

Émile Zola's Climate History of the Second Empire

Johannes Ungelenk
University of Potsdam, Germany
ungelenk@uni-potsdam.de

DOI: [HTTPS://DOI.ORG/10.37536/ECOZONA.2020.11.1.3181](https://doi.org/10.37536/ECOZONA.2020.11.1.3181)



Abstract

This article looks at Émile Zola's novel cycle *Les Rougon-Macquart* and argues that it describes its subject, the Second Empire, as a warming climate tending toward climate catastrophe. Zola's affinity to the notion of climate is shown to be linked to his poetic employment of the concept of 'milieu,' inspired by Hippolyte Taine. Close readings of selected passages from the *Rougon-Macquart* are used to work out the climatic difference between 'the old' and 'the new Paris,' and the process of warming that characterises the Second Empire. Octave Mouret's department store holds a special place in the article, as it is analysed through what the article suggests calling a 'meteorotopos': a location of intensified climatic conditions that accounts for an increased interaction between human and non-human actors. The department store is also one of the many sites in the novel cycle that locally prefigure the 'global' climate catastrophe of Paris burning, in which the Second Empire perishes.

Keywords: *Rougon-Macquart*, climate, milieu, Hippolyte Taine, global warming.

Resumen

El artículo hace una lectura del ciclo de novelas *Les Rougon-Macquart* de Émile Zola y sostiene la tesis de que el sujeto al que describe, el Segundo Imperio, puede leerse como un clima en proceso de calentamiento que se dirige hacia una catástrofe medioambiental. La afinidad de Zola con la noción de clima se ve expuesta al conectarla con su uso poético del concepto de 'milieu', inspirado en Hippolyte Taine. El artículo ofrece una lectura en profundidad de ciertos pasajes de las novelas *Rougon-Macquart* para mostrar las diferencias climáticas entre el "viejo" y el "nuevo París", y el proceso de calentamiento que caracteriza el Segundo Imperio. El gran almacén de Octave Mouret es analizado, en particular, bajo el concepto de "meteorotopos" propuesto en el artículo: un lugar de condiciones climáticas intensificadas, un lugar de interacción aumentada entre actores humanos y no-humanos. El almacén es uno de varios espacios en el ciclo de novelas en los que ya se señala la catástrofe climática 'global' del París en llamas, momento en que se hunde el Segundo Imperio.

Palabras clave: *Rougon-Macquart*, clima, milieu, Hippolyte Taine, calentamiento global.

"I have taken the whole of society for my subject," Zola writes in the essay "Du roman" ("The Novel" 260). The results of this extensive project of literary 'research' are presented in his twenty-novel cycle *Les Rougon-Macquart*. As the cycle's subtitle—*The Natural and Social History of a Family Under the Second Empire*—suggests, it is the reign of Napoléon III that Zola sets out to examine. Starting with the *coup d'état* in 1851 and ending with the defeat of the French army in the Franco-Prussian war of 1870/71, Zola's cycle not only covers a whole historical epoch, but gives a detailed account of the different social classes and milieus that constituted French society of the time. Each of the novels can be said to be "set in a specific well-defined milieu" (Alcorn 105): the

working-class in *L'Assommoir*, the petit-bourgeoisie in *Pot-Bouille*, the world of retail in *Au Bonheur des Dames*, the demi-monde and the aristocracy in *Nana*, the world of finance and speculation in *L'Argent*, and many more. However, despite their being set in different milieus, the novels do not each establish “a kind of ‘air-tight cell,’” as Clayton R. Alcorn claims (105). On the contrary, “the surface diversity of the *Rougon-Macquart*, Zola’s division of the world into categories and social groups, is belied by the strong unifying impression given by the dominant themes and characteristic imagery of his novels” (Nelson 11). Zola’s cycle does not content itself with an encyclopaedic approach to the ‘whole’ of the Second Empire: the ‘whole’ is not to be captured by a meticulous description of all of its parts (all of its milieus, for example) but emerges transversally ‘from’ these descriptions as the “strong unifying impression” that Brian Nelson talks of.¹ What exactly is, however, “the whole” of a society? What is the Second Empire? What defines this complex conglomerate of a historical, socio-cultural formation, of a specific political regime, and also of a certain ‘mentality’—or, as Zola would call it, of a certain ‘temperament’ characteristic for the Second Empire? Based on the novels’ dominant themes and imagery, I would suggest that it is as a *climate* that Zola captures the coherence which holds the Second Empire’s different local milieus and social groups together.

Before turning to the text of the *Rougon-Macquart*, I would like to present some poetic statements made by Zola that indicate a constitutive affinity of his literary project with the notion of climate. It is the concept of the ‘milieu’ that I am interested in. “An account of the milieu which determines and completes man” (“The Novel” 233; translation amended): this is what the “scientific employment of description” (“The Novel” 231) is all about. Zola’s role model Claude Bernard introduced the concept of ‘milieu’ as a cornerstone for the nascent discipline of physiology. ‘Milieu’ here lays the ground for a new, ‘scientific’ perspective of the world and the living, as it creates communication and correspondence across boundaries that had previously been regarded as absolute. In the case of Bernard’s physiology, it is “constant physico-chemical properties” (Zola, “The Experimental Novel” 3; translation amended) that force

¹ In *The Antinomies of Realism* (2013) Fredric Jameson works out a possible candidate for Nelson’s “unifying impression” that holds together the *Rougon-Macquart*: He calls it “affect”, “a new space” that is opened up by “the gradual enfeeblement of named emotions and the words for them”, a space that is created and stabilized by a certain autonomy from the descriptions, the plot and the point of view from which it emerges (55). Whereas Jameson’s Deleuzian concept of ‘affect’ explores a ‘formal’ phenomenon of unity which constitutes itself by gaining autonomy from the cycle’s thematic concerns, David Baguley’s “entropic vision” argues for turning to the thematic level, where he finds “a conceptual core deriving from a common vision” (205)—not only for Zola, but for the wider context of naturalism. My suggestion of locating the “unifying impression” in a notion of ‘climate’ which emerges from Zola’s *Rougon-Macquart* brings together different aspects of both Jameson’s and Baguley’s readings: Like Baguley it takes up thematic and motivic traces that can be found in the novels but, like Jameson, grants the ‘climate’, which emerges from them, a certain autonomy. This ‘climate’—understood as a notion that “connects material and imaginative worlds in ways that create order and offer stability to human existence” (Hulme, 2)—interacts with the thematic and political aims of Zola’s cycle, in some cases blocking, in others strengthening them. It is however not a single trait, not the conceptual essence that is produced by abstraction, by a bundling of all the single observations to one characteristic paradigm, as it is in Baguley’s “entropic vision”, but a complex sphere of heterogeneous forces, which develop their own observable regularities, even their own, non-linear concept of time and history.

the external milieu of the inanimate body and the internal milieu of the animate organism to correspond. As a result, the living becomes an 'adequate' subject for a science based on these "constant physico-chemical properties," and physiology is born. Zola's narrative project also focuses on groundbreaking interactions and correspondences, traversing apparently insurmountable boundaries: "we are into the exact study of the milieu," Zola writes, "into the observation of the conditions of the exterior world, which correspond to the interior conditions of the characters" ("The Novel" 233; translation amended). It is not, however, Claude Bernard's physiological boundary between the animate and inanimate that Zola is interested in, but another 'absolute' boundary. His *Rougon-Macquart* attempts a 'natural and social history'; it is dedicated to correspondences between the natural and the cultural. The problem with the kind of 'milieu' that Zola attempts to study is simple: in contrast to Bernard, Zola cannot base the correspondence of the milieus on knowledge of their factual similarities, their "constant physico-chemical properties." As Zola admits, he and his contemporaries "are not yet able to prove that the social milieu is also physical and chemical" ("The Experimental Novel" 20; translation amended). In order to compensate for this conceptual shortcoming, Zola turns to another prominent thinker concerned with the 'milieu', who has found a solution to the problem Zola faces: Hippolyte Taine.

Abstracted from very different epistemological frameworks, Taine uses natural philosophy to pave the way for his 19th-century milieu project. Ancient thought, more precisely Hippocratic humorism, constructs a passage from the natural to the social that allows for the observation of their 'modern' interaction. What Taine is aiming for, in a way, has been thought of before him—although, and we should hasten to emphasise this point, the epistemological problems Taine tackles are of a decisively modern pedigree. The fact that Taine imports ancient philosophemes of humoral theory into his thinking of milieu is clear: the initial parameters of "difference in air, food, temperature" stem from the same repertoire of Hippocratic, humoral thinking as his theory of race and its connection to the climate.

Like that of Taine, Zola's "study of the temperaments and the profound modifications brought about in the human organism by the pressure of milieus and circumstances" (Zola, *Thérèse Raquin* 5; translation amended) is based on the auxiliary construction of a humoral correspondence between temperament and the surrounding climatic conditions. For Taine, it was "with a people as with a plant," (22) while Zola uses the same image to refer to character: "The character has become the product of the air and the soil, like a plant; this is the scientific conception" ("The Novel" 233; translation amended). For this kind of analysis, 'character' is "no longer a psychological abstraction" ("The Novel" 233) but is rather conceptualised as interacting and corresponding with its 'milieu.' The description therefore deserves the label "scientific." The conceptual basis that makes this correspondence or interaction of the human being and its surroundings conceivable, however, is as heuristic for Zola, as it is for Taine. Both pursue an intuitive approach to the interactions crossing the nature/culture divide via atavistic notions of the climate's influence on plants or temperament.

Zola conceptualises the guiding correspondence of climate and temperament as radically interacting, one influencing the other, both open to change: “Indeed our great study is just there, in the reciprocal effect of society on the individual and the individual on society” (“The Experimental Novel” 20). In other words, Zola’s *Natural and Social History of a Family Under the Second Empire* narrates the story of a changing ‘climate’ that is both brought about by the human agents of a modern society and, at the same time, shapes the perceptions and actions of these agents. As he himself writes, his aim is “finally to exhibit man living in the social milieu produced by himself, which he modifies daily, and in the heart of which he himself experiences a continual transformation” (“The Experimental Novel” 21; translation amended).

In the *Rougon-Macquart*, Zola establishes the notion of the Second Empire’s characteristic climate by introducing a striking opposition between atmospheres associated with different locations. In *La Curée*, the second novel of the cycle, the overheated atmosphere of the Hôtel Saccard (Warning, “Der Chronotopos Paris” 156) is contrasted with the constant coldness (Berthier 117) and hostility to life (Warning, “Der Chronotopos Paris” 156), of the Hôtel Béraud. Aristide Saccard, the protagonist both of *La Curée* and the later *L’Argent*, embodies what Zola calls “the essentially modern impulse that sets the lower classes marching through the social system” (Zola, *The Fortune of the Rougons* 4). His luxurious home exposes the new wealth that he has created by strategically marrying into a rich family and using his wife’s money for real estate speculations during the Haussmannisation of Paris. The house is a monument of the ‘new Paris’. Its hypertrophic luxury of heat and light is represented symbolically by a hothouse that functions as the building’s *pars pro toto*. Zola’s novel narrates the progressive correspondence of the milieu the house creates—Saccard has designed the building for himself and his wife Renée—with the characters living in it. The climate of the hothouse, its “overheated soil” (Zola, *The Kill* 160) not only grows the “criminal fruit” (*The Kill* 160) of incest and perversion (Renée makes love with Saccard’s son Maxime) but is also associated with Saccard’s business model of fuelling aggressive speculation: “His brain teemed with extravagant ideas. He would have proposed, in all seriousness, putting Paris under an immense bell-glass, so as to transform it into a hothouse for forcing pineapples and sugar-cane” (*The Kill* 98). While the Hôtel Saccard comes to stand for heat, accelerated turnover and rapid change, the Hôtel Béraud, the home of Renée’s father, with its cold, damp walls, represents asceticism, moral integrity and death. It is a symbol for ‘the old Paris’, against which Zola sets his description of the ‘new’ developments of the Second Empire.

The difference in ‘climate’ we have diagnosed is not simply antithetical (Hemmings 37); cold vs. hot does not merely refer to the binary of old vs. new. The climatic realisation of this opposition opens up the possibility of communication, of passage, of crossing the boundary between the two worlds: the cold world can and will be heated up. It does not have to remain as isolated, apart and protected as the Île Saint-Louis and Renée’s father in *La Curée*. The warmth of the new world is spreading—this is the story of the Second Empire and its transformations that Zola tells in *Rougon-Macquart*. In reconstructing this story, I am heavily indebted to Michel Serres, who, in

Feux et signaux de brume (1975), famously indicated the importance of the thermodynamic processes taking place between the cold and the hot in Zola's cycle.

Another pair of houses and protagonists, this time in Zola's *Nana*, makes us aware of these processes of heating. The residence of the Muffats, writes Jean-François Tonard, cannot but remind us of the severe architecture of the Hôtel Béraud (201). Located in the "Rue Miromesnil, on the corner of the Rue de Penthièvre,"

[t]his huge, square building had been occupied by the Muffat family for more than a century; the tall, sombre façade with its large slatted shutters, rarely opened, looked asleep, as melancholy as a convent; in the tiny, damp back garden the trees had grown so tall and puny in their search for sun that their branches were visible above the slate roof. (Zola, *Nana* 54)

The place's characteristic "cold dignity" (*Nana* 54) is typical of Zola's labelling of a milieu: it is both a metaphorical label for its "customs" and "morality" (*Nana* 54), but also, literally, refers to its specific 'climate'. This climate, damp, dark and cold, both mirrors and affects the inhabitants of the house. The count and countess are shown to be chilly. They share an "icy look" (*Nana* 28)—but also, secretly, "search for sun" (*Nana* 54). The count finds his source of heat and light in the actress and courtesan Nana. She is a focal point of the Second Empire's process of warming: on the theatre stage or at the dinner parties she gives in her overheated apartment, she spreads excessive warmth and thereby enkindles and 'infects' the Parisian upper class. Count Muffat is one of the aristocrats who lose their "cold dignity" under the influence of the girl from the streets who has become a celebrity of the age, and become part of the Second Empire's 'hot' debaucheries. The transformation that Zola's novel narrates is however not merely the conventional one of a man falling for a woman. While the novel has focused on the count's adventures and transformations, Sabine's "coldness of a pious person" has undergone the same process of warming, without being exposed to the infecting contact of Nana. In the end, Sabine and her husband, side by side, as it were, united in their new hotness, receive guests for a party in their newly renovated house:

The party took place in a setting full of gentle, spring-like charm; mild June weather had made it possible to open up the double doors of the large drawing-room and to extend the dancing out on to the sandy garden terrace. The first guests, greeted at the door by the count and countess, were quite dazzled; they could remember the icy cold Countess Muffat and the old-fashioned drawing-room full of stern piety and solid mahogany Empire furniture, with its yellow velvet hangings and its damp, musty green ceiling. Now on entering the front hall you saw glittering mosaics picked out in gold, with the marble staircase and its delicately carved banisters gleaming under the high candelabra. [...] In this room the chandeliers and crystal sconces lit up a luxurious array of mirrors and fine furniture; Sabine's former single chaise longue, with its red silk upholstery which had looked so much out of place in the old days, seemed now to have spawned and expanded, filling the whole grand residence with a mood of idle pleasure and eager enjoyment which had broken out with the violence of a fire that had long been smouldering. (*Nana* 353)

The atmosphere at the Muffat's house clearly resembles the one that Nana had created in her apartment for her famous dinner parties. The warmth in the room had been gradually increasing, "[p]eople were starting to let themselves go" (*Nana* 94) and in the end, "the hullabaloo was deafening" (*Nana* 98). Zola even explicitly connects the

Muffat's party to the courtesan by introducing the waltz theme that has been associated with Nana and her naked entrance on the theatre stage:

The waltz swirled voluptuously on and on, battering at the old house in a rising tide of pleasure. The thrills of the piccolos were shriller, the sighs of the violins more and more rapturous; amidst the gilt and the paintings and the Genoa velvet, the chandeliers were glowing like hazy suns and the throng of guests, amplified by the mirrors, seemed to be growing larger and larger, the buzz of their voices louder and louder. [...] In the garden, the Venetian lanterns looked like the glowing embers of a fire which lit up the shadowy figures of the men and women strolling off to take a breath of air in the remoter oaths, with a gleam as if from some distant conflagration. And these quaking walls [tressaillement des murs] and this red haze were like a final holocaust [flambée dernière] consuming the honour of the whole of this ancient house. Those timid bursts of laughter which were just vaguely audible in that night in April in the past when Fauchery had mentally compared them to the tinkle of broken crystal, had become bolder and wilder to culminate in this peak of glittering revelry [éclat de fête]. Now, the crack [la fêlure] was widening and soon the whole house would crumble. In working-class slums, families dragged down by drunkenness finish up in utter destitution, with larders emptied and mattresses stripped to satisfy the mad craving for alcohol; in this house, where a vast accumulation of wealth was suddenly about to go up in flames and collapse in ruins, the knell of this ancient family was being tolled with a waltz, while poised over the dancers, loose-limbed and invisible, with the smell of her body fermenting in the stuffy air [ferment de son odeur flottant dans l'air chaud], Nana was turning this whole society putrid to the rhythm of her vulgar tune. (*Nana* 363–64)

Zola uses the party's "peak of glittering revelry" to prognosticate the catastrophic consequences of the extreme warming transforming the climate of Paris.² The scenario that Zola anticipates is not only a sort of apocalypse, staging the end of a world; it is, as the imagery shows, also a climate catastrophe, "a rising tide of pleasure" "batter[ing] at the old house." The "red haze" testifies to the overheated, fiery atmosphere finally turning into real fire, consuming the house and all.

Before I turn to an examination of the climate catastrophe toward which the changing climate is, according to Zola, destined to lead, I would like to emphasise the generalising or comparative note on which Zola closes the quoted passage. The last sentences open up the perspective of class: 'working class' families are ruined by alcohol, whereas the old aristocracy is brought to fall by Nana's 'air', by waltz and smell, by her "smell floating in the hot air." It is not, however, the contrast of different 'lethal' vices that this generalising move intends, but the overarching integration of these ruins: one and the same *fêlure* destroys the working class and kills the old aristocracy. This *fêlure* is heat damage, induced by the energy of a blatant difference in temperature, and it is precisely this *fêlure* that is the concern of Zola's *Rougon-Macquart*, as a *Natural and Social History* of the Second Empire (cf. Deleuze).³ *Nana*, I would like to suggest, does not

² In fact, the warming that can be observed in Zola's cycle is not limited to the city of Paris. In Zola's depiction it is a 'global' phenomenon of the Second Empire; it makes itself felt as early as in the town of Plassans in the first novel and even characterises the plot of *Germinal*, as Michel Serres pointed out: the revolt itself is a process of heating, of people catching fire [l'incendie de la révolte] (181).

³ My reading of 'fêlure' brackets the question of heredity, which for Zola was obviously a main concern of his cycle. Gilles Deleuze's famous analysis in "Zola et la fêlure" (1969) follows a different approach, which however challenges the traditional understanding of 'heredity'. He distinguishes between a "petite hérédité" (384), which is a heredity of the Same (377) and a "grande hérédité" (384), which is a heredity

merely represent the old, cold aristocratic world being infected and assimilated by the hot milieu of the demi-monde (cf. Tonard 201). The change of climate, the warming, transcends classes. The problem of alcohol—narrated in *L'Assommoir*—and the problem of the ruin of the aristocracy belong together. Nana's biography (she is the daughter of *L'Assommoir's* protagonist Gervaise) underlines this dimension of Nelson's "unifying impression."

Here, we encounter the historical perspective of Zola's *Natural and Social History of a Family Under the Second Empire*. Zola's concept of history is Tainean to the core: he unfolds a history of conditions (social, natural, cultural) that "combined with [the humans'] renewed effort, produces another condition, sometimes good, sometimes bad, sometimes slowly, sometimes quickly, and so forth" (Taine 16). History thus examines the "mechanism of human history," that is to say the interaction of milieu and human (re)action, which brings forth "a permanent force": "we may regard the whole progress of each distinct civilisation as the effect of a permanent force which, at every stage, varies its operation by modifying the circumstances of its action" (Taine 16). In the *Rougon-Macquart* this permanent force finds expression as a changing, warming climate. On the one hand, this warming is "a product of the *débordement des appétits* which characterizes the Empire" (Warning, "Zola's *Rougon-Macquart*" 723), the warming of the temperaments; on the other hand, it is an effect of modern developments, industrialisation, architecture, financial speculation and so forth, a 'warming of the world.' The two interact and increase with each other, producing the permanent force of a warming 'climate'. Zola's narrative project presents the 'history' of this 'climatic' change.

The interaction of the milieu and the human being can be observed best in locations that I will call 'meteorotopoi'. The term combines Mikhail Bakhtin's concept of 'chronotopos' (cf. 1981) and Michel Foucault's notion of 'heterotopos' (cf. 2001 [1984]): meteorotopoi emphasise the "intrinsic connectedness" (Bakhtin 84) not of *le temps qui passe* (time) but of *le temps qu'il fait* (weather) and space: It is their very own climate that, apparently, differs from the climate outside their boundaries and thus characterises them as a particular location. Although constructed and managed by human beings, meteorotopoi are particularly 'weathery' places. Their atmosphere is not only dominantly described in meteorological terms, it also acts upon the human beings exposed to their atmosphere in the very 'bodily' way that the weather does. The meteorotopoi are therefore emblematic locations for Zola's analysis of milieu. Being shaped by modern technology, architecture and organisation, they bring together the

of the Other (377). The first is associated with instincts and temperaments (which can and will be passed on from one generation to the other), the second with 'fêlure'. The two heredities interact, the instincts try to cover up the void of the fêlure, for example, but in Deleuze's reconstruction, the two cannot mix, they are located on different levels or scales and therefore must remain separate: 'small' heredity of history, associated with drives towards life vs. 'great' epic heredity, the fêlure as death drive (378). It is here that an ecological perspective may feel the need to intervene. As human induced climate change has taught us, there is a passage from 'small scale' developments to 'large scale' conditions. I would argue that this is exactly what Zola describes in the *Rougon-Macquart*: the fêlure has a history to which the heating up of the instincts of life contributes decisively.

historical and social specificities of locations that play an important role in the daily life of the Second Empire. They thereby embody the interaction of the social/cultural and the 'natural': they are, at the same time, products of human technology and progress and produce an inescapable, quasi-meteorological atmosphere that subjects the humans and shapes their behaviour and temperament. The humans that frequent the meteorotopoi are therefore exposed to forces that they themselves have caused, but one which nevertheless exert an uncontrollable and inescapable influence on them. The fact that the climate 'strikes back', however, is often concealed by the 'naturalness' of the atmosphere that encompasses rather than represses. The meteorotopoi, built by human beings, envelop its creators and make them part of their intense weathery activity.

The *Rougon-Macquart* assemble dozens of meteorotopoi, of locations where the forces of the milieu thicken, where the hot, damp atmosphere sometimes literally condenses into clouds and thereby becomes visible:⁴ the washhouse, Gervaise's laundry shop and the bar in *L'Assommoir*, the kitchen of the Quenus and the covered markets in *Le Ventre de Paris*, the hothouse in *La Curée*, the coal-pit in *Germinal*, the stock exchange in *L'Argent* and the department store in *Au Bonheur des Dames*, to name only the most prominent examples.

An analysis of the latter ties in well with the course of this essay, because the department store forms part of the characteristic climatic differences between the old and the new Paris. When Denise, the protagonist of *Au Bonheur des Dames*, arrives at Paris with her two younger siblings, what she finds in the quarter of retail trade where her uncle lives and has his small shop is a world split in two. She and her brothers are immediately taken in by the sheer grandness of a department store, "the windows of which were bursting with bright colours" (Zola, *Ladies' Paradise* 3). More than that, it seems to them "as if the shop were bursting and throwing its surplus stock into the street" (*Ladies' Paradise* 4–5). When the three finally arrive at their destination, uncle Baudu's shop, right opposite the department store, the contrast could not be more striking: "The door, which was ajar, seemed to lead into the dark gloom of a cellar" (*Ladies' Paradise* 7). A glance inside the house's "inner courtyard which communicated with the street by means of a dark alley" best summarises its 'climate':

This yard, sodden and filthy, was like the bottom of a well, a sinister light fell into it. In the winter the gas had to be kept burning from morning to night. When the weather allowed them to do without it, the effect was even more depressing. (*Ladies' Paradise* 13)

Dark, damp, and cold, like a well—this seems to be the climate that Zola associates with the 'old Paris', whether the 'old' aristocracy or the 'old' trade. This characteristic 'climate' metonymically spreads from the Baudus' courtyard to the house's interior and then to the atmosphere of the shop: "The shop retained its musty smell, its half-light, in which the old-fashioned way of business, good-natured and simple, seemed to be weeping at its neglect" (*Ladies' Paradise* 15).

⁴ See Jessica Tanner, "The Climate of Naturalism: Zola's Atmospheres" (2017) on "atmosphere" and "precipitation".

When Denise risks a first glance at the interior of the 'Le Bonheur des Dames' department store, into this bright and attractive place that differs so markedly from the gloomy and damp neighbourhood of little old boutiques, it is not so much the luxury of the commodities that draws her attention, but rather that the manifold impressions condense into one metaphorical and perhaps quite surprising 'vision':

Through windows dimmed with condensation she could make out a vague profusion of lights, the confused interior of a factory. Behind the curtain of rain this vision, distant and blurred, seemed like some giant stokehold, in which the black shadows of the stokers could be seen moving against the red fire of the furnaces. (*Ladies' Paradise* 27–28)

This vision ties in well with the climatic difference between the old and the new Paris we have analysed above: one cold, damp and dark, the other of a fiery heat. The 'vision' of the department store as a factory or a great machine, whose furnaces have to be constantly heated in order to ensure it works properly, is of greater importance: Zola comes back to this vision throughout the novel, and it is established as the store's emblematic metaphor. For instance, the procedures for the end of a day are described as the "final movement of the overheated machine," (*Ladies' Paradise* 117) and during the "summer slack season" (*Ladies' Paradise* 153),

the factories lay idle, the workers were deprived of their daily bread; and this took place with the unfeeling motion of a machine—the useless cog was calmly thrown aside, like an iron wheel to which no gratitude is shown for services rendered. (*Ladies' Paradise* 154)

The protagonist and owner of the store, Octave Mouret, is constantly haunted by the worst of his fears, the fear of feeling "his great machine coming to a standstill and growing cold beneath him" (*Ladies' Paradise* 95). Although Octave does all he can to heat his store's furnaces, he, like theatre manager Bordenave in *Nana*, is dependent on his 'audience,' which brings in the essential heat from the streets of Paris. Only when he hears the crowd of shoppers arrive can he be sure that his machine will reach its perfect operating temperature:

And he could no longer have any doubt about the sounds arriving from outside, the rattle of cabs, the banging of doors, the growing babble of the crowd. Beneath his feet he felt the machine being set in motion, warming up and coming to life again [...]. (*Ladies' Paradise* 99)

Octave has certainly contributed to this swarming crowd: "Newspapers and walls were plastered with advertisements, and the public was assailed as if by a monstrous brass trumpet relentlessly amplifying the noise of the great sales to the four corners of the globe" (*Ladies' Paradise* 392); the crowd that the store attracts is "a crowd warmed by a month of advertising" (*Ladies' Paradise* 390; translation amended). This strategy of metaphorical heating is accompanied by the quite excessive 'real' heating of the building: "It was very warm under the covered galleries; the heat was that of a hothouse, moist and close, laden with the insipid smell of the materials [...]" (*Ladies' Paradise* 242). The economic calculus behind the store's temperature management seems to work out,

as Zola shows with regard to a group of shoppers whose experiences and emotions he describes during a business day:

But a feeling of well-being was stealing over them; they felt they were entering spring after leaving the winter of the street. Whereas outside the icy wind of sleet storms was blowing, in the galleries of the Paradise the warm summer months had already arrived, with the light materials, the flowery brilliance of soft shades, and the rustic gaiety of summer dresses and parasols. (*Ladies' Paradise* 241)

As Edward Welch writes, “the store creates a parallel universe to the world outside. It has its own distinct climate, shoppers leaving a wintry breeze to enter a realm of perpetual spring or summer” (44). With regard to its constantly warm temperature, the store thus lives up to its paradisiac name.

Octave Mouret wants his customers to be “caught up in the overflow of all this luxury” (*Ladies' Paradise* 104). He wants them to lose control and drown in the mass of items they buy and carry home—despite the fact that they often neither need nor are really able to afford what they acquire. Octave’s store is not only a machine that has to be metaphorically heated to work properly and to produce the best of results, but also a weather-machine: the customers are exposed to the well-calculated violence of the store’s climate, which is not as cosy as it looks. It aims to infect the shoppers with the store’s excessive weather conditions, to induce them to become part of this weather, to give in to their desire to lose themselves and fall prey to the excesses of shopping fever.

The weather Octave Mouret tries to create by heating up his store, by firing its furnaces (and by arranging its items in the spectacular way he does) is characterised by a violent dynamic that brings all that is present in the shop into the fastest of circulations, thereby maximising turnover. It is thus the crowd that has to be observed in order to get an idea of the weather in the store:

A compact mass of heads was surging through the arcades, spreading out like an overflowing river [fleuve débordé] into the middle of the hall. [...] The great afternoon rush-hour had arrived, when the overheated machine led the dance of customers, extracting money from their very flesh. (*Ladies' Paradise* 108)

Zola here exhibits an association that is at the centre of this essay’s argument: the heating of the machine is thermodynamically linked to the violent movement of the weather. In other words, by (over)heating the machine, Octave Mouret produces the violent flooding of the crowd “spreading out like an overflowing river.” It is this important juncture that links the *Rougon-Macquart*’s dominant theme and the imagery of the steam engine, and of heating in general (examined extensively by Michel Serres and Jacques Noiray) with the theme of (violent) weather and climate. The association of heat with the weather’s dynamics is one of the basic intuitions from which the theory of thermodynamics departs:

To heat also are due the vast movements which take place on the earth. It causes the agitations of the atmosphere, the ascension of clouds, the fall of rain and of meteors, the currents of water which channel the surface of the globe, and of which man has thus far employed but a small portion. Even earthquakes and volcanic eruptions are the result of heat. (Carnot 37–38)

This passage is taken from the first pages of Sadi Carnot's ground-breaking study, titled *Réflexions sur la puissance motrice du feu et sur les machines propres à développer cette puissance* (1897 [1824]), which can be regarded as the foundation of thermodynamic theory. As does Michel Serres, I maintain that the thermodynamic discovery of the transformability of thermic energy into motive power is of crucial importance for Zola's *Rougon-Macquart*. This discovery forms the juncture between the 'warming global climate' that Zola, as we have seen, diagnoses for the Second Empire and this world's increasing "dynamism" (Nelson 30, Rochecouste 121), and consequently its increasingly heavy weather that in turn leads toward climate catastrophe, to the apocalyptic end of this world.

It is in the conceptualisation of the catastrophe that my reading parts ways from Michel Serres'. In contrast to Serres, I do not think that the ultimate catastrophe which destroys the Second Empire is "what one called thermal death [mort thermique]" (Serres 1975, 63; my translation); the Second Empire does not die a "cold death" (Serres 1975, 63; my translation) that would be characterised by the absence of thermodynamic free energy. This is not to say that David Baguley is mistaken in observing a "characteristic movement of the naturalist novel [...] in the direction of disintegration and confusion" (208), which he labels as its "entropic vision". Entropy and the paradigm of the steam engine are however not particularly suited to account for the débâcle, the ultimate catastrophe that Zola narrates in the *Rougon-Macquart*. That is why I suggest introducing a second thermodynamic paradigm, the weather, that interacts with or rather feeds on the first but may provide us with a better understanding of the circle's end.

Catastrophe in *Rougon-Macquart* happens as an uncontrolled release of thermodynamic energy (a very hot death)—modeled as a weather catastrophe—which destroys (that is Zola's 'positive' vision) many of the structures that had led to the dangerous accumulation of this energy. The weather as thermodynamic paradigm is compatible with Zola's cyclical vision of renewal: There is weather after the storm and there is the possibility—although highly improbable—that weather interacts with its own conditions of formation, thereby perhaps creating a more favourable equilibrium. In his thinking about fêlure, Gilles Deleuze sketches a similar movement of the fêlure against itself: "En allant au plus loin, l'Instinct de mort se retournera-t-il contre lui-même? Peut-être la fêlure a-t-elle de quoi se surpasser dans la direction qu'elle crée [...]" (385). The unresolvable ambiguity between good and evil is a characteristic trait of Zola's project; nature is surely not, as David Baguley claims, "ontologically evil" (216) and it is not good either. It is its inherent ambiguity, its tension, that thermodynamically feeds its processes.

Octave Mouret's store, as a weather-machine, exemplifies the thermodynamic procedure that combines the paradigm of the steam engine with the paradigm of the weather's forces: Octave stokes the furnace of this machine (metaphorically by promotion and spectacular installations; literally by heating up the store's air), and what he thermodynamically "causes" are indeed "agitations of the atmosphere," "the ascension of clouds" and "the currents of water which channel the surface of the globe":

the eddy of the crowd continued endlessly, its dual stream of entry and exit making itself felt as far as the silk department [...]. This sea of multi-coloured hats, of bare heads, both fair and dark, was flowing from one end of the gallery to the other [...]. (*Ladies' Paradise* 250)

By focalising on a customer, Mme Desforges, fighting her way through the store during a day of sales, Zola illustrates that it is almost impossible “to avoid being carried away by the stream of people” (*Ladies' Paradise* 253). The story of the sales is a story of the weathery natural forces that Octave releases in his store. The nautical topos of “flowing” streams, of a “sea of hats” or an “ocean of heads” (*Ladies' Paradise* 253) is dominant for relating the violent dynamic of the crowd. Moreover, the crowd cannot only be described as a weathery phenomenon: this is how it feels to be in the middle of it. The violent forces at work in the crowd spread throughout the whole building: “In the living vibration of the whole shop, the iron supports were perceptibly moving underfoot, as if trembling at the breath of the crowd” (*Ladies' Paradise* 253). This is important to note because the weather produced in the meteorotopos of the department store is not merely a phenomenon of a socio-psychical dynamic. It is not only human beings that get caught up in the violent weather of flows, streams and oceans, but also the commodities of the shop:

The counter was overflowing [débordait]; [Mme de Boves] was plunging her hands into the growing cascade of pillow lace, Mechlin lace, Valenciennes, Chantilly, her fingers trembling with desire, her face gradually warming with sensual joy; while Blanche, by her side, possessed by the same passion, was very pale, her flesh soft and puffy. (*Ladies' Paradise* 110)

The imagery used to narrate the circulation of the materials is exactly the same as that found in the description of the dynamic of the crowd. The crowd’s “dual stream of entry and exit” finds a counterpart in the “endless flow” of commodities circulating mostly behind the scenes, entering the building through a “yawning trap” in order to be sold and carried out of the shop again as quickly as possible:

Everything entered through this yawning trap; things were being swallowed up all the time, a continual cascade of materials falling with the roar of a river. During big sales especially, the chute would discharge an endless flow into the basement, silks from Lyons, woollens from England, linens from Flanders, calicoes from Alsace, prints from Rouen [...] streaming like rain from some spring higher up. (*Ladies' Paradise* 36–37)

The “roar of a river” of materials clearly equals the crowd’s “deafening noise” of “a swiftly flowing river”; the “overflowing river” of shoppers corresponds to the “overflowing counter” and the “cascade of materials.” The flow of materials and the flow of customers (the flow of money should too be added!) are not only similar, not only narrated in an analogous manner, but form part of the same setting. Furthermore, the similarity of the weather imagery indicates that both flows or streams are located on the same plane; neither of the two can claim a privileged position with regard to the other. Both are parts and products of Octave Mouret’s weather machine. The meteorotopos of the department store thus provides us with a perfect example of Zola’s weathery conception of milieu and the role that ‘the human’ plays in this constellation: the shop’s milieu brings together different elements (human beings, commodities, money) and

makes these disparate elements communicate and interact. Instead of resorting to the physico-chemical conditions that his idol Claude Bernard uses to bridge the boundary between the animate and the inanimate, Zola constructs a different medium: a medium of weather, of flows, streams, cascades, of weathery forces. In a way, this choice favours the abstract on the one hand; it is as alien to the commodities (that are 'things') as it is to the human beings and their motivations and intentions. On the other hand, it is the seeming abstractness of the medium that makes the observation of the communication or interaction possible. By abstracting from the privileged access via the human individual and its instrumental, rational or psychological approach to the world, Zola introduces an approach to the interaction of the disparate and to the mutual effects brought about when the disparate communicates.⁵

The violent weather forces that Octave Mouret unleashes are not merely responsible for the economic success of the department store as they produce a massive increase in turnover—they inevitably rush toward climate catastrophe:

Inside, beneath the flaming gas jets which, burning in the dusk, had illuminated the supreme tremors of the sale, it was like the battlefield still hot from the massacre of materials. The salesmen, harassed and exhausted, were camping amidst the havoc [débâcle] of their shelves and counters, which looked as if they had been wrecked by the raging blast of a hurricane. [...] Liénard was dozing on a sea of materials in which some half-destroyed stacks of cloth were still standing, like ruined houses about to be carried away by an overflowing river [un fleuve débordé]; (*Ladies' Paradise* 117; translation amended)

The passage's 'local debacle' clearly foreshadows the military, 'global' débâcle that will bring the Second Empire to an end. The battlefield scenes of *La Débâcle*, the penultimate novel of the cycle that is dedicated to the Franco-Prussian war, literalise the war imagery employed for the description of the sales day in *Au Bonheur des Dames*. Strikingly, we encounter the very same weather 'imagery' that exposes the logic and dynamic, the 'quasi-natural', the historical force that inevitably drives the Second Empire toward its fatal collapse. This catastrophic world is one of extreme weather, a world where "a terrifying storm br[eaks] out, a truly diluvian downpour" "soak[ing] the men to the skin" (Zola, *La Débâcle* 69) and "a hailstorm, a hurricane of bullets and shells" (*La Débâcle* 223; translation amended) coincide, where 'figural' and 'literal' weather become indistinguishable, where, as Jessica Tanner writes, "[t]he relationship between literary and literal atmosphere goes beyond metaphor" (23):

[They heard] ferocious yells which the crackling bullets accompanied with the noise of hailstorm, rattling down upon everything metal, mess-tins, water bottles, the copper trim on their uniforms and on the harnesses. Through the hail came the hurricane blast of wind and thunder that set the ground trembling, leaving a smell of scorched [brûlée] wool and sweating beasts rising up into the sunlight. (*La Débâcle* 266; translation amended)

In a similar way to the Second Empire's ultimate catastrophe, Paris burning—it is not quite clear whether it is the Prussians or the Communards who have set it alight—is

⁵ In a similar way Jessica Tanner observes in Zola's cycle "an ecology of heterogeneous agents operating on different spatiotemporal scales and intensities, making their interconnectedness perceptible within the time of reading" (22).

prefigured by a 'local' climate catastrophe. The injured Maurice, one of the protagonists of *La Débâcle*, hands out the hermeneutic keys for the figural reading of the cycle by babbling away in his "delirium of fever" in the face of Paris ablaze:

'What a beautiful party at the Conseil d'État and the Tuileries... They've lit up the façades, the chandeliers are sparkling, the women are dancing... Oh! Dance, then, dance, in your smouldering petticoats, with your chignons aflame...'

With his good arm he mimed the galas of Sodom and Gomorrah, with the music and flowers and perverted pleasures, the palaces bursting with so much debauchery, lighting up the naked abominations with such a wealth of candles that they'd set fire to themselves. (*La Débâcle* 496–97)

It is the 'metaphorical' fire, the "wealth of candles," the "Venetian lights" of the Muffat's party in *Nana* that have finally found their 'realisation': "the glowing embers of a fire," the "conflagration" and the "final holocaust" (*Nana* 364) have become reality.

The 'typological' connection between the pre-figuring novels not only works as a literalisation that turns metaphor into reality, but also makes use of an important metonymic dimension. It continues, to the most extreme extent, the movement of growth and proliferation that we have already observed as typical with regard to the meteorotopoi. The heart of most meteorotopoi (and also the heart of the process of modernisation), the furnace, that produces the heat for driving the steam engine, has grown to encompass the whole city: "And above the huge city of Paris, the fire's glow had swelled larger still, the sea of flames appeared to have gained the distant shadows of the horizon, the sky was like the roof of some gigantic oven, heated white-hot" (*La Débâcle* 510). Paris—white-hot," turned into one "gigantic oven"—marks the endpoint, the extreme point of the process of 'global' heating that the cycle diagnosed as the characteristic trait of the Second Empire. The point of transition from 'metaphorical' to 'metonymic' or to 'real' is impossible to determine. It is however important to note that the movement that Zola traces is no abstract rhetorical operation: it does not merely turn the metaphorical into the real, but also contains a line of predominantly metonymic continuity that accounts for the story of a historical development. The insistent theme of a fatal proliferation of heat metonymically supplements the cycle's progress toward literalising a metaphor.

The ultimate catastrophe of Paris burning is itself far from purely 'literal'. The fire is consistently conceptualised as an inundation, as a deluge of an "overflowing" "sea of flames" (*La Débâcle* 490). It is surely not unintentional that the two protagonists Jean and Maurice make their way through the burning city by boat—they are surrounded by fire "setting the skyline ablaze, flames standing out against more flames in a bloody, endless sea" (*La Débâcle* 496)—as if the city had been washed away by a flood. Even in the context of the Commune and the *pétrole* associated with it, the elemental combination of a 'fiery deluge' is too paradoxical a combination not to carry the weight of deeper meaning. It takes up and continues the imagery of overflowing, of *débordement*, that pervades the cycle from its first to its last pages. In fact, it is this familiar imagery that makes the ultimate catastrophe readable as another weather/climate catastrophe, as the last of a series of weather catastrophes handed to us in Zola's cycle. The 'Débâcle' thus exposes the thermodynamic link between a process

of (over)heating and violent weather that threatens to destroy the structures and do harm to the agents that have been contributing to the unleashing of this weather's forces. The 'imagery' of deluge, of inundation and overflowing that Zola employs to narrate the perishing of Paris and the Second Empire in the fires of (civil) war thus connects the ultimate, 'global', historical catastrophe to all the 'local' catastrophes.

The 'Débâcle' is not merely the mythical punishment imposed upon a modern Gomorrah by an abstract instance of justice; it is the "inevitable" result of the Second Empire's 'climate.' It marks the extreme point of a heating which has gone out of control, when the fires of the *Rougon-Macquart's* furnaces—'real' and 'figurative'—spread all over the city. Paris is flooded by all the torrents the Second Empire has unleashed and that have soon started to follow their own, uncontrollable, natural way down the slopes—streams and torrents of people, of goods, of money, of passions. The imagery of overflowing, of *débordement*, links the burning Paris (and the collapse of the Second Empire) to the torrents of shoppers in *Au Bonheur des Dames*, to the torrents of orders to sell from *L'Argent*, to the torrents of waters flooding the coal-pit of *Germinal*, to the torrents of fugitives in *La Débâcle*: it is the prime example of "the coherence of Zola's novels" that, according to Brian Nelson, "rests on their dense metaphorical structures" (11). It is this coherence of imagery that turns the descriptions of the meteorotopoi and of the 'local' catastrophes into detailed explanations for the 'global' catastrophe.

Seen from this perspective, the collapse of the Second Empire "was inevitable" (*La Débâcle* 490) for purely 'immanent' reasons. It is the laws and regularities of this world, of this modern world of the 19th century (historical, material, cultural, social, 'natural') that account for the necessity of the catastrophe.

To be sure, Zola's novels are not ecocritical in a narrow sense;⁶ he does not know about carbon dioxide and the scientific concept of the greenhouse effect. It is, however, no coincidence that his novels resonate so intensely with 20th and 21st century notions of climate change. Zola's construction of a milieu that abandons the divide between the natural and the social, his positing of a radical correspondence and interaction of the modern human being and the 'climate' surrounding it led him to metaphorically project or anticipate what science, still believing in the old division between nature and culture, started to reconstruct a hundred years later, only because data became available which demanded an explanation. His narrating a 'climate' that pervades the world of the Second Empire and that, nevertheless, proves to be so hard to 'describe' that it emerges only as a "unifying impression" holding together a cycle of twenty novels may be said to anticipate Timothy Morton's concept of the climate as a "hyperobject" (2013). More than that, it also suggests a way to approach this unapproachable object: literature.⁷

⁶ Ecocritical readings in the 'wider sense', as practiced in my paper, have long become a standard procedure in the environmental humanities. Tobias Menely and Jesse Oak Taylor's *Anthropocene Reading* (2017) and Nathan Hensley and Philip Steer's *Ecological Form* (2019) may stand exemplarily for the good amount of research that has been dedicated especially to the 19th century literature and its environmental implications. As Jessica Tanner's (2017) and Tancrède Lahary's (2017) articles show, the interest has also reached Zola's œuvre in the last years.

⁷ In "The Aesthetics of Heat. For a Cultural History of Climate in the Age of Global Warming", Eva Horn emphasises the importance of heat as a metaphor which has the capacity "to convey a phenomenal

The metaphorical links Zola constructs between the mentality of an era, the galloping forces of industrialisation and speculation, the employment of the steam engine with its combustion of fossil fuel and a 'general heating up' turning into a weathery catastrophe, cannot but strike the modern reader. However, the 'climate change' that Zola narrates is not merely an anticipation of a fact that would challenge generations after him. In fact, Zola's story of a 'climate change' oscillates continually between the metaphorical and the 'real'. For Zola, 'climate change' is not the description of a certain fact of nature ('the average temperature is rising') but a societal diagnosis.⁸ It is the answer to a complicated question, a question similar to the one that Hippolyte Taine had raised: Zola is searching for "certain general traits, certain characteristics of the intellect and the heart common to men of one race, age, or country" (Taine 13): in Zola's case, those of the Second Empire. 'Climate' stands for the forces behind the voluntary or the rational. His *Natural and Social History of a Family Under the Second Empire* goes beyond the human agent; that is why it is natural and social. The kind of history that Zola pursues attempts to work out "the general tendency of the whole" (*The Fortune of the Rougons* 3) by capturing its 'historical a priori,' (cf. Foucault, *L'archéologie du savoir* 174), that is to say the conditions responsible for the fact *that* things come into existence. The "general traits," the "certain characteristics" common to the Second Empire find expression in a meta-milieu that shapes the temperament and actions of the human agents and is, at the same time, itself shaped and brought about by these temperaments and actions. This meta-milieu that Zola conceptualises as having a resonance in 'climate' (always fluctuating between weather imagery and this imagery's becoming 'real' weather) gives an account of the 'unconscious' impetus behind the voluntary action of the individual, of phenomena of human behaviour and the interaction with non-human agents that are inaccessible to individual consciousness and will (Gumbrecht 91). Zola's narrative project testifies to literature's very particular contribution to thinking on 'climate.'

Submission received 4 July 2019

Revised version accepted 2 March 2020

sensibility to an uncanny, complex and unrepresentable process [i.e. climate change] that exceeds our categories of perception and cognition" (3). It does not come as a surprise that literature has been and continues to be a privileged place both for developing and spreading this metaphor.

⁸ Zola's societal diagnosis is more complex than the degeneration and decadence that David Baguley's 'entropic vision' detects. The warming climate which the cycle narrates is not simply an aberration, a maldevelopment that could be criticised or even cured from without, but is intrinsically and paradoxically linked to the very forces of life itself. By claiming "a constant assimilation of man (and particularly woman) to the natural order" (212)—he conceives of nature as "evil"—Baguley implicitly introduces the notion of 'good' humanity, for which, in my opinion, there is hardly any evidence in Zola's *Rougon-Macquart*. I think it important to take the ambiguities and paradoxes that Zola depicts seriously: The notion of a climate, i.e. a field of interacting and conflicting forces which is in itself neither good nor evil but has the capacity to bring forth harmful as well as beneficial effects, therefore appears to me to be a promising and more adequate way of thinking about modern society and life.

Works Cited

- Alcorn, Clayton R. "The Child and His Milieu in the *Rougon-Macquart*." *Yale French Studies*, vol. 42, 1969, pp. 105–14.
- Baguley, David. *Naturalist Fiction. The Entropic Vision*. Cambridge Univ. Press, 1990.
- Bakhtin, Mikhail M. "Forms of Time and of the Chronotope in the Novel. Notes toward a Historical Poetics." Translated by Michael Holquist. *Dialogic Imagination. Four Essays*. Univ. of Texas Press, 1981, pp. 84–258.
- Berthier, Philippe. "Hôtel Saccard. État des lieux." *La curée de Zola ou 'La vie à outrance'*. Edited by David Baguley. SEDES, 1987, pp. 107–18.
- Carnot, Sadi. *Reflections on the Motive Power of Heat and on Machines Fitted to Develop That Power*. Translated by Robert Henry Thurston, 2nd edition, 1824, J. Wiley & sons, 1897.
- Deleuze, Gilles. "Zola et la fêlure." *Logique du sens*. Éditions de Minuit, 1969, pp. 373–86.
- Foucault, Michel. *L'archéologie du savoir*. Gallimard, 1969.
- Foucault, Michel. "Des espaces autres." *Dits et écrits. II. 1976–1988*. Edited by Daniel Defert and François Ewald, 1984, Gallimard, 2001, pp. 1571–81.
- Gumbrecht, Hans Ulrich. *Zola im historischen Kontext. Für eine neue Lektüre des Rougon-Macquart-Zyklus*. Fink, 1978.
- Hemmings, F. W. J. "Fire in Zola's Fiction. Variations on an Elemental Theme." *Yale French Studies*, vol. 42, 1969, pp. 26–37.
- Hensley, Nathan K., and Philip Steer. *Ecological Form*. Fordham Univ. Press, 2019.
- Horn, Eva. "The Aesthetics of Heat. For a Cultural History of Climate in the Age of Global Warming." *Metaphora*, vol. 2, 2017, pp. 1–16.
- Hulme, Mike. *Weathered. Cultures of Climate*. Sage, 2017.
- Jameson, Fredric. *The Antinomies of Realism*. Verso, 2013.
- Lahary, Tancrède. "La Végétal révolté: Une approche écocritique de *La Faute de l'Abbé Mouret*." *Les Cahiers Naturalistes*, vol. 91, 2017, pp. 207–18.
- Menely, Tobias, and Jesse Oak Taylor. *Anthropocene Reading*. The Pennsylvania State Univ. Press, 2017.
- Morton, Timothy. *Hyperobjects. Philosophy and Ecology After the End of the World*. Univ. of Minnesota Press, 2013.
- Nelson, Brian. "Speculation and Dissipation. A Reading of Zola's *La Curée*." *Essays in French Literature*, vol. 14, 1977, pp. 1–33.
- Noiray, Jacques. *Le romancier et le machine. L'image de la machine dans le roman français (1850–1900)*. vol. 1, Corti, 1981.
- Rocheouste, Gabrielle Maryse. *The Role of Parallel Catamorphic Systems in the Structure of Zola's Rougon-Macquart*. Olms, 1988. *Romanistische Texte & Studien*.
- Serres, Michel. *Feux et signaux de brume. Zola*. Grasset, 1975. *Figures*.
- Taine, Hippolyte. *The History of English Literature*. Translated by Henry van Laun. 1863, Vol. 1, Chatto and Windus, 1920.
- Tanner, Jessica. "The Climate of Naturalism: Zola's Atmospheres." *L'Esprit Créateur*, vol. 57, 2017, pp. 20–33.

- Tonard, Jean-François. *Thématique et symbolique de l'espace clos dans le cycle des Rougon-Macquart d'Émile Zola*. Peter Lang, 1994.
- Walker, Philip. "Germinal and Zola's Youthful 'New Faith' Based on Geology." *Symposium*, vol. 36, no. 3, 1982, pp. 257–72.
- Warning, Rainer. "Der Chronotopos Paris bei Zola." *Städte der Literatur*. Edited by Roland Galle and Johannes Klingens-Protti, Winter, 2005, pp. 145–60.
- . "Zola's *Rougon-Macquart*. Compensatory Images of a 'Wild Ontology.'" *MLN*, vol. 113, no. 4, 1998, pp. 705–33.
- Welch, Edward. "Zola, Jourdain and the Architectonics of Modernity." *Visions/Revisions. Essays on Nineteenth-Century French Culture*. Edited by Nigel Harkness et al., Peter Lang, 2003, pp. 37–47.
- Zola, Émile. "The Experimental Novel." *The Experimental Novel and Other Essays*. Translated by Belle M. Sherman, Cassell Publishing, 1893, pp. 1–56.
- . "The Novel." *The Experimental Novel and Other Essays*. Translated by Belle M. Sherman, Cassell Publishing, 1893, pp. 209–90.
- . *La Débâcle*. Translated by Elinor Dorday, Oxford University Press, 2000. *Oxford World's Classics*.
- . *Thérèse Raquin*. Translated by Andrew Rothwell, Oxford University Press, 2008. *Oxford World's Classics*.
- . *The Kill*. Translated by Brian Nelson, Oxford University Press, 2008. *Oxford World's Classics*.
- . *The Ladies' Paradise*. Translated by Brian Nelson, Oxford University Press, 2008. *Oxford World's Classics*.
- . *Nana*. Translated by Douglas Parmée, Oxford University Press, 2009. *Oxford World's Classics*.
- . *The Fortune of the Rougons*. Translated by Brian Nelson, Oxford University Press, 2012. *Oxford World's Classics*.