the canoes, weights that plunge the canoes into the bottom of the waters. In the turbulence that is created, canoes take in water that needs to be bailed out. The hovercrafts often attach on to the aircraft carriers to prop them up when the hulls of the aircraft carriers get punctured.

While water turbulence and quality are sources of sustenance for all people, the water can also pose a threat to the cultural, economic and political self-determination of the people in the vessels, especially if the vessels take in water, or sink as a result of turbulence. The aircraft carriers create turbulence in the waters through the wake of their engines, and their sheer weight in the water. The turbulence is made worse by the blowing of the giant fans of the hovercrafts. The canoes, depending on their location and connections to aircraft carriers or hovercrafts jostle and bristle more in the water than the other vessels. Without the aircraft carriers and hovercrafts, the water would be a lot calmer and canoe vessels would have a lot more control, and be more stable.

The people in the aircraft carriers and hovercrafts no longer see how much turbulence their vessels create for canoes, because few of them live or work close enough to the water. The canoes simply disappear from vision or appear as small, fragile boats that are so vulnerable to the waters that it feels as if nobody would dare go there to find out what is happening. Nor do many of the people in the aircraft carriers see the risks endured by their fellow residents who live in areas of the ship that are more exposed to the waters. Moreover, going back many years, the aircraft carriers and hovercrafts have destroyed the aquatic carbon sinks and used fossil fuels so that they could power their engines and fans, producing greater turbulence in the waters, and more intense and frequent storms. The smoke stacks of the hovercrafts are piled on top of the crafts, with a direct line to polluting the sky. Underground oil drilling and leaking pipelines make the turbulent waters dirty as well.

Given that many occupants in the canoes can actually see the water, because the canoes are lower in height, those occupants have a good sense of how bad the turbulence is, how dirty the water is, and what to expect from the storms. People living high up

inside aircraft carriers or hovercrafts have not ever been close to the water, yet the technologies at their disposal allow them to reach out into the water and test for trends of greater or lesser turbulence. As the turbulence grows and the storms become more intense, all vessels are affected, but the canoes bear the brunt. Some sink completely into the water, their occupants escaping onto other canoes or, at times, onto aircraft carriers; others change their location in the water and detach from the aircraft carriers, in the process facing the onslaught of the disturbance caused by the hovercraft engines.

Some of those on the aircraft carriers realize that they are responsible for stirring up the waters or at least realize that they should do something about the impacts of the turbulence on smaller vessels. The occupants of the hovercrafts realize this, too; however, they feel that the solution is for them to create more, or larger, hovercrafts, eventually moving everyone into a network of interconnected hovercrafts or on to a massive, single hovercraft. The aircraft carriers, often disagreeing with the somewhat impractical ideas of the hovercrafts, put up proposals to bring the canoes closer to each other – in some cases lifting them out of the water and hoisting them like lifeboats; in other cases, beams and other materials are added to stabilize the canoes in the water. Yet, in cases where the aircraft carriers' proposals are put into practice, the results are disastrous. When the aircraft carriers fire their engines to move closer to the canoes, the wake of their engines further destabilizes the water, harming the canoe occupants even more. When severe storms break, the aircraft carriers cannot even see the canoes and run right over them.

The aircraft carriers blame climate change and smallness of the canoes for this unfortunate state of affairs. Yet, the occupants of canoes have a different perspective. The reason why the aircraft carriers cannot get closer is because they are too big, and their engines disturb the water greatly. The solutions with aircraft carriers and hovercrafts always involve creating more turbulence, a turbulence that was there even before "climate change" as an issue stirred the waters. One way to lessen the turbulence and storminess is to change the design of the aircraft carriers and hovercrafts completely. Yet this would mean that the occupants of those vessels would have to redesign their vessels in ways that do not disturb the waters. If there are parts and mechanisms of the aircraft carriers and hovercrafts that are not needed any more because they always disturb the waters, what would the occupants do with those parts and mechanisms? What would the occupants do in their lives *without* those parts and mechanisms?

INTERPRETING THE ALLEGORY

There are certainly many ways to interpret the allegory. The following is simply one place to begin—a starting point I offer as I quickly close this piece. The canoes represent the many different Indigenous peoples everywhere and people who share their situation. The aircraft carriers are nation-states and the hovercrafts are corporations. The pool of waters and sky are the earth system at broad and local scales. The engines, fans and carbon-intensive economics of the aircraft carriers and hovercrafts, their sheer size and desire to clear out the canoes, represent the nexus of colonialism, capitalism and industrialization. This nexus has multiple forms, including the military, extractive industries, and educational institutions. Capitalism and industrialization stir and disrupt the water and sky; colonialism makes it hard for some vessels to adapt to the disruptions.

I offer the allegory to demonstrate why climate change and many proposed solutions to adapt to or mitigate climate change produce great suffering for Indigenous peoples *unless* colonialism is addressed alongside capitalism and industrialization. Failing to address colonialism is like lowering or turning off some of the engines and fans of the aircraft carriers and hovercrafts. This, in turn, would sink the large vessels, pulling down the canoes with them. Given the physical realities of the vessels and waters in the allegory, it is hard to see how tweaks in the ways things work would change the ultimate ecological dynamics that are so unfavorable to the canoes.

So Watt-Cloutier's references to capitalism and colonialism in the opening quotations should not be dismissed within movements for climate justice. In the absence of a concern for addressing colonialism, climate justice advocates do not really propose solutions to climate change that are that much better for Indigenous well-being than the proposed inaction of even the most strident climate change deniers. Decolonization and anti-colonialism, understood in senses appropriate to the allegory, cannot be disaggregated from climate justice for Indigenous peoples. Indigenous climate justice movements are distinct in their putting resistance to the nexus of colonialism, capitalism and industrialization at the vanguard of their work.

REFERENCES

Aquino, M. (2009, June 7). Tension roils Peru after deadly Amazon clashes, *Reuters*.

Beeler, C. (2017, June 28). Navajo Power Plant Likely to Close, Despite Trump's Promises to Save Coal *Public Radio International's The World*.

Beymer-Farris, B. A., & Bassett, T. J. (2012). The REDD menace: Resurgent protectionism in Tanzania's mangrove forests. *Global Environmental Change, 22*(2), 332-341.

Callison, C. (2014). *How climate change comes to matter: the communal life of facts*. Raleigh-Durham, North Carolina, USA: Duke University Press.

Cameron, E. S. (2012). Securing Indigenous politics: A critique of the vulnerability and adaptation approach to the human dimensions of climate change in the Canadian Arctic. *Global Environmental Change, 22*(1), 103-114.

Carr, W., & Preston, C. J. (2017). Skewed Vulnerabilities and Moral Corruption in Global Perspectives on Climate Engineering. *Environmental Values, Forthcoming*.

Cooke, F. M., Nordensvard, J., Saat, G. B., Urban, F., & Siciliano, G. (2017). The Limits of Social Protection: The Case of Hydropower Dams and Indigenous Peoples' Land. *Asia & the Pacific Policy Studies*.

Deer, S. (2015). *The Beginning and End of Rape*: University of Minnesota Press.

Dhillon, J., & Estes, N. (2016). Introduction: Standing Rock, #NoDAPL, and Mni Wiconi *Cultural Anthropology, Hot Spots*, https://culanth.org/fieldsights/1007-introduction-standing-rock-nodapl-and-mni-wiconi.

Dussais, A. M. (2014). Room For a (Sacred View)? American Indian Tribes Confront Visual Desecration Caused by Wind Energy Projects. *American Indian Law Review, 38*(2), 336-420.

Eaton, K. (2017, April 12). Tribal Members in Oklahoma Defeat Natural Gas Pipeline, *Indian Country Today*.

3

The Muqaddimah

An Introduction to History

Ibn Khaldûn

Supplementary Note to the Second Prefatory Discussion

The northern quarter of the earth has more civilization than the southern quarter. The reason thereof.

We know from observation and from continuous tradition that the first and the second of the cultivated zones have less civilization than the other zones. The cultivated area in the first and second zones is interspersed with empty waste areas and sandy deserts and has the Indian Ocean to the east. The nations and populations of the first and second zones are not excessively numerous. The same applies to the cities and towns there (Figure 3, cf. Frontispiece).

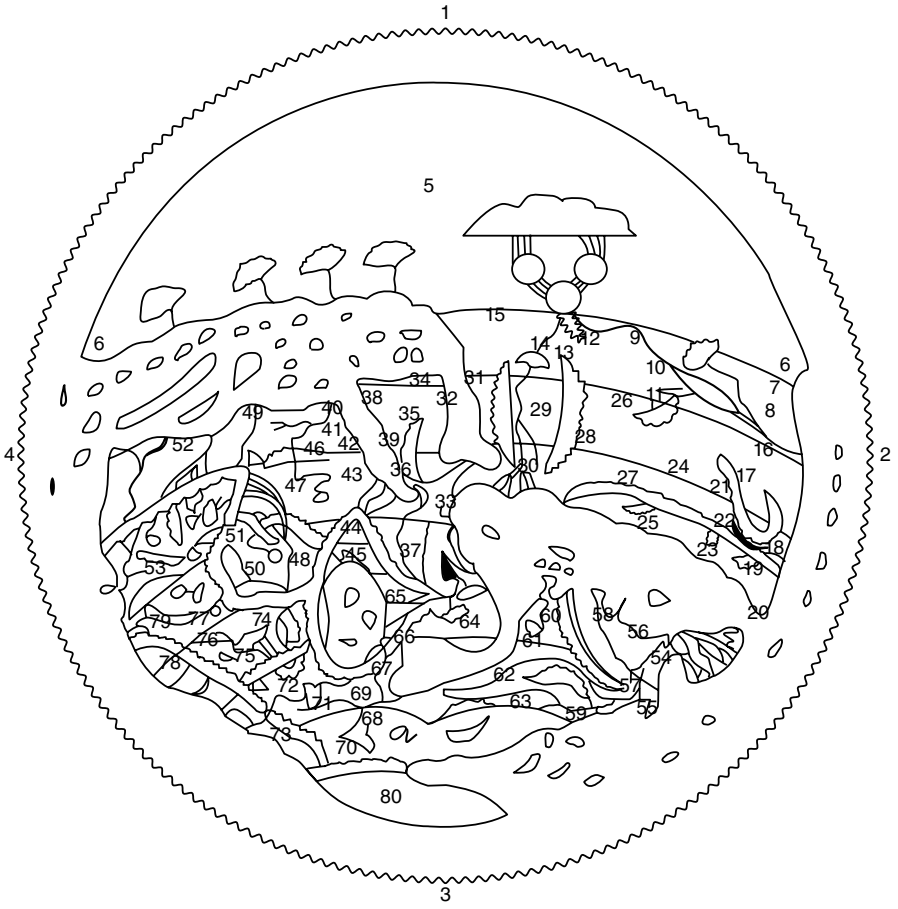
The third, fourth, and subsequent zones are just the opposite. Waste areas there are few. Sandy deserts also are few or non-existent. The nations and populations are tremendous. Cities and towns are exceedingly numerous. Civilization has its seat between the third and the sixth zones. The south is all emptiness.

Many philosophers have mentioned that this is because of the excessive heat and slightness of the sun's deviation from the zenith in the south. Let us explain and prove this statement. The result will clarify the reason why civilization in the third and fourth zones is so highly developed and extends also to the fifth, <sixth,> and seventh zones.

We say: When the south and north poles (of heaven) are upon the horizon, they constitute a large circle that divides the firmament into two parts. It is the largest circle (in it) and runs from west to east. It is called the equinoctial line. In astronomy, it has been explained in the proper place that the highest sphere moves from east to west in a daily motion by means of which it also forces the spheres enclosed by it to move. This motion is perceptible to the senses. It has also been explained that the stars in their spheres have a motion that is contrary to this motion and is, therefore, a motion from west to east. The periods of this movement differ according to the different speeds of the motions of the stars.

Parallel to the courses of all these stars in their spheres, there runs a large circle which belongs to the highest sphere and divides it into two halves. This is the ecliptic (zodiac).

The Anthropology of Climate Change: An Historical Reader, First Edition. Edited by Michael R. Dove.



KEY TO THE MAP

1 South	21 Ṣinhâjah	41 Mukrân	61 Bohemia
2 West	22 Dar'ah	42 Kirmân	62 Jathûliyah
3 North	23 Ifrîqiyah	43 Fârs	63 Jarmâniyah
4 East	24 Fezzan	44 *al-Bahlûs*	64 al-Baylaqân
5 Empty beyond the equator because of the heat	25 Jarîd	45 Azerbaijan	65 Armenia
	26 Kawâr	46 Desert	66 Ṭabaristân
6 Equator	27 Desert of Berenice	47 Khurâsân	67 Alans
7 Lamlam Country	28 Inner Oases	48 Khuwârizm	68 Bashqirs
8 Maghzâwaṅ (Maguzawa?)	29 Upper Egypt	49 Eastern India	69 Bulgars
9 Kanem [Country]	30 Egypt	50 Tashkent	70 Pechenegs
10 Bornu	31 Beja	51 Soghd	71 Stinking Land
11 Gawgaw	32 Ḥijâz	52 China	72 Waste Country
12 Zaghây	33 Syria	53 Tughuzghuz	73 Magog
13 at-Tâjuwîn	34 Yemen	54 Gascogne	74 Ghuzz
14 Nubia	35 Yamâmah	55 Brittany	75 Türgish
15 Abyssinia	36 al-Baṣrah	56 Calabria	76 Adhkish
16 Ghânah	37 'Irâq	57 France	77 Khallukh
17 Lamtah	38 ash-Shiḥr	58 Venice	78 Gog
18 as-Sûs	39 Oman	59 Germany (Alamâniyah)	79 Kimäk
19 Morocco	40 Western India	60 Macedonia	80 Empty in the north because of the cold
20 Tangier			

Figure 3.1 *Map of the World*
Ibn Khaldûn, The Muqaddimah. ©1958, 1967 by PUP Reprinted by permission of Princeton University Press.

It is divided into twelve "signs." As has been explained in the proper place, the equinoctial line intersects the ecliptic at two opposite points, namely, at the beginning of Aries and at the beginning of Libra. The equinoctial line divides the zodiac into two halves. One of them extends northward from the equinoctial line and includes the signs from the beginning of Aries to the end of Virgo. The other half extends southward from it and includes the signs from the beginning of Libra to the end of Pisces.

When the two poles fall upon the horizon <which takes place in one particular region> among all the regions of the earth, a line is formed upon the surface of the earth that faces the equinoctial line and runs from west to east. This line is called the equator. According to astronomical observation, this line is believed to coincide with the beginning of the first of the seven zones. All civilization is to the north of it.

The north pole gradually ascends on the horizon of the cultivated area (of the earth) until its elevation reaches sixty-four degrees. Here, all civilization ends. This is the end of the seventh zone. When its elevation reaches ninety degrees on the horizon – that is the distance between the pole and the equinoctial line – then it is at its zenith, and the equinoctial line is on the horizon. Six of the signs of the zodiac, the northern ones, remain above the horizon, and six, the southern ones, are below it.

Civilization is impossible in the area between the sixty-fourth and the ninetieth degrees, for no admixture of heat and cold occurs there because of the great time interval between them. Generation (of anything), therefore, does not take place.

The sun is at its zenith on the equator at the beginning of Aries and Libra. It then declines from its zenith down to the beginning of Cancer and Capricorn. Its greatest declination from the equinoctial line is twenty-four degrees.

Now, when the north pole ascends on the horizon, the equinoctial line declines from the zenith in proportion to the elevation of the north pole, and the south pole descends correspondingly, as regards the three (distances constituting geographical latitude). Scholars who calculate the (prayer) times call this the latitude of a place. When the equinoctial line declines from the zenith, the northern signs of the zodiac gradually rise above it, proportionately to its rise, until the beginning of Cancer is reached. Meanwhile, the southern signs of the zodiac correspondingly descend below the horizon until the beginning of Capricorn is reached, because of the inclination of the (two halves of the zodiac) upwards or downwards from the horizon of the equator, as we have stated.

The northern horizon continues to rise, until its northern limit, which is the beginning of Cancer, is in the zenith. This is where the latitude is twenty-four degrees in the Ḥijâz and the territory adjacent. This is the declination from the equinoctial at the horizon of the equator at the beginning of Cancer. With the elevation of the north pole (Cancer) rises, until it attains the zenith. When the pole rises more than twenty-four degrees, the sun descends from the zenith and continues to do so until the elevation of the pole is sixty-four degrees, and the sun's descent from the zenith, as well as the depression of the south pole under the horizon, is the same distance. Then, generation (of anything) stops because of the excessive cold and frost and the long time without any heat.

At and nearing its zenith, the sun sends its rays down upon the earth at right angles. In other positions, it sends them down at obtuse or acute angles. When the rays form right angles, the light is strong and spreads out over a wide area, in contrast to what happens in the case of obtuse and acute angles. Therefore, at and nearing its zenith, the heat is greater than in other positions, because the light (of the sun) is the reason for heat and calefaction. The sun reaches its zenith at the equator twice a year in two points of Aries and Libra. No declination (of the sun) goes very far. The heat hardly begins to become more temperate, when the sun has reached the limit of its declination at the beginning of Cancer or Capricorn and begins to rise again toward the zenith. The perpendicular rays then fall heavily upon the horizon there (in these regions) and hold steady for a long time, if not permanently. The air gets burning hot, even excessively so. The same is true whenever the sun reaches the zenith in the area between the equator and latitude twenty-four degrees, as it does twice a

year. The rays exercise almost as much force upon the horizon there (at this latitude) as they do at the equator. The excessive heat causes a parching dryness in the air that prevents (any) generation. As the heat becomes more excessive, water and all kinds of moisture dry up, and (the power of) generation is destroyed in minerals, plants, and animals, because (all) generation depends on moisture.

Now, when the beginning of Cancer declines from the zenith at the latitude of twenty-five degrees and beyond, the sun also declines from its zenith. The heat becomes temperate, or deviates only slightly from (being temperate). Then, generation can take place. This goes on until the cold becomes excessive, due to the lack of light and the obtuse angles of the rays of the sun. Then, (the power of) generation again decreases and is destroyed. However, the destruction caused by great heat is greater than that caused by great cold, because heat brings about desiccation faster than cold brings about freezing.

Therefore, there is little civilization in the first and second zones. There is a medium degree of civilization in the third, fourth, and fifth zones, because the heat there is temperate owing to the decreased amount of light. There is a great deal of civilization in the sixth and seventh zones because of the decreased amount of heat there. At first, cold does not have the same destructive effect upon (the power of) generation as heat; it causes desiccation only when it becomes excessive and thus has dryness added. This is the case beyond the seventh zone. (All) this, then, is the reason why civilization is stronger and more abundant in the northern quarter. And God knows better!

The[1] philosophers concluded from these facts that the region at the equator and beyond it (to the south) was empty. On the strength of observation and continuous tradition, it was argued against them that (to the contrary) it was cultivated. How would it be possible to prove this (contention)? It is obvious that the (philosophers) did not mean to deny entirely the existence of civilization there, but their argumentation led them to (the realization) that (the power of) generation must, to a large degree, be destroyed there because of the excessive heat. Consequently, civilization there would be either impossible, or only minimally possible. This is so. The region at the equator and beyond it (to the south), even if it has civilization as has been reported, has only a very little of it.

Averroes[2] assumed that the equator is in a symmetrical position[3] and that what is beyond the equator to the south corresponds to what is beyond it to the north; consequently, as much of the south would be cultivated as of the north. His assumption is not impossible, so far as (the argument of) the destruction of the power of generation is concerned. However, as to the region south of the equator, it is made impossible by the fact that the element of water covers the face of the earth in the south, where the corresponding area in the north admits of generation. On account of the greater amount of water (in the south), Averroes' assumption of the symmetrical (position of the equator) thus turns out to be impossible. Everything else follows, since civilization progresses gradually and begins its gradual progress where it can exist, not where it cannot exist.

The assumption that civilization cannot exist at the equator is contradicted by continuous tradition. And God knows better!

[Remainder of section, pp. 109–166 in original, not reprinted here]

Third Prefatory Discussion

The temperate and the intemperate zones. The influence of the air upon the color of human beings and upon many (other) aspects of their condition.

We[4] have explained that the cultivated region of that part of the earth which is not covered by water has its center toward the north, because of the excessive heat in the south and the excessive cold in the north. The north and the south represent opposite extremes of cold and heat. It necessarily follows that there must be a gradual decrease from the extremes toward the center, which, thus, is moderate. The fourth zone is the most temperate cultivated region. The bordering third and fifth zones are rather close to being temperate. The sixth and second

zones which are adjacent to them are far from temperate, and the first and seventh zones still less so. Therefore, the sciences, the crafts, the buildings, the clothing, the foodstuffs, the fruits, even the animals, and everything that comes into being in the three middle zones are distinguished by their temperate (well-proportioned character). The human inhabitants of these zones are more temperate (well-proportioned) in their bodies, color, character qualities, and (general) conditions.[5] They are found to be extremely moderate in their dwellings, clothing, foodstuffs, and crafts. They use houses that are well constructed of stone and embellished by craftsmanship. They rival each other in production of the very best tools and implements. Among them, one finds the natural minerals, such as gold, silver, iron, copper, lead, and tin. In their business dealings they use the two precious metals (gold and silver). They avoid intemperance quite generally in all their conditions. Such are the inhabitants of the Maghrib, of Syria, the two 'Irâqs, Western India (as-Sind), and China, as well as of Spain; also the European Christians nearby, the Galicians,[6] and all those who live together with these peoples or near them in the three temperate zones. The 'Irâq and Syria are directly in the middle and therefore are the most temperate of all these countries.

The inhabitants of the zones that are far from temperate, such as the first, second, sixth, and seventh zones, are also farther removed from being temperate in all their conditions. Their buildings are of clay and reeds. Their foodstuffs are durra and herbs. Their clothing is the leaves of trees, which they sew together to cover themselves, or animal skins. Most of them go naked. The fruits and seasonings of their countries are strange and inclined to be intemperate. In their business dealings, they do not use the two noble metals, but copper, iron, or skins, upon which they set a value for the purpose of business dealings. Their qualities of character, moreover, are close to those of dumb animals. It has even been reported that most of the Negroes of the first zone dwell in caves and thickets, eat herbs, live in savage isolation and do not congregate, and eat each other. The same applies to the Slavs. The reason for this is that their remoteness from being temperate produces in them a disposition and character similar to those of the dumb animals, and they become correspondingly remote from humanity. The same also applies to their religious conditions. They are ignorant of prophecy and do not have a religious law, except for the small minority that lives near the temperate regions. (This minority includes,) for instance, the Abyssinians, who are neighbors of the Yemenites and have been Christians from pre-Islamic and Islamic times down to the present; and the Mâlî, the Gawgaw, and the Takrûr who live close to the Maghrib and, at this time, are Muslims. They are said to have adopted Islam in the seventh [thirteenth] century. Or, in the north, there are those Slav, European Christian, and Turkish nations that have adopted Christianity. All the other inhabitants of the intemperate zones in the south and in the north are ignorant of all religion. (Religious) scholarship is lacking among them. All their conditions are remote from those of human beings and close to those of wild animals. "And He creates what you do not know."[7]

The (foregoing statement) is not contradicted by the existence of the Yemen, the Ḥaḍramawt, al-Aḥqâf, the Ḥijâz, the Yamâmah, and adjacent regions of the Arabian Peninsula in the first and second zones. As we have mentioned, the Arabian Peninsula is surrounded by the sea on three sides. The humidity of (the sea) influences the humidity in the air of (the Arabian Peninsula). This diminishes the dryness and intemperance that (otherwise) the heat would cause. Because of the humidity from the sea, the Arabian Peninsula is to some degree temperate.

Genealogists who had no knowledge of the true nature of things imagined that Negroes are the children of Ham, the son of Noah, and that they were singled out to be black as the result of Noah's curse, which produced Ham's color and the slavery God inflicted upon his descendants. It is mentioned in the Torah[8] that Noah cursed his son Ham. No reference is made there to blackness. The curse included no more than that Ham's descendants should be the slaves of his brothers' descendants. To attribute the blackness of the Negroes to Ham, reveals disregard of the true nature of heat and cold and of the influence they exercise upon

the air (climate) and upon the creatures that come into being in it. The black color (of skin) common to the inhabitants of the first and second zones is the result of the composition of the air in which they live, and which comes about under the influence of the greatly increased heat in the south. The sun is at the zenith there twice a year at short intervals. In (almost) all seasons, the sun is in culmination for a long time. The light of the sun, therefore, is plentiful.[9] People there have (to undergo) a very severe summer, and their skins turn black because of the excessive heat. Something similar happens in the two corresponding zones to the north, the seventh and sixth zones. There, a white color (of skin) is common among the inhabitants, likewise the result of the composition of the air in which they live, and which comes about under the influence of the excessive cold in the north. The sun is always on the horizon within the visual field (of the human observer), or close to it. It never ascends to the zenith, nor even (gets) close to it. The heat, therefore, is weak in this region, and the cold severe in (almost) all seasons. In consequence, the color of the inhabitants is white, and they tend to have little body hair. Further consequences of the excessive cold are blue eyes, freckled skin, and blond hair.

The fifth, fourth, and third zones occupy an intermediate position. They have an abundant share of temperance,[10] which is the golden mean. The fourth zone, being the one most nearly in the center, is as temperate as can be. We have mentioned that before.[11] The physique and character of its inhabitants are temperate to the (high) degree necessitated by the composition of the air in which they live. The third and fifth zones lie on either side of the fourth, but they are less centrally located. They are closer to the hot south beyond the third zone and the cold north beyond the fifth zone. However, they do not become intemperate.

The four other zones are intemperate, and the physique and character of their inhabitants show it. The first and second zones are excessively hot and black, and the sixth and seventh zones cold and white. The inhabitants of the first and second zones in the south are called the Abyssinians, the Zanj, and the Sudanese (Negroes). These are synonyms used to designate the (particular) nation that has turned black. The name "Abyssinians," however, is restricted to those Negroes who live opposite Mecca and the Yemen, and the name "Zanj" is restricted to those who live along the Indian Sea. These names are not given to them because of an (alleged) descent from a black human being, be it Ham or any one else. Negroes from the south who settle in the temperate fourth zone or in the seventh zone that tends toward whiteness, are found to produce descendants whose color gradually turns white in the course of time. Vice versa, inhabitants from the north or from the fourth zone who settle in the south produce descendants whose color turns black. This shows that color is conditioned by the composition of the air. In his *rajaz* poem on medicine, Avicenna said:

Where the Zanj live is a heat that changes
their bodies
Until their skins are covered all over with
black.
The Slavs acquire whiteness
Until their skins turn soft.[12]

The inhabitants of the north are not called by their color, because the people who established the conventional meanings of words were themselves white. Thus, whiteness was something usual and common (to them), and they did not see anything sufficiently remarkable in it to cause them to use it as a specific term. Therefore, the inhabitants of the north, the Turks, the Slavs, the Tughuzghuz, the Khazars, the Alans, most of the European Christians, the Gog and Magog are found to be separate nations[13] and numerous races called by a variety of names.

The inhabitants of the middle zones are temperate in their physique and character and in their ways of life. They have all the natural conditions necessary for a civilized life, such as ways of making a living, dwellings, crafts, sciences, political leadership, and royal authority. They thus have had (various manifestations of) prophecy, religious groups, dynasties, religious laws, sciences, countries, cities, buildings, horticulture, splendid crafts, and everything else that is temperate.

Charles-Louis de Secondat, Baron de La Brède et de Montesquieu: The Spirit of the Laws (1748)

Book XIV

1. ***General Idea.***

If it be true that the temper of the mind and the passions of the heart are extremely different in different climates, the laws ought to be in relation both to the variety of those passions and to the variety of those tempers.

2. ***Of the Difference of Men in different Climates.***

Cold air constringes the extremities of the external fibres of the body; [1] this increases their elasticity, and favours the return of the blood from the extreme parts to the heart. It contracts [2] those very fibres; consequently it increases also their force. On the contrary, warm air relaxes and lengthens the extremes of the fibres; of course it diminishes their force and elasticity.

People are therefore more vigorous in cold climates. Here the action of the heart and the reaction of the extremities of the fibres are better performed, the temperature of the humours is greater, the blood moves more freely towards the heart, and reciprocally the heart has more power. This superiority of strength must produce various effects; for instance, a greater boldness, that is, more courage; a greater sense of superiority, that is, less desire of revenge; a greater opinion of security, that is, more frankness, less suspicion, policy, and cunning. In short, this must be productive of very different tempers. Put a man into a close, warm place, and for the reasons above given he will feel a great faintness. If under this circumstance you propose a bold enterprise to him, I believe you will find him very little disposed towards it; his present weakness will throw him into despondency; he will be afraid of everything, being in a state of total incapacity. The inhabitants of warm countries are, like old men, timorous; the people in cold countries are, like young men, brave. If we reflect on the late wars, [3] which are more recent in our memory, and in which we can better distinguish some particular effects that escape us at a greater distance of time, we shall find that the northern people, transplanted into southern regions, [4] did not perform such exploits as their countrymen who, fighting in their own climate, possessed their full vigour and courage.

This strength of the fibres in northern nations is the cause that the coarser juices are extracted from their aliments. Hence two things result: one, that the parts of the chyle or lymph are more proper, by reason of their large surface, to be applied to and to nourish the fibres; the other, that they are less proper, from their coarseness, to give a certain subtilty to the nervous juice. Those people have therefore large bodies and but little vivacity.

The nerves that terminate from all parts in the cutis form each a nervous bundle; generally speaking, the whole nerve is not moved, but a very minute part. In warm climates, where the cutis is relaxed, the ends of the nerves are expanded and laid open to the weakest action of the smallest objects. In cold countries the cutis is constinged and the papill compressed: the miliary glands are in some measure paralytic; and the sensation does not reach the brain, except when it is very strong and proceeds from the whole nerve at once. Now, imagination, taste, sensibility, and vivacity depend on an infinite number of small sensations.

I have observed the outermost part of a sheep's tongue, where, to the naked eye, it seems covered with papill. On these papill I have discerned through a microscope small hairs, or a kind of down; between the papill were pyramids shaped towards the ends like pincers. Very likely these pyramids are the principal organ of taste.

I caused the half of this tongue to be frozen, and, observing it with the naked eye, I found the papill considerably diminished: even some rows of them were sunk into their sheath. The outermost part I examined with the microscope, and perceived no pyramids. In proportion as the frost went off, the papill seemed to the naked eye to rise, and with the microscope the miliary glands began to appear.

This observation confirms what I have been saying, that in cold countries the nervous glands are less expanded: they sink deeper into their sheaths, or they are sheltered from the action of external objects; consequently they have not such lively sensations.

In cold countries they have very little sensibility tor pleasure; in temperate countries, they have more; in warm countries, their sensibility is exquisite. As climates are distinguished by degrees of latitude, we might distinguish them also in some measure by those of sensibility. I have been at the opera in England and in Italy, where I have seen the same pieces and the same performers: and yet the same music produces such different effects on the two nations: one is so cold and phlegmatic, and the other so lively and enraptured, that it seems almost inconceivable.

It is the same with regard to pain, which is excited by the laceration of some fibre of the body. The Author of nature has made it an established rule that this pain should be more acute in proportion as the laceration is greater: now it is evident that the large bodies and coarse fibres of the people of the north are less capable of laceration than the delicate fibres of the inhabitants of warm countries; consequently the soul is there less sensible of pain. You must flay a Muscovite alive to make him feel.

From this delicacy of organs peculiar to warm climates it follows that the soul is most sensibly moved by whatever relates to the union of the two sexes: here everything leads to this object.

In northern climates scarcely has the animal part of love a power of making itself felt. In temperate climates, love, attended by a thousand appendages, endeavours to please by things that have at first the appearance, though not the reality, of this passion. In warmer climates it is liked for its own sake, it is the only cause of happiness, it is life itself.

In southern countries a machine of a delicate frame but strong sensibility resigns itself either to a love which rises and is incessantly laid in a seraglio, or to a passion which leaves women in a greater independence, and is consequently exposed to a thousand inquietudes. In northern regions a machine robust and heavy finds pleasure in whatever is apt to throw the spirits into motion, such as hunting, travelling, war, and wine. If we travel towards the north, we meet with people who have few vices, many virtues, and a great share of frankness and sincerity. If we draw near the south, we fancy ourselves entirely removed from the verge of morality; here the strongest passions are productive of all manner of crimes, each man endeavouring, let the means be what they will, to indulge his inordinate desires. In temperate climates we find the inhabitants inconstant in their manners, as well as in their vices and virtues: the climate has not a quality determinate enough to fix them.

The heat of the climate may be so excessive as to deprive the body of all vigour and strength. Then the faintness is communicated to the mind; there is no curiosity, no enterprise, no generosity of sentiment; the inclinations are all passive; indolence constitutes the utmost happiness; scarcely any punishment is so severe as mental employment; and slavery is more supportable than the force and vigour of mind necessary for human conduct.

3. *Contradiction in the Tempers of some Southern Nations.*

The Indians [5] are naturally a pusillanimous people; even the children [6] of Europeans

born in India lose the courage peculiar to their own climate. But how shall we reconcile this with their customs and penances so full of barbarity? The men voluntarily undergo the greatest hardships, and the women burn themselves; here we find a very odd compound of fortitude and weakness.

Nature, having framed those people of a texture so weak as to fill them with timidity, has formed them at the same time of an imagination so lively that every object makes the strongest impression upon them. That delicacy of organs which renders them apprehensive of death contributes likewise to make them dread a thousand things more than death: the very same sensibility induces them to fly and dare all dangers.

As a good education is more necessary to children than to such as have arrived at maturity of understanding, so the inhabitants of those countries have much greater need than the European nations of a wiser legislator. The greater their sensibility, the more it behoves them to receive proper impressions, to imbibe no prejudices, and to let themselves be directed by reason.

At the time of the Romans the inhabitants of the north of Europe were destitute of arts, education, and almost of laws; and yet the good sense annexed to the gross fibres of those climates enabled them to make an admirable stand against the power of Rome, till the memorable period in which they quitted their woods to subvert that great empire.

4. *Cause of the Immutability of Religion, Manners, Customs, and Laws in the EasternCountries.*

If to that delicacy of organs which renders the eastern nations so susceptible of every impression you add likewise a sort of indolence of mind, naturally connected with that of the body, by means of which they grow incapable of any exertion or effort, it is easy to comprehend that when once the soul has received an impression it cannot change it. This is the reason that the laws, manners, and customs, [7] even those which seem quite indifferent, such as their mode of dress, are the same to this very day in eastern countries as they were a thousand years ago.

5. *That those are bad Legislators who favour the Vices of the Climate, and good Legislators who oppose those Vices.*

The Indians believe that repose and non-existence are the foundation of all things, and the end in which they terminate. Hence they consider entire inaction as the most perfect of all states, and the object of their desires. To the Supreme Being they give the title of immovable. [8] The inhabitants of Siam believe that their utmost happiness [9] consists in not being obliged to animate a machine, or to give motion to a body.

In those countries where the excess of heat enervates and exhausts the body, rest is so delicious, and motion so painful, that this system of metaphysics seems natural; and Foe, [10] the legislator of the Indies, was directed by his own sensations when he placed mankind in a state extremely passive; but his doctrine arising from the laziness of the climate favoured it also in its turn; which has been the source of an infinite deal of mischief.

The legislators of China were more rational when, considering men not in the peaceful state which they are to enjoy hereafter, but in the situation proper for discharging the several duties of life, they made their religion, philosophy, and laws all practical. The more the physical causes incline mankind to inaction, the more the moral causes should estrange them from it.

8. *An excellent Custom of China.*

The historical relations [11] of China mention a ceremony [12] of opening the ground which

the emperor performs every year. The design of this public and solemn act is to excite the people to tillage. [13]

Further, the emperor is every year informed of the husbandman who has distinguished himself most in his profession; and he makes him a mandarin of the eighth order.

Among the ancient Persians [14] the kings quitted their grandeur and pomp on the eighth day of the month, called *Chorrem-ruz,* to eat with the husbandmen. These institutions were admirably calculated for the encouragement of agriculture.

10. *Of the Laws in relation to the Sobriety of the People.*

In warm countries the aqueous part of the blood loses itself greatly by perspiration; [15] it must therefore be supplied by a like liquid. Water is there of admirable use; strong liquors would congeal the globules [16] of blood that remain after the transuding of the aqueous humour.

In cold countries the aqueous part of the blood is very little evacuated by perspiration. They may therefore make use of spirituous liquors, without which the blood would congeal. They are full of humours; consequently strong liquors, which give a motion to the blood, are proper for those countries.

The law of Mahomet, which prohibits the drinking of wine, is therefore fitted to the climate of Arabia: and indeed, before Mahomet's time, water was the common drink of the Arabs. The law [17] which forbade the Carthaginians to drink wine was a law of the climate; and, indeed, the climate of those two countries is pretty nearly the same.

Such a law would be improper for cold countries, where the climate seems to force them to a kind of national intemperance, very different from personal ebriety. Drunkenness predominates throughout the world, in proportion to the coldness and humidity of the climate. Go from the equator to the north pole, and you will find this vice increasing together with the degree of latitude. Go from the equator again to the south pole, and you will find the same vice travelling south, [18] exactly in the same proportion.

It is very natural that where wine is contrary to the climate, and consequently to health, the excess of it should be more severely punished than in countries where intoxication produces very few bad effects to the person, fewer to the society, and where it does not make people frantic and wild, but only stupid and heavy. Hence those laws [19] which inflicted a double punishment for crimes committed in drunkenness were applicable only to a personal, and not to a national, ebriety. A German drinks through custom, and a Spaniard by choice.

In warm countries the relaxing of the fibres produces a great evacuation of the liquids, but the solid parts are less transpired. The fibres, which act but faintly, and have very little elasticity, are not much impaired; and a small quantity of nutritious juice is sufficient to repair them; for which reason they eat very little.

It is the variety of wants in different climates that first occasioned a difference in the manner of living, and this gave rise to a variety of laws. Where people are very communicative there must be particular laws, and others where there is but little communication.

SEVENTH AND LAST EPOCH

When the Power of Man Has Assisted That of Nature

The first men, witnesses of convulsive movements of the Earth, then still recent and very frequent, having only mountains as refuge against inundations, often chased from these same refuges by the fires of volcanoes, trembling on an Earth that was trembling under their feet, naked in spirit and body, exposed to the curses of all the elements, victims of the fury of ferocious animals, of which they could not avoid being the prey; all equally penetrated by a common feeling of baleful terror, all equally driven by necessity, did they not all very quickly seek to unite, first to defend themselves in numbers, then to help each other and work in concert to make dwellings and weapons? They started by sharpening hard pebbles into the form of axes, these jades, these *lightning stones*, that they thought had fallen from the clouds and formed by thunder, and which nevertheless are only the first monuments of the art of man in a state of pure nature. He would soon draw fire from these same pebbles in striking them one against the other; he would have seized the flames of volcanoes, or profited from the fire of their burning lavas, to communicate it, in order to make daylight in the forests and the undergrowth. Because, with the help of this powerful element, he cleansed, made healthy, purified the terrains that he wished to inhabit. With the stone axe he split and cut the trees, fashioned the wood, shaped his weapons and his most essential tools; and after arming themselves with clubs and other heavy and defensive arms, did not these first men find the means to make weapons lighter to strike at a distance? A nerve, an animal tendon, threads of aloes, or the supple bark of a woody plant would have served them as cord to unite the two extremities of an elastic branch out of which they made their bow. They sharpened other little pebbles to arm the arrow; soon they would have had rope, rafts, canoes, and would have thus maintained themselves or formed small nations formed of a few families, or rather of relatives descended from the same family, as we still see today among the savages who wish to stay savages, and who can do this, in those places where the free space is not lacking, nor game, fish, and fruit. But

among all those where space is confined by water or restricted by high mountains, these small nations become more numerous, or are forced to divide up the land between them, and it is from this moment that the Earth became the domain of man. He took possession by his work of cultivation, and attachment to a fatherland very quickly followed these first acts of possession; individual interests being part of national interest, order, police, and laws soon followed, and society assumed its solidity and its force.

Nevertheless, these men, profoundly affected by the calamities of their first condition, and still having before their eyes the ravages of floods, the fires of volcanoes, the chasms opened by the shaking of the earth, conserved a durable and almost eternal memory of these misfortunes of the world: the idea that one must perish by a universal deluge or by a general conflagration; the respect for certain mountains[1] where they were saved from inundations; the horror of other mountains that launched fires more terrible than those of thunder; the vision of these combats of the Earth against the heavens, founded on the fable of the Titans and of their assaults upon the Gods; the idea of the real existence of a malevolent Being, the fear and the superstition that are its first product. All of these feelings founded upon terror have from then on taken possession forever of the heart and mind of man; it is barely reassured today by the passage of time, by the calm that followed these centuries of storms, and ultimately by knowledge of the actions and operations of Nature: a knowledge that could be acquired only after the establishment of some great society in these peaceable lands.

It was not in Africa, nor in the lands of Asia that are farthest to the south, that the great societies could first form. These countries were still burning and deserted. It was not in America, which is evidently only, with the exceptions of its mountain chains, a new land. It is not even in Europe, which only much later received the light from the East, where the first civilized humans were established, since before the foundation of Rome, the happiest countries of this part of the world, such as Italy, France, and Germany, were still only peopled by men who were half-savages. Read Tacitus, on the customs of the Germans: it is the picture of those of the Huron, or rather the habits of the entire human species on leaving the state of Nature. It is thus in the northern countries of Asia that the stem of human knowledge grew; and it was upon the trunk of the tree of science that was raised the throne of man's power. The more he knew, the more he could do, but the more he was able. But also, the less he did, the less he knew. All this assumes active peoples in a happy climate, under a pure sky for observing, upon fertile earth for cultivation, in a privileged country, sheltered from floods, distant from volcanoes, higher, and consequently temperate for longer than the others. And all these conditions, all these circum-

stances, were united in the center of the continent of Asia, from the fortieth degree of latitude to the fifty-fifth. The rivers that bring their waters into the North Sea, the eastern ocean, into the seas of the south and into the Caspian, all depart from this high ground, which today makes part of southern Siberia and Tartary. It was thus in this terrain that was higher, more solid than the others, because it served them as center and because it was distant by nearly five hundred leagues from all the oceans. It was in this privileged country that arose the first people worthy to bear this name, worthy of all our respect, as creator of the sciences, the arts, and all the useful institutions. This truth is equally revealed to us by the monuments of natural history and by the almost inconceivable progress of ancient astronomy. How were some men, so new, able to find the lunisolar period of six hundred years?[2] I confine myself to this single fact, although one could cite many others as marvelous and as constant. They thus knew as much astronomy as *Dominique Cassini* knew in our days, who was the first to demonstrate the reality and exactitude of this period of six hundred years, knowledge of which neither the Chaldeans, nor the Egyptians, nor the Greeks discovered. It is knowledge that supposes that of the precise movement of the Moon and the Earth, and that demands a great perfection in the instruments needed to observe them: a knowledge that could be acquired only after having acquired all, that was only founded upon a long succession of researches, of studies, and of astronomical works, and presumes at least two or three thousand years of cultivating the human mind to attain this.

These first people were very content, because they became very knowledgeable. They enjoyed several centuries of peace, of repose, of the leisure necessary for this culture of mind upon which depend the fruits of all the other cultures. For, to detect this period of six hundred years, it needed at least twelve hundred years of observations. To be assured of it as certain fact, more than double this time is needed. Here already is three thousand years of astronomical studies, and this should not astonish us, since it needed the same duration for astronomers, counting from the Chaldeans up to us, to recognize this period. And were not these first three thousand years of observations necessarily preceded by several centuries when the science was not yet born? Are six thousand years, counting from today, sufficient to ascend to the most noble epoch in the history of man, and even to follow it in the initial progress that he has made in the arts and in the sciences?

But unfortunately they have been lost, these high and beautiful sciences, they have come to us only as fragments too shapeless to serve us otherwise than as knowledge of their former existence. The invention of the formula that the Brahmins used to calculate the eclipses needs as much science as the construction of our ephemerides, and yet these same Brahmins did not have the

least idea of the composition of the universe. They were quite wrong concerning the movement, the size, and the position of the planets, they calculated the eclipses without knowing the theory, guided like machines by an array founded on wise formulae that they did not understand, and that probably their ancestors did not at all invent, because they perfected nothing and did not transmit the least ray of science to their descendants. In their hands these formulae were only practical methods, but they presumed a deep knowledge of which they did not possess the elements, and of which they did not conserve even the least vestiges, and which consequently never belonged to them. These methods could thus only have come from this ancient learned people who had reduced to formulae the movements of the stars, and who by a long suite of observations had arrived not only at the prediction of the eclipses, but at the much more difficult knowledge of the period of six hundred years and of all the astronomical facts that this knowledge demands and necessarily presumes.

I believe that I have a basis to say that the Brahmins did not create these learned formulae, because all of their ideas of physics are contrary to the theory upon which these formulae depend, and if they had understood this theory even in the times when they received its results, they would have retained the science and would not have found themselves reduced today to the greatest ignorance, and given to the most ridiculous presumptions concerning the system of the world—because they believe that the Earth is immobile and rests upon the peak of a mountain of gold; they think that the Moon is eclipsed by aerial dragons, that the planets are smaller than the Moon, and so on. It is thus evident that they never possessed the first elements of astronomical theory, nor even the least knowledge of the principles which suppose the methods that they use. But, I must refer to the excellent work that M. Bailly has just published on ancient astronomy, in which he discusses in depth all that relates to the origin and progress of this science. One will see that his ideas accord with mine, and moreover he has treated this important subject with an inspired wisdom and profound erudition that deserves the praise of all who are interested in the progress of science.

The Chinese, a little more enlightened than the Brahmins, calculated the eclipses roughly enough and have calculated them similarly for two or three thousand years. Because they have never perfected anything, they have never invented anything. Science was thus not born in China any more than in India. Although also neighboring with the Indians, the first knowledgeable people, the Chinese seem not to have drawn anything from them; they do not even have the astronomical formulae of which the Brahmins have conserved the use, and which are nevertheless the first and great monuments of the knowl-

edge and well-being of peoples. It also seems that neither the Chaldeans, the Persians, the Egyptians, nor the Greeks have received anything from these first enlightened people. Because, in these countries of the Levant, the new astronomy is due only to the determined assiduity of the Chaldean observers, and then to the works of the Greeks,[3] which one can date only from the time of the founding of the School of Alexandria. Nevertheless, this science was still very imperfect after two thousand years of the new culture and even after our recent centuries. It thus appears to me certain that these first people, who had invented and cultivated astronomy so happily and for so long, left nothing of this but some fragments of a few results that could be retained in memory, such as the period of six hundred years that the historian Joseph passed down to us without understanding it.

The loss of the sciences, this first wound made upon humanity by the axe of barbarism, was without doubt the effect of an unfortunate revolution, which would have destroyed, perhaps in a few years, the work and the works of several centuries. Because, we cannot doubt that these first peoples, at first as powerful as knowledgeable, did not for a long time maintain themselves in their splendor, because they made such great progress in the sciences, and consequently in all the arts demanded by their study. But it altogether seems that, when the lands to the north of this happy country cooled too much, the men who lived there, still ignorant, wild, and barbaric, would have streamed toward the same country that was rich, fertile, and cultivated in the arts. It is even somewhat astonishing that they seized it and that they there destroyed not only the origins, but even the memory of all science, with the result that perhaps thirty centuries of ignorance followed the thirty centuries of light that had preceded them. Of all these beautiful and first fruits of the human mind, there remain only the dregs. Religious metaphysics cannot be understood, have no need of study, and cannot be altered nor lost except by lack of memory, which can never be lacking once it is struck with wonder. So this metaphysics spread out from this first center of the sciences to all parts of the world. The idols of Calicut are seen to be the same as those of Seleginskoi. The pilgrimages to the Grand Lama, established at more than two thousand leagues of distance; the idea of metempsychosis carried yet farther, adapted as an article of faith by the Indians, the Ethiopians, the Atlanteans; these same ideas, disfigured, were received by the Chinese, the Persians, the Greeks, to arrive as far as to us; all seems to show us that the first stock and common stem of human knowledge belongs to this land in high Asia, and that these sterile or degenerate parts of the noble branches of this ancient stock extended into all parts of the Earth among civilized peoples.

And what can we say about these centuries of barbarism, which passed in

pure loss for us? They are buried forever in a profound night: man was then plunged back into the shadows of ignorance, and so to say stopped being man. Because coarseness, followed by the forgetting of duty, started by relaxing the ties of society, and barbarism managed to break them; laws derided or done away with, customs degenerated into savage habits, the love of humanity, although engraved in holy letters, finally wiped from hearts. Finally man, without education, without morals, reduced to leading a solitary and wild life, only offers, in place of an elevated nature, that of a being degraded below the level of an animal.

Nevertheless, after the loss of the sciences, the useful arts to which they had given birth were retained: cultivation of the land, which became more necessary as men became more numerous, more crowded; all of the practices demanded by this same culture, all the arts implied by the construction of edifices, the fabrication of idols and of weapons, the weaving of fabrics, and so on, survived after science; they spread out from place to place, and were perfected more and more. They followed the paths of the great populations: the ancient empire of China arose the first, and almost at the same time those of the Atlanteans in Africa; those of the continent of Asia, those of Egypt, of Ethiopia were successively established, and finally that of Rome, to which our Europe owes its civil existence. It is thus only since around thirty centuries that the power of man has been united with that of Nature, and has extended over the greater part of the Earth; the treasures of its fertility were until then buried, and man placed them in bright daylight. Its other riches, still more profoundly buried, could not hide from his researches, and have become the price of his work. Everywhere, where he conducted himself with wisdom, he followed the lessons of Nature, profited from its examples, employed its means, and chose in its immensity all the objects that could service him or please him. By his intelligence, the animals were tamed, subjugated, broken in, reduced to obey him forever. By his works, the swamps were drained, the rivers contained, their cataracts smoothed, the forests cleared, the land cultivated. By his reflection, time was counted, space was measured, the celestial movements recognized, calculated, represented, the heavens and Earth compared, the universe enlarged, and the Creator respectfully adored. Through his arts derived from science, the seas were traversed, mountains crossed, peoples brought closer, a new world discovered, a thousand other isolated lands became his domain. Finally, the entire face of the Earth today carries the imprint of the power of man, which, though subordinate to that of Nature, often created more than did she, or at least marvelously assisted, so it is with the help of our hands that she developed in all her extent, and that she arrived by degrees to the point of perfection and magnificence that we see today.

Compare in effect brute Nature with Nature cultivated: compare the small wild nations of America with our great civilized peoples; compare even those of Africa, which are only half civilized. See at the same time the state of the lands that these nations live in: you will easily determine the small worth of these men by the slight impression that their hands have made on the soil. Either stupid, or lazy, these half-brute men, these unpoliced nations, large or small, only weigh down the globe without comforting the Earth, starve it without nourishing it, destroy without building, using all and renewing nothing. Nevertheless, the most despicable condition of the human species is not that of the savage, but that of those nations that are a quarter policed, which have always been the real curse of human nature, and which civilized peoples still have trouble to contain today. They have, as we have said, ravaged the first happy land, they tore out the seeds of contentment and destroyed the fruits of science. And with how many other invasions was this first incursion of the barbarians followed! It is these same countries of the north, where once were found all of the good of the human species, and then subsequently there arrived all of its faults. How many times have waves of animals with human faces been seen, always coming from the north, ravaging the lands of the south? Cast your eyes on the annals of all the peoples, you will count there twenty centuries of desolation for a few years of peace and repose.

It took six hundred centuries for Nature to construct her great works, to cool the Earth, to shape its surface and to arrive at a tranquil state. How many centuries will be needed for men to arrive at the same point and cease to trouble, to agitate, and to destroy themselves? When will they recognize that the peaceful working of the lands of their fatherland suffices for their happiness? When will they be wise enough to reduce their pretensions, to renounce their imagined dominance, relinquish their foreign possessions, often ruinous or at least more burden than use? The empire of Spain is as extensive as that of France in Europe, and ten times greater in America—is it ten times more powerful? Would it be even so much if this proud and great nation was limited to draw from its own happy land all the goods that it could provide for itself? The English, these people so judicious, so profoundly thoughtful, did they not make a great mistake in extending too far the limits of their colonies? The ancients seem to me to have had saner ideas about these matters; they planned emigrations only when their population became too great, and when their lands and their commerce no longer sufficed for their needs. The invasions of the barbarians, which one regards with horror, did they not have causes still more pressing as they found themselves too tightly pressed in lands that were thankless, cold, and denuded, and at the same time neighboring other lands that were cultivated, fertile, and covered with all the goods that they lacked?

But also how much did these horrific conquests cost in blood, how much unhappiness, how many losses accompanied them and followed them?

We will not long dwell on the sad spectacle of these revolutions of death and devastation, all produced by ignorance. Let us hope that the equilibrium, however imperfect, which is now present between the powers of the civilized peoples will be maintained and can even become more stable as men sense better their true interests, that they will recognize the value of peace and tranquil contentment, that they will make these the sole object of their ambition, that the princes will scorn the false glory of conquerors and disdain the small vanity of those who, to play a role, provoke them into great movements.

Let us suppose thus a world at peace, and see more closely how much the power of man could influence that of Nature. Nothing seems more difficult, not to say impossible, than to oppose the progressive cooling of the Earth and to raise the temperature of a climate; however, man can do this and has done this.

Paris and Quebec are about at the same latitude and at the same elevation on the globe; Paris would thus be as cold as Quebec, if France and all the countries that neighbor it were as bereft of people, as covered with forest, as bathed in waters as are the lands that neighbor Canada. To cleanse, to reclaim and people a country, is to provide it with warmth for many thousands of years, and this forestalls the only reasonable objection that one could make against my opinion, or to put it better, against the real fact of the cooling of the Earth.

According to your system, people tell me, all the Earth should be colder than it was two thousand years ago; yet, tradition seems to prove the opposite. The Gauls and Germania nourished elks, lynx, bears, and other animals that have since retreated into northern countries. This progression is very different from that which you might presume for them, from north to south. Furthermore history tells us that every year the river Seine was generally ice covered for part of winter. Do not these facts seem directly opposed to the suggestion of the progressive cooling of the globe? They would be, I admit, if France and Germany were like Gaul and Germania: if one had not cut down the forests, drained the swamps, contained the torrents, directed the rivers, and cleared all the lands that were overly covered and charged with the debris of their production. But does one not need to consider that the loss of the heat of the globe took place insensibly; that it needed seventy-six thousand years to cool to the level of the present temperature, and that in another seventy-six thousand years it will not yet be cold enough for the particular warmth of living Nature to be obliterated? Does one then not need to compare this cooling, which is so slow, with the prompt and sudden cold that comes to us from the

regions of the air? Recall that there is nevertheless only one thirty-second of difference between the greatest heat of our summers and the greatest cold of our winters; and one will already sense that exterior causes have a much greater influence than the interior cause on the temperature of each clime, and that in all those where the cold of the overlying air is attracted by humidity or pushed by the winds, which bring it down to the surface of the Earth, the effects of these particular causes greatly prevail over the product of the general cause. We can give an example that will leave no doubt on this matter, and that forestalls at the same time any objection of this type.

In the immense extent of the lands of Guyana, which are only thick forests where the Sun can barely penetrate, where the widespread waters occupy large areas, where the closely spaced rivers are neither contained nor directed, where it rains continually for eight months of the year, only over the last century has a very small region of these vast forests around Cayenne started to be cleared. And, already, the difference in temperature in this small area of cleared terrain is so noticeable that one suffers there from too great a heat, even during the night, while over all the rest of the tree-covered ground it is cold enough at night to force one to light a fire. It is the same with the quantity and continuity of the rains. They cease sooner and commence later at Cayenne than in the interior of the country; they are also less abundant and less continuous. There are four months of absolute drought at Cayenne, while in the interior of the country, the dry season lasts only three months, and also it rains every day as a violent enough storm, that one calls the *grain de midi*, because it is toward the middle of the day that this storm begins. Furthermore, there is hardly ever any thunder at Cayenne, while thunder is violent and very frequent in the interior of the country, where the clouds are black, thick, and very low. These facts, which are certain, do not they show that one can stop the eight months of continual rainfall, and that one could prodigiously increase the heat in all this country, if one destroyed the forests that cover it, if one constrained the waters and directed the rivers, and if the cultivation of the land, which presumes the movement and great number of animals and of men, drove away the cold and superfluous humidity that the infinitely too-great quantity of vegetation attracts, maintains, and spreads widely?

Like all movement, all action produced by heat, and with all beings endowed with progressive movement being themselves nothing so much as little furnaces of heat, it is the proportion of the number of men and animals to that of plants that determines (all other things being equal) the local temperature of each terrain in particular. The former are a source of heat, and the latter produce only cold humidity. The habitual use that man has made of fire adds much to this artificial temperature in all those places that he inhabits

in numbers. In Paris, in times of great cold, the thermometers in Faubourg Saint-Honoré show two to three degrees of cold more than at Faubourg Saint-Marceau, because the wind from the north is tempered on passing above the chimneys of this great city. A single forest more or less in a country suffices to change the temperature. While trees are around, they attract the cold, they diminish by their shade the heat of the Sun, they produce damp vapors, which form clouds and fall back as rain, all the colder as it has descended from height. And, if these forests are abandoned to Nature alone, these same trees, fallen from old age, decay coldly upon the earth, while in the hands of man, they serve to feed the element of fire, and become secondary causes of all particular heat. In the lands of the prairies, before the harvest of grasses, one always has abundant dew and very frequently little rains, which cease as soon as the grasses are harvested. These little rains would therefore become more abundant and would not cease, if our prairies, like the savannahs of America, were always covered with the same quantity of grasses which, far from diminishing, can only augment, by the fertilization from all those that dry and decay upon the earth.

I could easily give many other examples,[4] which all concur to show that man can modify the influences on the climate in which he lives, and can secure, so to speak, the temperature to the level at which it suits him. And here is something that is singular: it is more difficult for him to cool the Earth than to heat it. Master of the element of fire, that he can augment and propagate at his will, he cannot do the same with the element of cold, which he can neither grasp nor communicate. The principle of cold is not even a real substance, but a simple lack or rather a diminution of heat, a diminution that must be very large in the high regions of the air, and it is large enough at a league of distance from the Earth to convert aqueous vapors into hail and snow.

Because the emanations of the globe's own heat follow the same law that do all the other physical quantities or qualities that leave from a common center, and their intensity decreases in an inverse sense to the square of the distance, it seems certain that it is four times as cold at two leagues than at one league of height in our atmosphere, in taking every point at the Earth's surface as center. On the other hand, the interior heat of the globe is constant in all the seasons at ten degrees above freezing. In this way all greater cold, or rather all heat less than ten degrees, can come to the Earth only by the fall of matter chilled in the higher regions of the air, where the effects of this internal heat diminish as one goes higher. Now the power of man does not extend so far. He cannot make the cold descend as he can make heat rise; he has no other means to protect himself from the excessive heat of the Sun than by creating shade. But it is much easier to fell the forests in Guyana to warm the humid

earth than to plant them in Arabia to refresh the arid sands. However, a single forest in the middle of these burning deserts is sufficient to make them more temperate, to bring there the waters of the sky, to bring to the Earth all the principles of its fertility, and consequently to make man enjoy there all the mildness of a temperate climate.

It is upon the difference in temperature that depends the greater or lesser energy of Nature: the growth, the development, and the very production of all the organized beings are only particular effects of this general cause. Thus man, in modifying that, can at the same time destroy that which harms him and bring forth all that is suitable for him. Happy are the countries where all the elements of temperature are in balance and advantageously enough combined to work only to good effect! But are there any that had this privilege from their origin? Any, where the power of man has not assisted that of Nature, either by bringing in or turning away water, or by destroying useless herbs and plants that are harmful or superfluous, or by favoring useful animals and multiplying them? Of three hundred species of quadruped animals and fifteen hundred species of birds that populate the surface of the Earth, man has chosen nineteen or twenty. These twenty species themselves figure more largely in Nature and make more good on the Earth than all the other species together. They figure more importantly because they are directed by man, who has prodigiously multiplied them. They operate in concert with him all the good that one can expect from a wise administration of force and of power for the cultivation of the Earth, for the transport and commerce of its productions, for the increase of materials, in a word, for all the needs and even for the pleasures of the sole master who can pay for their services by his care.

And in this small number of animal species that man has chosen, that of the chicken and the pig, which are the most fecund, are also the most generally widespread, as if the aptitude for the greatest multiplication was accompanied by this vigor of temperament that braves all hardships. One has found the chicken and the pig in all the least frequented parts of the Earth, on Tahiti and on all the other islands that have been longest unknown and that are the most distant from the continents; it seems that these species have followed that of man in all his migrations. On the isolated continent of South America where none of our animals could penetrate, the peccary and the wild chicken have been found which, although smaller and a little different from the pig and the chicken of our continent, must nevertheless be regarded as very closely related species that one could similarly reduce to domesticity; but savage humans having no idea of society, they did not even seek that of animals. In all the lands of South America, the savages have no domestic animals at all. They indiscriminately kill both good species and bad; they do not choose any to

breed and to multiply, while a single species like the *curassow*, which they have at hand, would provide them, without effort and with only a little care, more subsistence than they can get for themselves by their arduous hunting.

Thus the first trait of man as he starts to become civilized is the empire that he learns to take over animals, and the first trait of his intelligence then becomes the greater character of his power over Nature. Because, it is only after having subjugated them that he has, through their help, changed the face of the Earth, converted the deserts into plowed land and the heaths into cornfields. In multiplying the species of useful animals, man has increased the amount of movement and of life on the Earth, he has at the same time ennobled the entire series of organisms and ennobled himself in transforming plant into animal and both into his own substance, which then spreads out by many multiplications. Everywhere that he produces in abundance, there always follows a great population; millions of people exist in the same space that was once occupied by two or three hundred savages, and thousands of animals where there were barely a few individuals. Through him and for him the precious germs are solely the developed ones, the most noble productions the cultivated ones alone. On the immense tree of fecundity, the fruit-bearing branches are the sole sustaining ones, all being perfected.

The grain with which man makes his bread is not a gift of Nature but the great, useful fruit of his researches and his intelligence in the first of the arts. Nowhere on Earth has wild wheat been found, and it is evidently a plant perfected by his efforts. He must thus have recognized and chosen, among thousands and thousands of others, this precious grass; he must have sown it, gathered it many times to note its multiplication, always proportional to the cultivation and to the fertility of the Earth. And this property, so to speak unique, that wheat has, to resist in its early stages the cold of our winters, although subject, like all the annual plants, to perish after giving its grain, the marvelous quality of this grain, which suits all people, all animals, almost in all climes, and which besides keeps a long time without alteration, without losing its power to reproduce, all this shows us that it is the happiest discovery that man has ever made, and however ancient one may suppose it to be, it was nevertheless preceded by the art of agriculture founded on science and perfected by observation.

If one wishes to have more modern, and even more recent examples of the power of man upon the nature of plants, one has only to compare our vegetables, our plants, and our fruits with the same species as they used to be a hundred and fifty years ago. This comparison can be made immediately and very precisely on running your eyes over the great collection of colored drawings, commenced at the time of *Gaston d'Orleans* and which still continues

today in the Jardin du Roi. One will see there, perhaps with surprise, that the most beautiful flowers of that time, buttercups, carnations, tulips, bears'-ears and so on, would be rejected today, I do not say by our florists, but by the village gardeners. These flowers, although already then cultivated, were not yet far from their state of nature. A simple row of petals, long pistils, and with hard or false colors, without velvety texture, without variety, without nuances, with all the rustic characters of wild nature. Among the kitchen plants, a single species of chicory and two types of lettuce, both quite bad, while today we can count on more than fifty types of lettuce and chicory, all very good to the taste. We can similarly provide the very modern date of our best fruit with pips and with kernels, all different from those of the ancients, which they resemble only in name. Ordinarily things stay the same and names change over time; here it is the contrary, the names have remained and the objects have changed. Our peaches, our apricots, our pears are new productions for which one has conserved the odd names of earlier productions. To have no doubt of this, one need only compare our flowers and our fruits with the descriptions or rather the accounts that the Greek and Latin authors have left us; all their flowers were simple and all their fruit trees were only wild ones, badly enough chosen of each type, of which the little fruits, sharp or dry, had neither the flavor nor the beauty of ours.

It is not that there were no good or new species that did not originally stem from wild stock. But how many times were needed for man to tempt Nature to obtain from it the excellent species? How many thousands of germs was he obliged to entrust to the earth so that he would finally produce them? It is only in sowing, in raising, in cultivating and putting to fruit an almost infinite number of plants of the same species that he was able to recognize a few individuals bearing fruit that were softer and sweeter and better than the others. And this first discovery, which already implies much effort, would have yet remained sterile forever if there were not a second person, who must have had as much ingenuity as the first needed patience. This was to have found the means to multiply by grafting those precious individuals, which unfortunately could not produce a line as noble as them nor propagate by themselves their excellent properties. And this alone proves that in effect there are only purely individual qualities and not specific properties; because, the seeds or pips of these excellent fruits do not produce like others, except simple wild ones and consequently they do not form species that would be essentially different. But, by means of grafting, man could so to speak create secondary species that he could propagate and multiply at his will. The bud or the little branch that he joins to the wild form encloses this individual quality, which cannot be transmitted by seed, and which only needs to develop to produce the same fruit

as the individual from which they were separated to unite them with the wild form, which does not communicate to them any of its bad qualities, because it did not contribute to their formation. It is not a mother, but a simple wet nurse, which only serves for their development through nourishment.

In the animals, most of the qualities that seem individual cannot be transmitted or be propagated by the same route as the specific properties. It was therefore easier for man to influence the nature of animals than that of plants. The races in each species of animals are only constant varieties that are perpetuated by generation, while in plant species there are no races at all, or any varieties constant enough to be perpetuated by reproduction. In the species of the chicken and pigeon alone, a great number of new races have been created very recently, which are all capable of propagating themselves. Every day, among other species, one elevates or ennobles the races in crossing them; from time to time foreign or wild species are acclimatized or cultivated. All these recent and modern examples prove that man has only lately known the extent of his power, and even that he does not yet know enough; it depends entirely upon the exercise of his intelligence. And so, the more he will observe, the more he will cultivate Nature, the more he will have the means to subjugate it and to make it easier to draw new riches from her heart, without diminishing the treasures of her inexhaustible fecundity.

And what could he not do upon himself, I wish to say upon his own species, if the will was always guided by intelligence? Who knows to what point man could perfect his nature, either moral or physical? Is there a single nation that can boast to have arrived at the best government possible, which would make all men not equally happy, but less unequally unhappy? In watching over their care, so to spare their sweat and their blood through peace, by the abundance of materials, by the ease of their life and the means of their propagation: here is the moral goal of all society that seeks to better itself. And for physics, for medicine, and the other arts of which the object is to preserve us, are they as advanced, as well known, as the arts of destruction, the children of war? It seems that man has always reflected less upon the good than he has strived for evil. All society is a mixture of one and the other; and like all the sentiments that affect the multitude, fear is the most powerful; the great talents in the art of making evil were the first to strike the mind of man, and then those that amused him occupied his heart, and it was only after long use of these two means to false honor and sterile pleasure that finally he recognized that his true glory is science, and that peace is his true happiness.

Volume 3. From Vormärz to Prussian Dominance, 1815-1866
Alexander von Humboldt: Excerpts from *Cosmos* (1845-58)

Toward the end of his life, the geographer, naturalist, and explorer Alexander von Humboldt (1769-1859) authored *Cosmos* (1845-58), an ambitious multi-volume work. *Cosmos* was one of the last manifestations of the classicistic/idealistic quest to articulate the unity of all scholarly and scientific knowledge. Humbodlt's study was subsequently superseded by works that took a more pluralistic approach to epistemology.

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In considering the study of physical phenomena, not merely in its bearings on the material wants of life, but in its general influence on the intellectual advancement of mankind, we find its noblest and most important result to be a knowledge of the chain of connection, by which all natural forces are linked together, and made mutually dependent upon each other; and it is the perception of these relations that exalts our views and ennobles our enjoyments. Such a result can, however, only be reaped as the fruit of observation and intellect, combined with the spirit of the age, in which are reflected all the varied phases of thought. He who can trace, through by-gone times, the stream of our knowledge to its primitive source, will learn from history how, for thousands of years, man has labored, amid the ever-recurring changes of form, to recognize the invariability of natural laws, and has thus, by the force of mind, gradually subdued a great portion of the physical world to his dominion. In interrogating the history of the past, we trace the mysterious course of ideas yielding the first glimmering perception of the same image of a Cosmos, or harmoniously ordered whole, which, dimly shadowed forth to the human mind in the primitive ages of the world, is now fully revealed to the maturer intellect of man kind as the result of long and laborious observation.

Each of these epochs of the contemplation of the external world—the earliest dawn of thought and the advanced stage of civilization—has its own source of enjoyment. In the former, this enjoyment, in accordance with the simplicity of the primitive ages, flowed from an intuitive feeling of the order that was proclaimed by the invariable and successive reappearance of the heavenly bodies, and by the progressive development of organized beings; while in the latter, this sense of enjoyment springs from a definite knowledge of the phenomena of nature. When man began to interrogate nature, and, not content with observing, learned to evoke phenomena under definite conditions; when once he sought to collect and record facts, in order that the fruit of his labors might aid investigation after his own brief existence had passed away, the

philosophy of Nature cast aside the vague and poetic garb in which she had been enveloped from her origin, and, having assumed a severer aspect, she now weighs the value of observations, and substitutes induction and reasoning for conjecture and assumption. The dogmas of former ages survive now only in the superstitions of the people and the prejudices of the ignorant, or are perpetuated in a few systems, which, conscious of their weakness, shroud themselves in a vail of mystery. We may also trace the same primitive intuitions in languages exuberant in figurative expressions; and a few of the best chosen symbols engendered by the happy inspiration of the earliest ages, having by degrees lost their vagueness through a better mode of interpretation, are still preserved among our scientific terms.

Nature considered *rationally*, that is to say, submitted to the process of thought, is a unity in diversity of phenomena; a harmony, blending together all created things, however dissimilar in form and attributes; one great whole animated by the breath of life. The most important result of a rational inquiry into nature is, therefore, to establish the unity and harmony of this stupendous mass of force and matter, to determine with impartial justice what is due to the discoveries of the past and to those of the present, and to analyze the individual parts of natural phenomena without succumbing beneath the weight of the whole. Thus, and thus alone, is it permitted to man, while mindful of the high destiny of his race, to comprehend nature, to lift the vail that shrouds her phenomena, and, as it were, submit the results of observation to the test of reason and of intellect.

In reflecting upon the different degrees of enjoyment presented to us in the contemplation of nature, we find that the first place must be assigned to a sensation, which is wholly independent of an intimate acquaintance with the physical phenomena presented to our view, or of the peculiar character of the region surrounding us. In the uniform plain bounded only by a distant horizon, where the lowly heather, the cistus, or waving grasses, deck the soil; on the ocean shore, where the waves, softly rippling over the beach, leave a track, green with the weeds of the sea; every where, the mind is penetrated by the same sense of the grandeur and vast expanse of nature, revealing to the soul, by a mysterious inspiration, the existence of laws that regulate the forces of the universe. Mere communion with nature, mere contact with the free air, exercise a soothing yet strengthening influence on the wearied spirit, calm the storm of passion, and soften the heart when shaken by sorrow to its inmost depths. Every where, in every region of the globe, in every stage of intellectual culture, the same sources of enjoyment are alike vouchsafed to man. The earnest and solemn thoughts awakened by a communion with nature intuitively arise from a presentiment of the order and harmony pervading the whole universe, and from the contrast we draw between the narrow limits of our own existence and the image of infinity revealed on every side, whether we look upward to the starry vault of heaven, scan the far-stretching plain before us, or seek to trace the dim horizon across the vast expanse of ocean.

The contemplation of the individual characteristics of the landscape, and of the conformation of the land in any definite region of the earth, gives rise to a different source of enjoyment, awakening impressions that are more vivid, better defined, and more congenial to certain

phases of the mind, than those of which we have already spoken. At one time the heart is stirred by a sense of the grandeur of the face of nature, by the strife of the elements, or, as in Northern Asia, by the aspect of the dreary barrenness of the far-stretching steppes; at another time, softer emotions are excited by the contemplation of rich harvests wrested by the hand of man from the wild fertility of nature, or by the sight of human habitations raised beside some wild and foaming torrent.

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We find even among the most savage nations (as my own travels enable me to attest) a certain vague, terror-stricken sense of the all-powerful unity of natural forces, and of the existence of an invisible, spiritual essence manifested in these forces, whether in unfolding the flower and maturing the fruit of the nutrient tree, in upheaving the soil of the forest, or in rending the clouds with the might of the storm. We may here trace the revelation of a bond of union, linking together the visible world and that higher spiritual world which escapes the grasp of the senses. The two become unconsciously blended together, developing in the mind of man, as a simple product of ideal conception, and independently of the aid of observation, the first germ of a *Philosophy of Nature*.

Among nations least advanced in civilization, the imagination revels in strange and fantastic creations, and, by its predilection for symbols, alike influences ideas and language. Instead of examining, men are led to conjecture, dogmatize, and interpret supposed facts that have never been observed. The inner world of thought and of feeling does not reflect the image of the external world in its primitive purity. That which in some regions of the earth manifested itself as the rudiments of natural philosophy, only to a small number of persons endowed with superior intelligence, appears in other regions, and among entire races of men, to be the result of mystic tendencies and instinctive intuitions. An intimate communion with nature, and the vivid and deep emotions thus awakened, are likewise the source from which have sprung the first impulses toward the worship and deification of the destroying and preserving forces of the universe. But by degrees, as man, after having passed through the different gradations of intellectual development, arrives at the free enjoyment of the regulating power of reflection, and learns by gradual progress, as it were, to separate the world of ideas from that of sensations, he no longer rests satisfied merely with a vague presentiment of the harmonious unity of natural forces; thought begins to fulfill its noble mission; and observation, aided by reason, endeavors to trace phenomena to the causes from which they spring.

The history of science teaches us the difficulties that have opposed the progress of this active spirit of inquiry. Inaccurate and imperfect observations have led, by false inductions, to the great number of physical views that have been perpetuated as popular prejudices among all classes of society. Thus by the side of a solid and scientific knowledge of natural phenomena there has been preserved a system of the pretended results of observation, which is so much the more difficult to shake, as it denies the validity of the facts by which it may be refuted. This empiricism, the melancholy heritage transmitted to us from former times, invariably contends for

the truth of its axioms with the arrogance of a narrow-minded spirit. Physical philosophy, on the other hand, when based upon science, doubts because it seeks to investigate, distinguishes between that which is certain and that which is merely probable, and strives incessantly to perfect theory by extending the circle of observation.

This assemblage of imperfect dogmas, bequeathed by one age to another—this physical philosophy, which is composed of popular prejudices—is not only injurious because it perpetuates error with the obstinacy engendered by the evidence of ill-observed facts, but also because it hinders the mind from attaining to higher views of nature. Instead of seeking to discover the *mean* or *medium* point, around which oscillate, in apparent independence of forces, all the phenomena of the external world, this system delights in multiplying exceptions to the law, and seeks, amid phenomena and in organic forms, for something beyond the marvel of a regular succession, and an internal and progressive development. Ever inclined to believe that the order of nature is disturbed, it refuses to recognize in the present any analogy with the past, and, guided by its own varying hypotheses, seeks at hazard, either in the interior of the globe or in the regions of space, for the cause of these pretended perturbations.

It is the special object of the present work to combat those errors which derive their source from a vicious empiricism and from imperfect inductions. The higher enjoyments yielded by the study of nature depend upon the correctness and the depth of our views, and upon the extent of the subjects that may be comprehended in a single glance. Increased mental cultivation has given rise, in all classes of society, to an increased desire of embellishing life by augmenting the mass of ideas, and by multiplying means for their generalization; and this sentiment fully refutes the vague accusations advanced against the age in which we live, showing that other interests, besides the material wants of life, occupy the minds of men.

It is almost with reluctance that I am about to speak of a sentiment, which appears to arise from narrow-minded views, or from a certain weak and morbid sentimentality—I allude to the fear entertained by some persons, that nature may by degrees lose a portion of the charm and magic of her power, as we learn more and more how to unvail her secrets, comprehend the mechanism of the movements of the heavenly bodies, and estimate numerically the intensity of natural forces. It is true that, properly speaking, the forces of nature can only exercise a magical power over us as long as their action is shrouded in mystery and darkness, and does not admit of being classed among the conditions with which experience has made us acquainted. The effect of such a power is, therefore, to excite the imagination, but that, assuredly, is not the faculty of mind we would evoke to preside over the laborious and elaborate observations by which we strive to attain to a knowledge of the greatness and excellence of the laws of the universe.

The astronomer who, by the aid of the heliometer or a double refracting prism,* determines the diameter of planetary bodies; who measures patiently, year after year, the meridian altitude and the relative distances of stars, or who seeks a telescopic comet in a group of nebulae, does not feel his imagination more excited—and this is the very guarantee of the precision of his labors—than the botanist who counts the divisions of the calyx, or the number of stamens in a flower, or examines the connected or the separate teeth of the peristoma surrounding the capsule of a moss. Yet the multiplied angular measurements on the one hand, and the detail of organic relations on the other, alike aid in preparing the way for the attainment of higher views of the laws of the universe.

We must not confound the disposition of mind in the observer at the time he is pursuing his labors, with the ulterior greatness of the views resulting from investigation and the exercise of thought. The physical philosopher measures with admirable sagacity the waves of light of unequal length which by interference mutually strengthen or destroy each other, even with respect to their chemical actions; the astronomer, armed with powerful telescopes, penetrates the regions of space, contemplates, on the extremest confines of our solar system, the satellites of Uranus, or decomposes faintly sparkling points into double stars differing in color. The botanist discovers the constancy of the gyratory motion of the chara in the greater number of vegetable cells, and recognizes in the genera and natural families of plants the intimate relations of organic forms. The vault of heaven, studded with nebulæ and stars, and the rich vegetable mantle that covers the soil in the climate of palms, can not surely fail to produce on the minds of these laborious observers of nature an impression more imposing and more worthy of the majesty of creation than on those who are unaccustomed to investigate the great mutual relations of phenomena. I can not, therefore, agree with Burke when he says, "it is our ignorance of natural things that causes all our admiration, and chiefly excites our passions."

While the illusion of the senses would make the stars stationary in the vault of heaven, Astronomy, by her aspiring labors, has assigned indefinite bounds to space; and if she have set limits to the great nebula to which our solar system belongs, it has only been to show us in those remote regions of space, which appear to expand in proportion to the increase of our optic powers, islet on islet of scattered nebulae. The feeling of the sublime, so far as it arises from a contemplation of the distance of the stars, of their greatness and physical extent, reflects itself in the feeling of the infinite, which belongs to another sphere of ideas included in the domain of mind. The solemn and imposing impressions excited by this sentiment are owing to the combination of which we have spoken, and to the analogous character of the enjoyment and emotions awakened in us, whether we float on the surface of the great deep, stand on some lonely mountain summit enveloped in the half-transparent vapory vail of the atmosphere, or by the aid of powerful optical instruments scan the regions of space, and see the remote nebulous mass resolve itself into worlds of stars.

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* Arago's ocular micrometer, a happy improvement upon Rochon's prismatic or double-refraction micrometer. See M. Mathieu's note in Délambre's *Histoire de l'Astronomie au dix-huitième Siècle*, 1827.

The mere accumulation of unconnected observations of details, devoid of generalization of ideas, may doubtlessly have tended to create and foster the deeply-rooted prejudice, that the study of the exact sciences must necessarily chill the feelings, and diminish the nobler enjoyments attendant upon a contemplation of nature. Those who still cherish such erroneous views in the present age, and amid the progress of public opinion, and the advancement of all branches of knowledge, fail in duly appreciating the value of every enlargement of the sphere of intellect, and the importance of the detail of isolated facts in leading us on to general results. The fear of sacrificing the free enjoyment of nature, under the influence of scientific reasoning, is often associated with an apprehension that every mind may not be capable of grasping the truths of the philosophy of nature. It is certainly true that in the midst of the universal fluctuation of phenomena and vital forces—that inextricable net-work of organisms by turns developed and destroyed—each step that we make in the more intimate knowledge of nature leads us to the entrance of new labyrinths; but the excitement produced by a presentiment of discovery, the vague intuition of the mysteries to be unfolded, and the multiplicity of the paths before us, all tend to stimulate the exercise of thought in every stage of knowledge.

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Man can not act upon nature, or appropriate her forces to his own use, without comprehending their full extent, and having an intimate acquaintance with the laws of the physical world. Bacon has said that, in human societies, knowledge is power. Both must rise and sink together. But the knowledge that results from the free action of thought is at once the delight and the indestructible prerogative of man; and in forming part of the wealth of mankind, it not unfrequently serves as a substitute for the natural riches, which are but sparingly scattered over the earth. Those states which take no active part in the general industrial movement, in the choice and preparation of natural substances, or in the application of mechanics and chemistry, and among whom this activity is not appreciated by all classes of society, will infallibly see their prosperity diminish in proportion as neighboring countries become strengthened and invigorated under the genial influence of arts and sciences.

As in nobler spheres of thought and sentiment, in philosophy, poetry, and the fine arts, the object at which we aim ought to be an inward one—an ennoblement of the intellect—so ought we likewise, in our pursuit of science, to strive after a knowledge of the laws and the principles of unity that pervade the vital forces of the universe; and it is by such a course that physical studies may be made subservient to the progress of industry, which is a conquest of mind over matter. By a happy connection of causes and effects, we often see the useful linked to the beautiful and the exalted. The improvement of agriculture in the hands of freemen, and on properties of a moderate extent—the flourishing state of the mechanical arts freed from the trammels of municipal restrictions—the increased impetus imparted to commerce by the multiplied means of contact of nations with each other, are all brilliant results of the intellectual progress of mankind, and of the amelioration of political institutions, in which this progress is

reflected. The picture presented by modern history ought to convince those who are tardy in awakening to the truth of the lesson it teaches.

Nor let it be feared that the marked predilection for the study of nature, and for industrial progress, which is so characteristic of the present age, should necessarily have a tendency to retard the noble exertions of the intellect in the domains of philosophy, classical history, and antiquity, or to deprive the arts by which life is embellished of the vivifying breath of imagination. Where all the germs of civilization are developed beneath the aegis of free institutions and wise legislation, there is no cause for apprehending that any one branch of knowledge should be cultivated to the prejudice of others. All afford the state precious fruits, whether they yield nourishment to man and constitute his physical wealth, or whether, more permanent in their nature, they transmit in the works of mind the glory of nations to remotest posterity. The Spartans, notwithstanding their Doric austerity, prayed the gods to grant them "the beautiful with the good."[*]

I will no longer dwell upon the considerations of the influence exercised by the mathematical and physical sciences on all that appertains to the material wants of social life, for the vast extent of the course on which I am entering forbids me to insist further upon the utility of these applications. Accustomed to distant excursions, I may, perhaps, have erred in describing the path before us as more smooth and pleasant than it really is, for such is wont to be the practice of those who delight in guiding others to the summits of lofty mountains: they praise the view even when great part of the distant plains lie hidden by clouds, knowing that this half-transparent vapory vail imparts to the scene a certain charm from the power exercised by the imagination over the domain of the senses. In like manner, from the height occupied by the physical history of the world, all parts of the horizon will not appear equally clear and well defined. This indistinctness will not, however, be wholly owing to the present imperfect state of some of the sciences, but in part, likewise, to the unskillfulness of the guide who has imprudently ventured to ascend these lofty summits.

The object of this introductory notice is not, however, solely to draw attention to the importance and greatness of the physical history of the universe, for in the present day these are too well understood to be contested, but likewise to prove how, without detriment to the stability of special studies, we may be enabled to generalize our ideas by concentrating them in one common focus, and thus arrive at a point of view from which all the organisms and forces of nature may be seen as one living, active whole, animated by one sole impulse. "Nature," as Schelling remarks in his poetic discourse on art, "is not an inert mass; and to him who can comprehend her vast sublimity, she reveals herself as the creative force of the universe—before all time, eternal, ever active, she calls to life all things, whether perishable or imperishable."

By uniting, under one point of view, both the phenomena of our own globe and those presented in the regions of space, we embrace the limits of the science of the *Cosmos*, and convert the

[*] Pseudo-Plato.—*Alcib*., xi., p. 184, ed. Steph.; Plut., *Instituta Laconica*, p. 253, ed. Hutten.

physical history of the globe into the physical history of the universe, the one term being modeled upon that of the other. This science of the Cosmos is not, however, to be regarded as a mere encyclopedic aggregation of the most important and general results that have been collected together from special branches of knowledge. These results are nothing more than the materials for a vast edifice, and their combination can not constitute the physical history of the world, whose exalted part it is to show the simultaneous action and the connecting links of the forces which pervade the universe. The distribution of organic types in different climates and at different elevations—that is to say, the geography of plants and animals—differs as widely from botany and descriptive zoology as geology does from mineralogy, properly so called. The physical history of the universe must not, therefore, be confounded with the *Encyclopedias of the Natural Sciences*, as they have hitherto been compiled, and whose title is as vague as their limits are ill defined. In the work before us, partial facts will be considered only in relation to the whole. The higher the point of view, the greater is the necessity for a systematic mode of treating the subject in language at once animated and picturesque.

But thought and language have ever been most intimately allied. If language, by its originality of structure and its native richness, can, in its delineations, interpret thought with grace and clearness, and if, by its happy flexibility, it can paint with vivid truthfulness the objects of the external world, it reacts at the same time upon thought, and animates it, as it were, with the breath of life. It is this mutual reaction which makes words more than mere signs and forms of thought; and the beneficent influence of a language is most strikingly manifested on its native soil, where it has sprung spontaneously from the minds of the people, whose character it embodies. Proud of a country that seeks to concentrate her strength in intellectual unity, the writer recalls with delight the advantages he has enjoyed in being permitted to express his thoughts in his native language; and truly happy is he who, in attempting to give a lucid exposition of the great phenomena of the universe, is able to draw from the depths of a language, which, through the free exercise of thought, and by the effusions of creative fancy, has for centuries past exercised so powerful an influence over the destinies of man.

Source of English translation: Alexander von Humboldt, *Cosmos: a Sketch of the Physical Description of the Universe*, translated by E. C. Otté, introduction by Michael Dettelbach. Baltimore: Johns Hopkins University Press, 1997, pp. 23-25, 36-41, 53-56.

Endres, D. (2009). The rhetoric of nuclear colonialism: Rhetorical exclusion of American Indian arguments in the Yucca Mountain nuclear waste siting decision. *Communication and Critical/Cultural Studies, 6*(1), 39-60.
Fuller, R. B. (2008). *Operating manual for spaceship earth*: Estate of R. Buckminster Fuller.
Grann, D. (2017). *Killers of the Flower Moon: The Osage Murders and the Birth of the FBI*. New York, NY, USA: Penguin.
Grinde, D. A., & Johansen, B. E. (1995). *Ecocide of Native America: environmental destruction of Indian lands and peoples* (1st ed.). Sante Fe, New Mexico USA: Clear Light.
Hardin, G. (1974). Commentary: Living on a Lifeboat. *BioScience, 24*(10), 561-568.
Maldonado, J. K., Shearer, C., Bronen, R., Peterson, K., & Lazrus, H. (2013). The impact of climate change on tribal communities in the US: displacement, relocation, and human rights. *Climatic Change, 120*(3), 601-614.
Ransom, J. W. (1999). The Waters *Words that Come Before All Else* (pp. 25-33): Native North American Travelling College.
Robb, P. (2015). Q and A: Sheila Watt-Cloutier seeks some cold comfort, *Ottawa Citizen*.
Royster, J. (1997). Oil and Water in Indian Country. *Natural Resources Journal, 37*.
Saro-Wiwa, K. (1992). *Genocide in Nigeria: the Ogoni Tragedy*. Port Harcourt, Nigeria: Saros International.
Small, G. (1994). War Stories: Environmental Justice in Indian Country. *Daybreak, 4*(2), No pagination.
Treaty Indian Tribes in Western Washington. (2011). Treaty Rights At Risk: Ongoing Habitat Loss, the Decline of the Salmon Resource, and Recommendations for Change.
Turkewitz, J. (2017, April 1). Tribes That Live Off Coal Hold Tight to Trump's Promises *New York Times*.
Weaver, J. (1996). *Defending mother earth: Native American perspectives on environmental justice*. Maryknoll, N.Y., USA: Orbis Books.
Whyte, K. P. (2017). Indigenous Climate Justice Teaching Materials & Advanced Bibliography Retrieved April 26, 2017, from http://kylewhyte.cal.msu.edu/climate-justice/
Wildcat, D. R. (2009). *Red alert! saving the planet with indigenous knowledge*. Golden, CO, USA: Fulcrum.
Williams, T., & Hardison, P. (2013). Culture, law, risk and governance: contexts of traditional knowledge in climate change adaptation. *Climatic Change, 120*(3), 531-544.