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Light(s) and Darkness(es): Looking Back, Looking Forward

Abstract
In this special issue, we argue that light(s) and darkness(es) should be understood in their multiplicity, and that they constitute two aspects of the same phenomenon. They should, therefore, be studied in relation to each other. The complex dynamics of light and dark are more integral to the history of art than other fields, thus offering models for a relational approach to empirical studies beyond this discipline. Drawing on this work, this special issue aims to challenge reductionist frameworks that focus on light alone, without reference to darkness. It explores some of the nuances of light/darkness created by candle, kerosene, oil, gas, and electricity, teasing out the diverse, sometimes contradictory meanings and experiences of light(s) and darkness(es) in the past. It thus aims to study the juxtaposition of light and dark, placing this seeming contrast in dialogue with broader conversations in the history of energy, environmental history, the history of science and technology, as well as the history of representations.

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INTRODUCTION

1 Today more than ever, light is the subject of considerable contemporary debate. On the one hand, access to artificial light is increasingly assumed to be a human right. For many, its absence or irregularity—often called "lighting poverty"—is no longer acceptable. For instance, protests in May 2003 in Dhaka, Bangladesh demanded water, gas, and electricity,[1] while more recently, a major blackout struck Venezuela in March 2019, depriving its inhabitants of light, water, and transportation, and subsequently crippling much of the country. On the other hand, some have begun to denounce excess light in urbanized and industrialized territories, or argue for limiting light to conserve energy. Poorly designed or superfluous light is now suspected of not just wasting energy and contributing to global warming, but also of "polluting"[2] the night and disrupting the biological rhythms of both humans and non-humans. The growing popularity of "Earth Hour" reflects such new critiques of artificial light. Founded in Sydney, Australia in 2007 to raise awareness about climate change, this grassroots movement encourages people to turn off their lights between 8:30 and 9:30 p.m. on the last Saturday of March. By reducing artificial light and restoring night closer to celestially-lit conditions—even for just a brief period—this initiative reminds us that light and darkness have complex relations, evolve over time and with cultural assumptions, and are closely connected to the history of energy.

2 Light(s) and darkness(es) are also expanding areas of scholarship in the humanities and social sciences, with important new work on the history of night. Pioneering research includes that of Anne Cauquelin,[3] Wolfgang Schivelbusch,[4] and A. Roger Ekirch,[5] all of whom have made significant contributions by exploring nocturnal cultures in Western Europe and North America since the 18th C., and by demonstrating how the night—formerly a time generally associated with rest—was gradually appropriated. European researchers[6] have also examined night before the spread of public lighting, in an effort to show that the boundaries between day and night were not clear-cut, and that the division of nocturnal activities and roles was similarly complex and sometimes ambiguous.[7]

3 In this special issue, we build on and extend this avenue of research by arguing that light(s) and darkness(es) should be understood in their multiplicity, and that they constitute two aspects of the same phenomenon. They should, therefore, be studied in relation to each other. The complex dynamics of light and dark are more integral to the history of art than other fields, thus offering models for a relational approach to empirical studies beyond this discipline. Drawing on this work, this special issue of *JEHRHE* aims to challenge reductionist frameworks that focus on light alone, without

1 Fondation EDF (ed.), *Mondes électriques* (Issy-les-Moulineaux: Beaux Arts-TTM éditions, 2012), 59.

2 Not surprisingly, there is debate over terminology here. One can consider the differences between "nuisance" and "pollution" both historically and politically. On the framing of the problem, see Samuel Challéat, Dany Lapostolle, and Rémi Bénos, "Consider the Darkness: From an Environmental and Sociotechnical Controversy to Innovation in Urban Lighting," *Articulo–Journal of Urban Research*, vol. 11, 2015 (online since 24 November 2016). Url: http://articulo.revues.org/3064 (accessed 15/11/2018); and more generally the work of the RENOIR Collectif de recherche. See also Sara B. Pritchard, Erin McLaughlin, and Michelle Shin, "Describing Artificial Light at Night: Keywords in Light Pollution Literature and Why They Matter," *Lighting Research & Technology*, under review.

3 Anne Cauquelin, *La Ville la nuit* (Paris: Presses universitaires de France, 1977).

4 Wolfgang Schivelbusch, *Disenchanted Night: The Industrialization of Light in the Nineteenth Century, trans. Angela Davies* (Berkeley: University of California Press, 1988); Wolfgang Schivelbusch, *La Nuit désenchantée* (Paris: Gallimard, 1993).

5 A. Roger Ekirch, *At Day's Close: Night in Times Past* (New York: Norton, 2005).

6 Elisabeth Crouzet-Pavan, "Recherches sur la nuit vénitienne à la fin du Moyen Âge," *Journal of Medieval History*, n° 7, 1981, 339-356; Mario Sbriccoli (dir.), *La Notte. Ordine, sicurezza e disciplinamento in età moderna* (Florence: Ponte alle Grazie, 1991); Jean Verdon, *Night in the Middle Ages* (Notre Dame: University of Notre Dame Press, 2002).

7 Ezequiel Borgognoni, "El dinamismo en la vida nocturna en el munda urbano castellano a fines de la edad media," *Miscelànea Medieval Murciena*, vol. 36, 2013, 9-26. For earlier time periods, see also Mario Dowd and Robert Hensey, *The Archeology of Darkness* (Oxford: Oxbow Books, 2016).

reference to darkness. It explores some of the nuances of light/darkness created by candle, kerosene, oil, gas, and electricity, teasing out the diverse, sometimes contradictory meanings and experiences of light(s) and darkness(es) in the past. It thus aims to study the juxtaposition of light and dark, placing this seeming contrast in dialogue with broader conversations in the history of energy, environmental history, the history of science and technology, as well as the history of representations.

4 In our initial call for papers, we posed four main questions:

5 - How are light and darkness in tension with one another, juxtaposed, and/or concomitant? Are the borders between light and dark stark, or are there examples in which these distinctions blur and fall apart?

6 - How did various factors—political, economic, cultural, environmental, technological, etc.—shape the understandings and experiences of light/dark in diverse contexts (urban/rural, metropole/colony, etc.) and for different social groups (class, race, gender, sexuality, etc.)?

7 - How, why, and when did (some) people and societies shift from fearing darkness to valuing it?

8 - How can the examination of light(s) and darkness(es) inspire and provide new insights with respect to the history of energy, and vice versa? In other words, how can the history of energy enrich our understanding of the complex relationships of light and dark in diverse contexts? And how does the exploration of light(s)/darkness(es) raise new questions for the history of energy?

9 As these broad, thematic, and analytical questions suggest, we decided not to restrict this special issue to a particular time period or geography in order to acknowledge and appreciate diverse experiences, avoid naturalizing one norm, and facilitate comparisons across time, place, and culture. Our call for papers was largely successful, given that we received proposals evoking the relations between light(s) and darkness(es) from Antiquity to the present from three continents: Europe, North America, and Asia. Although we had hoped for more proposals from more parts of the globe, the Western world still remains overrepresented. We also felt that it was important for our call to be open to all scales of analysis: building, street, city, nation, and planet—all of which can teach us about the links and interactions between light(s) and darkness(es). For instance, in this special issue, Bastien Rueff reconstructs the interior and exterior lighting environments of edifices from Bronze Age Crete, while Benjamin Bothereau explores the streets of late 18th-C. Paris and Barcelona within a revolutionary context. Trish Kahle tackles industrial democracy, urban blackouts, and the U.S. energy crisis during the second half of the 20th C.

10 In addition, these articles invite us to move beyond the simple sensorial (and specifically visual) dimension of the light/darkness pair to consider their linguistic, symbolic, and even psychological dimensions. For example, beyond literal light, the term “bright” can refer to a rational and comprehensible person, whose remarks are “clear” or “illuminating”; conversely, the term obscure (from the Latin *obscurus*, dark) can refer to statements that are unintelligible. In fact, in French, the expression “obscure person” is a synonym for “unknown person.” Some of these meanings are connected with Latin etymological roots and remain more or less explicit by language. The word “clear” (from the Latin *clārus*, meaning bright, clear, apparent, or evident) in French is closer to its original Latin roots than it is in English. On the symbolic level, *lumière* or light (and by extension *Les Lumières*, the French term for the Enlightenment) has referred to the progress (or supposed progress) made by a certain form of civilization. According to this reading, it brought an end to the “obscurantism” of the *Ancien Régime*, and served as a key element during revolutionary periods. Historically, this idea has been applied to other contexts, especially colonialism, empire, and colonized peoples. This issue is explored by Ute Hasenöhrl, who focuses on the unequal spread of lighting in Bombay (British India), the British Empire’s second largest city.

11 These assumptions have also been present in modern architecture, which for hygienist reasons favored light, with darkness being synonymous with unhealthiness and even regression.[8] The article by Mathilde Thouron examines the work required to rehabilitate darkness that accompanied the development of architecture for cinemas. Nona Schulte-Römer's study further complicates "darkness" by suggesting how history and culture shape perceptions of and preferences for light/dark in European contexts. Nick Dunn's contribution looks to both the past and the future, exploring how the history of lighting in Manchester (England) has mediated the experiences of light and darkness in the contemporary city. Linking history and auto-ethnography, Dunn invites us to consider how we do—and might—experience light/dark in urban landscapes today. In her accompanying essay, Sara B. Pritchard shares elements of Dunn's ethnographic approach, reflecting upon light, darkness, energy, and their entanglement in the endscape of the high Arctic during polar night, based on her recent experience in Longyearbyen (Norway).

RECENT HISTORIOGRAPHICAL RENEWAL: FROM LIGHT TO DARKNESS

12 Historians have ably examined the history of light, lighting, lighting technologies, and lighting industries, especially for the period from the 19th C. to the present. Such studies are particularly well represented in the history of technology and urban history.[9] In general, this research suggests a gradual disappearance of darkness due to control over light—what is sometimes called the "colonization" of the night[10] (a metaphor that requires serious reflection). This process enabled an appropriation of the night, which was long considered *terra incognita*: for instance, during the Middle Ages, curfews required city dwellers to stay home, leaving darkness to creatures of the shadows, whether real or imagined.

13 With its simultaneously technical[11] and entrepreneurial[12] dimension, innovation represents a large swath of this historiography. The development of lighting systems has also been central to scholarship over the last four decades; the history of electricity networks has received much of this attention,[13] although other forms of lighting, such as gas, were not forgotten.[14] Scholars have shown how these systems took considerable political, economic, and cultural work to realize.[15] The history of public lighting offers a classic illustration of

8 For the U.S. case, see Daniel Freund, *American Sunshine: Diseases of Darkness and the Quest for Natural Light* (Chicago: University of Chicago Press, 2012).

9 Thomas P. Hughes, *Networks of Power: Electrification in Western Society, 1880-1930* (Baltimore: Johns Hopkins University Press, 1983); David E. Nye, *Electrifying America: Social Meanings of a New Technology* (Cambridge, MA: MIT Press, 1990); David E. Nye, *When the Lights Went Out: A History of Blackouts in America* (Cambridge, MA: MIT Press, 2010); David E. Nye, *American Illuminations: Urban Lighting, 1800-1920* (Cambridge, MA: MIT Press, 2018).

10 Murray Melbin, *Night as Frontier: Colonizing the World After Dark* (New York: Free Press, 1987); Sandy Isenstadt, Margaret Maile Petty, and Dietrich Neumann (eds.), *Cities of Light: Two Centuries of Urban Illumination* (New York: Routledge, 2015), XVII.

11 For instance, see Robert D. Friedel, *Edison's Electric Light: Biography of an Invention* (New Brunswick: Rutgers University Press, 1986); Brian Bowers, *Lengthening the Day: A History of Lighting Technology* (New York: Oxford University Press, 1998); Robert Friedel and Paul Israel with Bernard. S. Finn, *Edison's Electric Light: The Art of Invention* (Baltimore: Johns Hopkins University Press, 2010).

12 Robert Fox, "Edison et la presse française à l'exposition internationale d'électricité de 1881," *in* Cardot Françoise (ed.), *Un siècle d'électricité dans le monde, 1880-1980* (Paris: Presses universitaires de France, 1987), 223-235; Paul Israel, *Edison: A Life of Invention* (New York: John Wiley, 1998); Jill Jonnes, *Empires of Light: Edison, Tesla, Westinghouse and the Race to Electrify the World* (New York: Random House, 2003); Ernest Freeberg, *The Age of Edison: Electric Light and the Invention of Modern America* (New York: Penguin Press, 2013).

13 On systems and networks (including, but not limited to, electrical systems), see Hughes, *Networks of Power*; Harold L. Platt, *The Electric City: Energy and the Growth of the Chicago Area, 1880-1930* (Chicago: University of Chicago Press, 1991); Jean-Pierre Williot, "Naissance d'un réseau gazier à Paris au XIXe siècle : distribution gazière et éclairage," *Histoire, Économie et Société*, n°4, 1989, 569-591; Sophie Reculin, "'Le règne de la nuit désormais va finir'. L'invention et la diffusion de l'éclairage public dans le royaume de France (1697-1789)" (Ph.D diss., Université Lille-3, 2017).

14 Jean-Pierre Williot, *Naissance d'un service public : le gaz à Paris au XIXe siècle* (Paris: Éditions Rive droite, 1999); Alain Beltran, *La Ville-Lumière et la Fée Électricité. L'énergie électrique dans la région parisienne : service public et entreprises privées* (Paris: Éditions Rive droite, 2002).

15 Hughes, *Networks of Power*.

infrastructure: extensive, often invisible, technological systems that are taken for granted—at least until they fail.[16] Finally, more popular histories have shared some of these insights with wider publics.[17]

14 Together, these studies—focused primarily on large metropolitan centers of Europe and North America—have underscored the tension between an intention to evenly light urban territories, and the reality of this lighting, which was usually concentrated along the central roads of cities at the expense of the periphery or narrower streets. This segregation of light and space was often accompanied by social segregation: the best-lit spaces were generally those where the wealthy (aristocrats or bourgeoisie) lived, worked, walked, and entertained, while peripheries inhabited by immigrants, laborers, and more generally those referred to as the "working classes" had to be content with dim or unpredictable lights—when not deprived of lighting altogether. Histories of lighting in colonial or quasi-colonial metropoles shared similarities with major cities in the global North, from associations between light and power to social inequities in the distribution of light.[18]

15 In contrast, lighting technologies and practices continued in many rural areas or smaller cities for decades—in some places a century (or longer) after the development of public lighting first based on gas and then on electricity. In this sense, urban/rural and class divides may be more significant in the history of lighting than those of metropole/colony. National narratives based on major metropoles may therefore exaggerate change, obscure continuity, and fail to capture the persistence of "old" technologies.[19] As these points begin to suggest, this history is still incomplete. Much less is known about smaller, provincial cities, rural spaces, and peripheral areas.[20] Studies of cases in Africa,[21] Asia,[22] and Latin America[23] remain rare. Historical generalizations based on empirical sites to date may, therefore, ultimately not hold in many other contexts, including for a significant share of the world's population—both past and present.

16 Taken together, this scholarship has largely focused on the history of light and its various dimensions. However, over the past decade, more scholars have begun to attend to darkness and night, often entwined phenomena that are, in fact, more complex than either term suggests at first glance. Night may be—to borrow

16 Nye, *When the Lights Went Out*. For a few key pieces on infrastructure in STS, see Susan Leigh Star, "The Ethnography of Infrastructure," *American Behavioral Scientist*, vol. 43, n° 3, 1999, 377-391; Paul N. Edwards, "Infrastructure and Modernity: Force, Time, and Social Organization in the History of Sociotechnical Systems," *in* Thomas J. Misa, Philip Brey, and Andrew Feenberg (eds.), *Modernity and Technology* (Cambridge, MA: MIT Press, 2003), 185-226; Paul N. Edwards, Geoffrey C. Bowker, Steven J. Jackson, and Robin Williams, "Introduction: An Agenda for Infrastructure Studies," *Journal of the Association for Information Systems*, vol. 10, n°5, 2009, 364-374.

17 For instance, see Jonnes, *Empires of Light*; Jane Brox, *Brilliant: The Evolution of Artificial Light* (New York: Houghton Mifflin Harcourt, 2010).

18 See some of the current research of Ute Hasenöhrl. See also Ronen Shamir, *Current Flow: The Electrification of Palestine* (Stanford, CA: Stanford University Press, 2013).

19 David Edgerton, *The Shock of the Old: Technology and Global History Since 1900* (New York: Oxford University Press, 2011).

20 Panu Savolainen, "Les débuts de l'éclairage à Turku, 1805-1827," *Histoire urbaine*, n°50, 2017, 13-28.

21 Céline Ardurat, "L'électrification du Sénégal de la fin du XIX^{e} siècle à la Seconde Guerre mondiale," *Outre-mers*, n° 334-335, 2002, 439-457; Robert Lekoulekissa, *L'électrification en Afrique : le cas du Gabon, 1935-1985* (Paris: L'Harmattan, 2011); Stéphane W. Mehyong, Robert E. Ndong, "L'électrification de l'Afrique équatoriale française (AEF) dans la période de l'après Seconde Guerre mondiale : aménagements hydroélectriques et rivalités interterritoriales," *Revue historique*, n° 657, 2011/1, 93-118; Jules Kouosseu, William Pokam Kamdem, "L'électricité et le fédéralisme au Cameroun : la West Cameroon Electricity Corporation" (POWERCAM), 1962-1975, *Journal Gabonais d'Histoire Économique et Sociale*, n° 1, 2013, 27-42; Salif Diedhiou, "L'énergie électrique au Sénégal de 1887 à 1985," *e-Phaïstos* [online], V-1 2016 | 2018, published online January 21, 2018. Url: http://journals.openedition.org/ephaistos/1209 (accessed 05/11/2018)

22 Pierre Lanthier, "Les quatre phases de l'histoire de l'électricité en Inde, de 1890 à nos jours," *in* Alain Beltran, Léonard Laborie, Pierre Lanthier, and Stéphanie Le Gallic (eds.), *Electric Worlds / Mondes électriques. Creations, Circulations, Tensions, Transitions (19th-21st C.)* (Brussels: Peter Lang, 2016), 575-594. Ian J. Miller's current book project, *Tokyo Electric: Japan in the Age of Global Energy, will help expand work on electrification in Asia*.

23 R. Maranhao, "Le groupe Light au Brésil de 1947 à 1948," *in* Monique Trédé (ed.), *Electricité et électrification dans le monde, 1880-1980* (Paris: PUF, 1990), 401-410.

Ekirch's phrase—at day's close. Yet, as he and other scholars have shown, it still has a social and cultural history.[24] Historians and geographers have begun exploring nocturnal life: from shift work and the night-time economy to pleasure, transgression, and liberation.[25] Geographer Robert Shaw has proposed four specific directions for research under his call for "nightology," while an interdisciplinary team of scholars has argued for a broader, more interdisciplinary approach to "night studies."[26] In the process, these and related studies have helped to complicate narratives about night and dark, revalorize darkness, and critique artificial light, thereby challenging powerful narratives dating back at least to the Judeo-Christian tradition and the Enlightenment in the Western context.[27]

17 Cultural geographer Tim Edensor has dedicated the most sustained attention to light(s) and darkness(es) simultaneously, exploring art, atmosphere, affect, sensory experience, cultural meanings and performances, and urban space.[28] Susanne Bach and Folkert Degenring have spearheaded work exploring this interconnection in literary studies.[29] Yet little historical scholarship, including work in the history of energy, has tackled light/dark at once. We hope this special issue helps inspire future studies.

RECONSIDERING LIGHT(S) AND DARKNESS(ES)

Given recent research and contemporary concerns, this is a timely moment to consider light(s) and darkness(es). It also reflects our own interests in the history of darkness and 18

24 Ekirch, *At Day's Close* (cf. note 5). It is noteworthy that while the subtitle of Ekirch's book is "Night in Times Past," almost all of his empirical sites are European and North American. Verdon's Night in the Middle Ages (cf. note 6) and Koslofsky's Evening's Empire (cf. note 13) also focus on Europe, the medieval and early modern periods, respectively.

25 Bryan D. Palmer, *Cultures of Darkness: Night Travels in the Histories of Transgression* (New York: Monthly Review Press, 2000); Peter C. Baldwin, *In the Watches of the Night: Life in the Nocturnal City, 1820-1930* (Chicago: University of Chicago Press, 2012); Jacques Galinier, Aurore Monod Becquelin (eds.), *Las cosas de la noche. Une mirada diferente* (Mexico: Centro de estudios mexicanos y centroamericanos, 2016); Robert Shaw, "Night as Fragmenting Frontier: Understanding the Night that Remains in an era of 24/7," *Geography Compass*, vol. 9, n° 12, 2015, 637-647; Robert Shaw, *The Nocturnal City* (New York: Routledge, 2018).

26 Shaw, *The Nocturnal City*, 110-121; Christopher C.M. Kyba *et al.*, "Night Matters," *Proceedings of the National Academy of Sciences*, under review.

27 Nick Dunn, *Dark Matters: A Manifesto for the Nocturnal City* (Washington DC: Zero Books, 2016); Matthew Gandy, "Negative Luminescence," *Annals of the American Association of Geographers*, vol. 107, n° 5, 2017, 1090-1107; Taylor Stone, "The Value of Darkness: A Moral Framework for Urban Nighttime Lighting," *Science and Engineering Ethics*, vol. 24, n° 2, 2018, 607-628; Taylor Stone, "Re-envisioning the Nocturnal Sublime: On the Ethics and Aesthetics of Nighttime Lighting," *Topoi* (May 31, 2018). Url: https://doi.org/10.1007/s11245-018-9562-4 (accessed 02/12/2018)

28 On light/darkness, see especially Tim Edensor, *From Light to Dark: Daylight, Illumination, and Gloom* (Minneapolis: University of Minnesota Press, 2017); Tim Edensor, "Introduction: Sensing and Perceiving with Light and Dark," *The Senses and Society*, vol. 10, n° 2, 2015, 129-137; Tim Edensor and Hayden Lorimer, "'Landscapism' at the Speed of Light: Darkness and Illumination in Motion," *Geografiska Annaler: Series B, Human Geography*, vol. 97, n° 1, 2015, 1-16; Tim Edensor, "The Gloomy City: Rethinking the Relationship Between Light and Dark," *Urban Studies*, vol. 52, n° 3, 2015, 422-438; Tim Edensor, "Aurora Landscapes: Affective Atmospheres of Light and Dark," *in* Karl Benediktsson and Katrin A. Lund (eds.), *Conversations with Landscape* (London: Routledge, 2010), 227-240. Other Edensor works tend to examine either light or dark. For instance, see Tim Edensor, "Seeing with Light and Landscape: A Walk around Stanton Moor," *Landscape Research*, vol. 42, n° 6, 2017, 616-633; Matthew Cook and Tim Edensor, "Cycling through Dark Space: Apprehending Landscape Otherwise," *Mobilities*, vol. 12, n° 1, 2017, 1-19; Tim Edensor and Emily Falconer, "Dans Le Noir? Eating in the Dark: Sensation and Conviviality in a Lightless Place," *Cultural Geographies*, vol. 22, n° 4, 2015, 601-618; Tim Edensor, "Introduction to Geographies of Darkness," *Cultural Geographies*, vol. 22, n° 4, 2015, 559-565; Tim Edensor, "Light Design and Atmosphere," *Visual Communication*, vol. 14, n° 3, 2015, 331-350; Tim Edensor, "Light Art, Perception, and Sensation," *The Senses and Society*, vol. 10, n° 2, 2015, 138-157; Tim Edensor, "ON: A Re-Imagining of Blackpool Illuminations," *Senses & Society*, vol. 8, n° 3, 2013, 367-377; Tim Edensor, "Reconnecting with Darkness: Gloomy landscapes, Lightless Places," *Social and Cultural Geography*, vol. 14, n° 4, 2013, 446-465; Tim Edensor, "Illuminated Atmospheres: Anticipating and Reproducing the Flow of Affective Experience in Blackpool," *Environment and Planning D: Society and Space*, vol. 30, n° 6, 2012, 1103-1122.

29 Susanne Bach and Folkert Degenring (eds.), *Dark Nights, Bright Lights: Night, Darkness, and Illumination in Literature* (Berlin: De Gruyter, 2015).

its representations (Le Gallic),[30] as well as the history of light pollution and light-pollution science (Pritchard).[31]

19 Light and dark are prominent dualities in a wide range of thought—from art to religious traditions. Moreover, as lighting technologies have developed, the more it seems that light and dark are entangled with and map onto other powerful, often problematic dualisms. For example, darkness seems natural because it is associated with night, whereas light suggests the artifice of culture; similarly, light is the privilege of so-called "civilized" societies, while darkness remains the prerogative of "primitive" societies. The latter association is epitomized by Conrad's novel *Heart of Darkness* (1899). In short, light is often associated with and helps to purportedly define culture, civilization and modernity, the "West," whiteness, the urban, and the interior, while darkness is frequently associated with nature, the "primitive," the global South, race as non-white, the rural, and the exterior. Of course, all of these dichotomies are laden with strong cultural associations, not to mention hierarchies. These binaries are, of course, crude, often false, Western-biased, and implicated in violence, oppression, and empire. Yet they remain persistent, powerful ideas. Nonetheless, old dichotomies and assumptions can also be read in new ways. For instance, bright cities of Western Europe and North America can be reframed as over-illuminated. In this sense, light does not signal development, but *over*development.[32] Moreover, overlit, urban, industrial areas contrast with large parts of the world that are desperately dark, a duality often also present in the "city/country" binary. In this sense, light pollution places lighting poverty into sharper relief.[33]

20 Yet, as is the case with most dichotomies, the dualism of light/darkness inadequately describes complex phenomena. Dawn and dusk are ambiguous periods in Earth's daily cycles. They are liminal times of light and darkness—simultaneously both and neither.[34] The onset of day and night (concurrently the end of night and day, respectively) is even more ambiguous in polar regions during the late fall and earliest days of spring, when dawn and dusk bleed briefly into one another before the sun descends below the horizon again for yet another long night.[35] Similarly, although night is normally darker than day, public lighting was not always dependent on this temporality. For instance, during the 19th C., in the middle of the Industrial Revolution, when London smog was too thick, gas lighting was needed even during daytime. Conversely, when urban lighting developed beginning in the late 17th C., it was adapted according to natural luminosity. It might be turned off entirely during summer, or on nights with a full moon. In each illuminated city, light tables calculated the exact time of sunrise, sunset, and moonlight for every month, a practice that remained in place until the mid-19th C. Taking advantage of natural (moon)light during the lunar cycle to reduce the use of artificial lighting may have been motivated primarily for economic reasons. Nonetheless, it reflected awareness of natural cycles, the adaptation of artificial systems to natural rhythms, and a

30 Stéphanie Le Gallic, "When Light was Creating Darknesses: Oil Lighting in Bordeaux in the 19th Century," *International Conference on the Urban Night: Governance, Diversity, Mobility*, *(Sofia University, Sofia, Bulgaria, June 7-8, 2018)*; Stéphanie Le Gallic, *Lumières publicitaires, Paris, Londres, New York* (Paris: CTHS, 2019).

31 Sara B. Pritchard, "The Trouble with Darkness: NASA's Suomi Satellite Images of Earth at Night," *Environmental History*, vol. 22, n° 2, 2017; Sara B. Pritchard, "On (Not) Seeing Artificial Light at Night: Light Pollution or Lighting Poverty?," *Discard Studies: Social Studies of Waste, Pollution, & Externalities*, 2017. Url: https://discardstudies.com/2017/06/12/on-not-seeing-artificial-light-at... (accessed 13/05/2019)

32 On the concept of overdevelopment, see Maria Mies, "Deceiving the Third World: The Myth of Catching-Up Development," *in* Louis P. Pojman and Paul Pojman (eds.), *Environmental Ethics: Readings in Theory and Application, 5th edition* (Belmont, CA: Thomson, 2008).

33 Pritchard, "Trouble with Darkness"; Pritchard, "On (Not) Seeing Artificial Light at Night."

34 Ben Gallan and Christopher R. Gibson, "Commentary: New Dawn or New Dusk? Beyond the Binary of Night and Day," *Environment and Planning A*, vol. 43, n° 11, 2011, 2509-2515.

35 On polar "northscapes," see Dolly Jorgensen and Sverker Sorlin (eds.), *Northscapes: History, Technology, and the Making of Northern Environments* (Vancouver: UBC Press, 2013).

fascinating moment when some cities relied on a hybrid system designed around both natural and artificial light.[36]

21 Light within purported darkness, as well as persistent dark within light, also confound simplistic dualisms. As astronomers, outdoor enthusiasts, and dark-sky tourists know, remote locations with little anthropogenic light may be dark, especially for city residents used to extensive public and private lighting. Yet a variety of celestial phenomena brighten the night sky, depending on location, season, and time of night. The moon, stars, airglow, zodiacal light, and Milky Way all illuminate the nightscape.[37] The same principle governs movie theaters: darkness actually reveals the screen and its animated images. Conversely, light can also create a well-known form of darkness: shadows. In this case, the sensation of darkness is all the more powerful when lighting—natural or artificial—is intense and cannot be separated from it. Simply opposing light and darkness cannot acknowledge the ways in which the two phenomena exist simultaneously. Both natural and artificial "light" regimes therefore actually combine light and darkness in complex, unevenly experienced ways.

22 The borders of light/dark can be fluid, fragile, and impermanent. Artificial light, regardless of type, extends day and shortens night, but extinguishing the lights can quickly bring about the return of night—whether a simple act at bedtime or a political demonstration, as in the case of Earth Hour. Such "greenouts" are forms of political protest, but they are also limited, symbolic, and reflect privilege. After all, one has to have lights in order to choose to extinguish them. At other times, structural breakdown, whether technical or political, limits individual agency with respect to regimes of light/dark. In his history of blackouts in modern America, David E. Nye has shown how the sudden onset of darkness can be caused by war, overconsumption, technical glitches, and systemic complexity.[38] Yet in some contexts, rolling blackouts—planned interruptions in service—actually enable systems to keep functioning, albeit not 24/7 for all residents. Crises, in particular, demonstrate the limits of progress narratives that track supposedly linear, permanent shifts from darkness to light. During World War II, energy shortages and blackouts spurred by fears of nighttime aerial bombing temporarily darkened European skies. More recently, satellite imagery reveals how civil war in Syria is manifested in light at night—or, rather, its expanding absence—as the political crisis tragically worsened.[39]

23 Some of these examples suggest the political valences of light and darkness—power, prestige, progress, empire. But other cases of light/dark are seemingly banal or products of culture, leisure, and pleasure. Dylan Mulvin has described how technologies of "media prophylaxis" seek to darken ubiquitous self-illuminated screens. "Night mode," or dark(er) light, thus attempts to address concern for human health and sleep, while nonetheless permitting continued use of electronic gadgets at all hours.[40] Another example of the complex relations between lights and darknesses, between lighting and non-lighting (which is also different from opting to turn off lights), is closed spaces. In the absence of a window, or in cases of narrow openings, we might think that artificial lighting would always

36 Literature at the intersection of environmental history and the history of technology is now too considerable to list comprehensively here. Works explicitly theorizing this nexus—"Envirotech"—are less common. One starting point, as well as an example of a hybrid system, is Sara B. Pritchard, *Confluence: The Nature of Technology and the Remaking of the Rhône* (Cambridge, MA: Harvard University Press, 2011), especially the Introduction. For another example, see Daniel Schneider, *Hybrid Nature: Sewage Treatment and the Contradictions of the Industrial Ecosystem* (Cambridge, MA: MIT Press, 2011).

37 For an effective overview, see Paul Bogard, *The End of Night: Searching for Natural Darkness in an Age of Artificial Light* (New York: Little, Brown and Company, 2013).

38 Nye, *When the Lights Went Out* (cf. note 8). See also Charles Perrow, *Normal Accidents: Living with High-Risk Technologies* (New York: Basic Books, 1984).

39 Earth Observation Group, "Blackout in Syria," 2019. Url: https://payneinstitute.mines.edu/1773-2/ (accessed 26/03/2019)

40 Dylan Mulvin, "Media Prophylaxis: Night Modes and the Politics of Preventing Harm," *Information & Culture*, vol. 53, n° 2, 2018, 175-202.

be favored. However, the gradual darkening of theaters illustrates how darkness can also be the norm or objective sought. Until the 17th C., both the theater hall and stage were lit, with chandeliers adorning and lighting both spaces equally. The evolution toward darkness began during the 18th C. with the marking of a boundary, which was characterized by the decrease and gradual ban of chandeliers in the theater hall, whereas the stage took advantage of advances in lighting. This process culminated in the film projector, which required the hall to be dark in order to be fully effective.

24 Moreover, even human perception of light/darkness is dynamic and contingent. In well-lit conditions, humans see according to photopic vision; in low lighting, according to scotopic vision. Mesopic vision combines elements of both. However, it takes the human eye time to adjust to "darkness"—a misnomer since, in most cases, darkness refers to low-light levels, not pitch-black conditions. Scientists at the U.S. National Park Service studying night skies in American national parks recommend allowing a minimum of 30 minutes, preferably 90 minutes, for this process of "dark adaptation" to take place. Humans therefore see less light within supposed darkness early in this dark-adaption phase than if they are fully dark-adapted. In addition, children can usually see better in "darker" environments than adults. Younger eyes usually perceive more stars in the night sky. The biology of light, darkness, and sight thus defies simplistic characterization, further problematizing a tidy light/dark dualism. Moreover, this focus on human perception of light/dark entirely neglects the host of non-human species, for whom vision and sensory experiences of light/dark (bats, owls) can be radically different.

LIGHTS(S) AND DARKNESS(ES): DIVERSE EXPERIENCES

25 We have purposefully chosen to refer to light(s) and darkness(es) in the plural for several reasons. For starters, pluralizing these terms serves as an important reminder of the instability and multiplicity of the concepts, both individually and together, in some of the ways outlined above. In addition, the diversity of energy sources that have been used to produce light since humankind mastered fire renders use of the plural for "light" self-evident. The experience of a candle is not the same as that of electric light, with respect to intensity, ambiance, or regularity; the candle is more intimate and distills a light that is "warmer" than the incandescent lamp. The intensity of a flame burning around its wick is also extremely variable, whereas the light from a bulb is uniform. Already during Antiquity, the possibility of choosing between a number of fuels (beeswax, pork fat, olive oil) could be made not just according to their technical performance, but also on the sensory perception of and preference for the light emitted.

26 Contemporaries often remarked upon changes in lighting regimes. For instance, when gas lighting began to spread in the first half of the 19th C. in major European and North American cities, it was accompanied by commentaries on its brightness. Its glow was described as being "dazzlingly white" and "bright as day," while traditional sources of light seemed to offer no more than a dim, warm glimmer. This phenomenon is all the more complex given that preferences (in terms of intensity, color, etc.) are not universal. In short, history and culture matter. More recently, there has been criticism of LEDs, which have been accused of diffusing light that is too white and cold, in part due to cultural expectations of what "light" should look like, based on norms developed over the previous century. Of course, natural light is not uniform either, differing by latitude, season, time of day, weather, and even ground cover—something that was well understood by Impressionist painters, who were sensitive to and aimed to depict these variations and nuances of light. The singular term "light" thus seems deficient when it comes to capturing its many dimensions and characteristics.

27 In addition, it seems particularly appropriate to refer to these terms in the plural, as we are co-editors from different national and linguistic contexts. We are using light/*lumière* and darkness/*obscurité* interchangeably here, but

translation is never perfect. Other cultural and linguistic contexts may have richer vocabularies to capture experiences of both light and dark—or, more accurately, light(s) and darkness(es). It would be interesting in this respect to know whether the First Nations of northern Canada, Nordic countries, other people living in the High or Low Arctic, and scientists working in Antarctica, all of whom have a more intimate knowledge of light during at least several consecutive months per year, have a subtler and richer vocabulary for distinguishing among darknesses.[41] We imagine that even polar nights—extended periods of no sunlight—are not monolithic to those who actually experience them.

28 On the contrary, dark/*obscurité* is more difficult to perceive in its plurality, especially if it is defined by the negative, in other words by the absence of light—as the *Oxford English Dictionary* does: "Characterized by (absolute or relative) absence of light; devoid of or deficient in light; unilluminated; said *esp.* of night." For that matter, in our view, the French language is particularly poor in describing darkness, simply evoking an atmosphere that is "s*ombre*," or an "*ombre*" or "pén*ombre*." The etymological root of these terms—*umbra*, shadow—is the same, whereas there is a wider range of terms to describe light, which can "*illumine*," "*éclaire*," "*brille*," "*allume*," "*luit*," or "*flamboie*." Light can also be "*luminescente*," "*incandescente*," and even "*éclatante*," and come from a bulb, lighthouse, torch, or streetlamp, or it can simply be a "*lueur*," a "*flash*," or a "*halo*." It appears that only "*ténèbres*" and "*opacité*" can independently depict the field of darkness, although these terms have strong connotations. English seems to establish a nuance between "dark" and "darkness." "Dark" is both a noun and an adjective in English, "darkness" a noun alone. Moreover, "darkness" in English offers a rich lexical field: "black," "blackness," "candlelight," "dark," "dimness," "dusk," "gloom," "murk," "night," "nighttime," "nightfall," "obscurity," "penumbra," "shade," "shadow," "twilight," and "umbra." As an adjective, "dark" is "black," "dim," "dusky," "gloomy," "lightless," "murky," "obscure," "pitch-black," "shadowy," "shady," "somber," and "unlit"—and, less commonly, "caliginous," "rayless," "stygian," "tenebrific," and "tenebrous."[42] Singular terms—light and dark—thus obscure this linguistic nuance and complexity.

RELATIONAL STUDIES OF LIGHT(S)/ DARKNESS(ES)

As the authors in this special issue seek to show, 29
examining light(s) and darkness(es) *together* is more illuminating, so to speak, precisely because doing so calls attention to their juxtaposition, presumed opposition, and the ways in which they are, in fact, more complicated than a reductionistic binary. For example, a recurring problem in urban lighting during the early modern period was the "cluttering" of lanterns: wax from candles would melt and pool at the bottom of lanterns, ultimately altering the quality of the lighting, especially as it was already dimmed by dirty glass panes. Ironically, then, the source of light in this case (candles) contributed to its very diminishment (soot, wax). Keeping candle lanterns closer to their maximum intensity therefore required regular maintenance and repair.[43] Should the street therefore be considered *dark*, despite the dim, warm glare of a lantern, or *lit*, even though the lantern no longer entirely fulfilled the role for which it was intended, or both? This brief example suggests how assessment of light/dark likely depends on the observer and her expectations.

We hypothesize that changes in human-pro- 30
duced light, including its intensity, color, duration, reliability, geographical reach, and so forth over the past two centuries contributed to shifting understandings and meanings of darkness over time. In other words, understandings of

41 For a starting point on "extreme" environments, see Steve Pyne, "Extreme Environments," *Environmental History*, vol. 15, n° 3, 2010, 509-513.

42 See https://www.merriam-webster.com/thesaurus/darkness; https://www.merriam-webster.com/thesaurus/dark.

43 Andrew L. Russell and Lee Vinsel, "After Innovation, Turn to Maintenance," *Technology and Culture*, vol. 59, n° 1, 2018, 1-25.

light/darkness are fundamentally relational and co-produced. For one, environmental psychologists assert that brighter light regimes alter standards of "darkness," because those familiar with these lighting levels have never experienced "true night."[44] More immediately, amid relative darkness, sudden exposure to light, even at low levels, *seems* brighter as a result of the dramatic contrast.

31 This is, in fact, another reason that prompts us to reject the systematic opposition between light and darkness. Both of these phenomena include a striking similarity in their effects: they can be blinding, preventing the legibility of one's surroundings. For those who are sighted, darkness can be incapacitating. Yet notably, those with visual impairments may not face similar challenges in these conditions. Scholars have shown how, as artificial lighting developed and shifted, observers and users had to be educated with respect to their gaze at new forms of light. A light source that is too powerful actually becomes blinding, which is why it is important to look at the lit object, rather than at the light source itself. Curtains and lamp shades also mediate the gaze physically and technologically by softening and diffusing a light perceived as too intense.

32 Rather than focusing on the history of light in isolation, we suggest that thinking about the *making* of light/darkness is fruitful. Of course, the production of artificial light, regardless of type and energy source, seems obvious and self-evident. In contrast, darkness may seem natural. Yet assumptions about light/darkness shape even scientific studies. Most assessments of "natural night-sky brightness" are taken during the new moon (little lunar light) and under clear sky conditions (which darken the night sky in low artificial-light areas), which together contribute to "darker" night skies.[45] Furthermore, the dark can also be *made* for diverse reasons—from war to political protests. It is worth noting that at the very moment urban lighting was developed in major European cities, often through royal impetus, many city residents resisted their systematized surveillance. This could take the form of breaking lanterns, especially in France, as well as through nocturnal movement without lanterns in violation of rules, or, in Catalonia, by burning threatening emblems, paper lanterns painted with effigies, and gallows. These political meanings and uses of light/dark are also significant in the U.S. context, as laws required slaves over the age of 14 to carry lanterns at night. As Simone Browne argues, "black luminosity" facilitated the surveillance and oppression of African-American people—a trend that continues to the present-day.[46] In other cases, the political and ethical implications of darkness are disturbing and unsettling. Utilities shutting off the electricity because a family is unable to pay their bill—or lack of access to artificial lighting altogether—reveal economic disparities at various political scales, from the home to the globe. Overall, regimes of light/dark depend on a complex matrix of natural-cultural conditions.[47]

AVENUES FOR FUTURE RESEARCH

33 We hope future scholars will build on some of this work and develop new directions for scholarly inquiry. Already, we acknowledge the need for more scholarship analyzing light/dark in diverse cultural contexts, particularly beyond the so-called West and the modern era. Other

44 On "environmental generational amnesia," see Peter H. Kahn, Jr., "Children's Affiliations with Nature: Structure, Development, and the Problem of Environmental Generational Amnesia," *in* Peter H. Kahn, Jr., and Stephen R. Kellert (eds.), *Children and Nature: Psychological, Sociocultural, and Evolutionary Investigations* (Cambridge, MA: MIT Press, 2002), 93-116.

45 Although we do not yet have specific quantitative numbers here, we identified this trend during our research for Pritchard *et al.*, "Describing Artificial Light at Night."

46 Simone Browne, "Everybody's Got a Little Light under the Sun: Black Luminosity and the Visual Culture of Surveillance," *Cultural Studies*, vol. 26, n° 4, 2012, 542-564; Simone Brown, *Dark Matters: On the Surveillance of Blackness* (Durham: Duke University Press, 2015).

47 "Nature-culture" is from Bruno Latour, *We Have Never Been Modern, trans. Catherine Porter* (Cambridge, MA: Harvard University Press, 1993), 7. "Naturecultures" is from Donna Haraway, *The Companion Species Manifesto: Dogs, People, and Significant Otherness* (Chicago: Prickly Paradigm Press, 2003), 1; Donna Haraway, *When Species Meet* (Minneapolis: University of Minnesota Press, 2008), 16.

scholars might propose a chronology of light/darkness. For example, we might consider how different energy types have enabled, afforded, and/or transformed different light/dark regimes over *la longue durée*.

34 As this last point suggests, we are interested in thinking about light/darkness *together* in relationship to the history of energy—a growing subfield that has been catalyzed by concern about global climate change over the last decade. We highlight three questions here. *First, how is energy foundational to light/darkness?* It seems obvious that different kinds of light require more or less energy. Yet whose? The labor and energy behind lighting are also differentially visible to consumers—and scholars. A rural family making their own candles has closer, more direct ties to the sources of energy, both human and non-human, embodied in the candles. Furthermore, candles or lighting using oil were highly intimate, as their low luminous power was just enough to light the immediate surroundings. On the contrary, the emergence of gas lighting was marked by a dual distancing: a first distance relating to the fuel, which now came from industrial gas facilities usually far removed from the place of consumption; and a second distance relating to the light intensity of the gas flame, which was so powerful that one could no longer look at it directly.

35 *Second, how do shifts in the history of energy have implications for light and darkness?* In the contemporary moment, growing concern over climate change and the drive for more sustainable sources of energy have spurred the adoption of LEDs in the public and private sector. Here, the relationship between energy and light is clear and direct. Yet just as history is filled with examples of unintended consequences, recent studies have demonstrated that the ability to produce more light through LED technology has resulted in not only brighter but also whiter cities. The LED revolution is readily visible from airplanes or astronaut photos in the lightscapes of many cities, as older, yellow lights have been replaced with white LEDs. In other cases, cities have lobbied for nocturnal darkness out of concern for both ecology and economy. In France, towns in the center-west of the country, such as Saint-Junien or Panazol, have experimented with the voluntary extinguishing of public lighting between 11:30 p.m. and 5:30 a.m. since the fall of 2018, while those in the south (Aveyron) chose the time slot between midnight and 5:00 a.m.

36 *Third, how do perceptions, meanings, and uses of light/dark have implication for energy and its history?* Historical scholarship has traced how light—and by extension new energy sources—was often associated with progress, modernity, and civilization. Although some critiques have challenged this utopian vision, it persists in other ways. The colossal ITER project, an international project for a nuclear fusion reactor, hopes to "bottle the sun."[48] This vision seems to mark continuity with earlier ideas (and ideologies), thereby placing ITER within a longer trajectory of ever growing energy consumption since the 19th C. However, recent protests to challenge or limit the project also suggest that light and progress are not an inevitable pair, and prompt us to explore similar challenges in the past.

37 Overall, we hope that this Introduction, and the entire special issue, foster new conversations and insights at the intersection of light(s), darkness(es), and the history of energy.

48 Jacquinot Jean, Marbach Gabriel, "ITER: l'enjeu d'une grande collaboration internationale," *Revue internationale et stratégique*, n° 55, 2004, 93-97. See also Anna Åberg, "Fusion nucléaire et utopie d'une énergie sans fin : la coopération transnationale autour du projet ITER," conference held on February 12, 2015 as part of the Histoire des sciences, histoire de l'innovation seminar (Université Paris Sorbonne, UPMC, LabEx EHNE). The summary is available here: https://europeflux.hypotheses.org/508

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