‘Stealing fire from heaven’: Odette du Puigaudeau and French nuclear colonialism in the Algerian Sahara

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Abstract

‘By wanting to steal fire from heaven, the men of today will lose the world’—so commented the French ethnologist, Odette du Puigaudeau (1894–1991), as she reflected on her opposition to French nuclear weapons tests in the Algerian Sahara. Odette, a Breton known for her field research in Mauritania, was unable to prevent the tests, with 17 detonations taking place between 1960 and 1966 near the oasis town of Reggane and in the Hoggar Massif. The ethnologist was, however, able to expose the hollowness of military propaganda, which framed the test sites as a desert wilderness. Her pronouncements on the agriculture, demography and hydrology of Reggane suggested the opposite: tests would take place near a cosmopolitan, fertile hub in the oasis region of the Touat, rich in history and vital to trans-Saharan trade. In this article, we draw on Odette’s archive—broadcasts, essays and letters from French and British collections—to reconstruct her interpretation of the Reggane tests. This enables us to define colonialism and nuclear power in relation to the historical geography of the desert environment, as well as in relation to Odette’s unique position as a researcher: an amateur scientist whose work was indebted to a combination of colonial structures and environmental, gendered perspectives. To this end, we suggest that French nuclear colonialism emerged as a struggle over nature, technology and modernity in the desert.

Keywords: Algeria, atmospheric nuclear weapon tests, France, Sahara
‘By wanting to steal fire from heaven, the men of today will lose the world’. This phrase, uttered by Odette du Puigaudeau (1894–1991) in an interview with her first biographer, Monique Verité, offers an entry point into her thinking about French colonialism and nuclear weapons tests in the Algerian Sahara (Figure 1).¹ In juxtaposing Promethean technology—‘fire from heaven’—with the natural environment of the desert—‘the world’—the French ethnologist touched on one of her long-standing concerns: the role of modern technology in the development of the Sahara and the welfare of its people. For Odette, the arrival of the ‘Atomic Age’ in the ‘Oases’ was the logical outcome of a technological imperative in which French colonialism, particularly under the Fourth Republic (1946–58), had torn

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Stealing fire from heaven

asunder the environmental fabric of desert societies. As a student of these societies who undertook three expeditions to Mauritania and its surrounding countries (1933–34, 1936–38 and 1950–51), she interpreted this imperative as a masculine dialectic of history. Rather than embracing the nature of the desert on its own terms, this modernising impulse sought in her view only to master it, culminating in the obscene expression of nuclear tests. In overlooking the natural wonders to which Odette and her romantic partner, Marion Sénones, dedicated their lives, ‘the men of today’ did seem to the ethnologist to be ‘losing the world’. For her, this ‘world’ stood in microcosm for the oasis region of the Touat: a fragile, irreplaceable environment located in the south-west portion of modern Algeria, on the precipice of history after serving as a trans-Saharan crossroads for millennia.

From this reading, it seems that Odette has much to offer current eco-criticism of nuclear weapons. Her interpretation of nuclear tests as exemplars of a modern ideology in which nature was treated as separate from—and subordinate to—human progress seems particularly far-sighted. The lineage of this opposition between progress and nature has been a focal point in the environmental humanities, where researchers have seen it as a precursor of climate crisis as much as nuclear testing. Like Odette, these researchers have sought to explain how this opposition has been sustained, turning, also like Odette, to colonial and gendered incarnations of science and technology as sources of inspiration. Odette was also prescient in her reflections on the ideological power of nuclear weapons within what she saw as the colonial project to conquer nature. In suggesting that a masculine fixation with ‘fire from heaven’ was jeopardising engagements with nature, she presaged calls for a shift away from the ‘nuclear sublime’ and a return to environmental science.

To borrow from Donna

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Haraway, Odette’s denunciation of French officials for ‘stealing fire from heaven’ implied that she had ‘no truck’ with ‘sky-gazing Homo’. She was more attentive to the ‘material meaningfulness of earth processes’ at the test sites themselves.\(^6\)

Of at least equal value, however, are the strands of Odette’s research that resist co-option into recent studies of nuclear tests. Among these, her role as a colonial-era traveller, invested in orientalist practices that reinforced the colonial domination of the Sahara, meant that her opposition to French tests was not a simple protest against ‘nuclear colonialism’. The origins of this phrase, popularised in recent times by the International Campaign to Abolish Nuclear Weapons (ICAN), may be traced back to both African and Polynesian resistance to French nuclear tests, with 17 taking place in the Algerian Sahara and 193 in French Polynesia between 1960 and 1996.\(^7\) In the run-up to the Saharan tests, it was Kwame Nkrumah, the first leader of independent Ghana, who sought to unite colonies and postcolonial states under a banner of ‘no nuclear imperialism’.\(^8\) Where Nkrumah’s use of ‘imperialism’ reflected his theories about the remaking of American, British and French power during the Cold War, we suggest that ‘nuclear colonialism’ provides a more suitable term for this article.\(^9\) This can be explained by our focus on the implications of nuclear testing for the oases rather than France itself, even though Odette did consider the significance of the oases for wider imperial geopolitics. While nuclear colonialism has been studied with reference to test site selection, Indigenous protest and the legacies of residual waste, it has rarely been studied with reference to rival configurations of colonial modernity within European colonialism.\(^10\) Such an endeavour, told here through Odette, repositions the Saharan tests within colonial tensions about modernity, technology and nature. In a similar manner to recent research on oceans and islands, we show how colonial relations with another natural environment, the desert, are crucial to explaining nuclear colonialism as an historical phenomenon.\(^11\)

By drawing on Odette’s broadcasts, essays and letters about the Saharan tests, we make two contributions to the literature on both the tests themselves and on nuclear colonialism as a set of power relations discernible in all state projects to acquire

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\(^7\) On ICAN and nuclear colonialism, see ICAN, ‘Racism, Colonialism, and Nuclear Weapons’, d3n8a8pro7vhmx.cloudfront.net/ican/pages/2001/attachments/original/1630676848/Racism_and_nuclear_weapons_briefing_paper_-_formatted.pdf, accessed 10 October 2023.


nuclear weapons. First, we seek to reconstruct from Odette’s archive a perspective on the historical geography of the oasis region that may be unmatched in French and English language sources. In providing data about population, crop yields and water systems, Odette’s materials are highly original. Her letters to April Carter, a key figure in the Direct Action Committee against Nuclear War (DAC), a British organisation that led international protests against French tests, also reveal the importance of gender to her anti-nuclear position. We suggest that gender dynamics, forged in solidarity with women such as Carter and Odette’s partner, Sénonès, were highly influential in orienting the ethnologist’s environmentalism. This gendered view of science and technology feeds into our second contribution, which is to interrogate the relationship between nuclear power and colonialism through the environmental prism of a devoted orientalist. In Odette’s struggle to save her own exoticised ideal of the Sahara, she was arguably struggling to save a distinct iteration of modernity and nature in the colonial project. The Saharan tests had given rise to a paradigm shift in colonial techniques by which the nature of the desert was controlled and perceived. This shift threatened to displace both Odette and the nomadic societies on which she specialised.

Despite never having used ‘nuclear colonialism’ as a term, Odette remains useful in her formulation of this colonialism as a specific set of power relations between modern technology and nature. While we value her view that these relations reached a high point of antagonism during the tests, we also recognise that this can preclude interactions between ‘technology’ and ‘nature’ as overlapping categories: a shortcoming that can undermine the analytical purchase of ‘nuclear colonialism’ as a term itself. It is more precise, perhaps, to see this opposition between modern technology and nature as forcing crises of new knowledge about atomic science and the environment, which served in turn to modify colonialism as a system of control defined by these categories. After all, as much as research in environmental humanities has focused on the destructiveness of nuclear detonations, it has also registered the integration of environmental sciences into the heart of test operations. As Laura Martin has commented in relation to the rise of ecosystem ecologies during American tests on the Marshall Islands, it seemed that ‘destruction was the enabling condition for understanding life as interconnected’. To this end, we see

12 Especially in view of the loss of Arabic sources from the oasis region, which were rumoured to have been sold by its ‘supreme chiefs’ to the Libyan leader, Colonel Muammar Gaddafi (1942–2011).

Odette’s opposition between modern technology and nature not in the rigid terms she proposed, but as a generator of new environmental understandings, rooted in violence and transforming the scope of colonial power.

In the first section of the article, we consider the nuclear colonialism of French tests in the context of the Algerian Sahara. In doing so, we focus on the Touat: a region critical not only for the nomadic pastoralism of the Kel Ahaggar—the northern Tuareg people—but also for the historical geopolitics of French imperialism. We then draw on published sources about and by Odette to root her knowledge of the Sahara in her personal and professional background. In doing so, we pay particular attention to the writing of the Mauritanian anthropologist, Abdel Wedoud Ould Cheikh, who, belonging to the country for which Odette developed such a passion, helps to expose the colonial foundations of her practice. In the final section, we explore what Odette saw as the principal risks of French tests for the oases and the Sahara as a whole. She interprets these risks as stemming not only from the radioactive fallout of nuclear detonations, but also from the socio-economic repercussions of military bases for the pastoralism of the Kel Ahaggar. While we do not intend to make a scientific intervention on the extent or impacts of fallout, we do cross-reference Odette’s materials with declassified papers and scientific reports about the test sites. This enables us to reflect on fallout and nuclear colonialism in relation to Odette’s description of the unique geography of the oasis region.

Nuclear colonialism

On the surface, the colonial element to French nuclear weapons tests in the Algerian Sahara seems self-evident. It stemmed from the extension of French sovereignty over Algeria from the Invasion of Algiers in 1830, when Algerian territories were first governed as part of a French colony, and then as overseas departments from the French Second Republic in 1848 to Algerian independence in 1962. Of the 17 tests conducted within the legal borders of French and postcolonial Algeria between 1960 and 1966, four atmospheric tests took place near Reggane, a town located near the southernmost oases of the Touat, and 13 underground near In Ekker in the Hoggar Massif. In the Évian Accords, the peace treaties that led to Algerian independence, the French also insisted on retaining rights to the Sahara as a result of oil discoveries and their nuclear facilities. This insistence, made on the grounds that the Sahara was only Algerian due to a separate annexation by France, aligned with French efforts to retain sovereignty over key sites in former colonies, including the naval base of Bizerte.

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in Tunisia.\textsuperscript{17} This renegotiation of colonial sovereignty took place during the Algerian War of Independence (1954–62). As Roxanne Panchasi has argued, this brought the legal basis of French tests into further jeopardy, with the French Government refusing to refer to the conflict as a ‘war’ until 1999.\textsuperscript{18} Panchasi queries whether the tests were ‘a \textit{part of} or \textit{apart from}’ the war itself, a subject tackled more widely in Robert Jacobs’ reframing of the Cold War as a limited nuclear war.\textsuperscript{19}

Yet it would be misleading to develop an explanation of nuclear colonialism that responds only to the sovereignty of the Algerian state. Although the test sites were legal constituents of that state, the regions in which they were located remained largely beyond the reach of Algerian state infrastructure until the late 1960s, when ‘Algerianisation’ of the Sahara gathered pace.\textsuperscript{20} For the first 50 years of French rule, the Algerian Sahara was also largely undisturbed. The only significant incursion, Colonel Paul Flatters’ mission in 1881 to find a route for the proposed trans-Saharan railway, ended in the massacre of around 79 out of 90 troops by the Tuareg, the much-mythologised ‘blue-veiled warriors’ who inhabited the Touat. When the French did begin to colonise the Sahara after the Flamand–Pein expedition of 1899, they did so not as a result of French policy—itself sensitive to British-backed Moroccan claims to the Touat—but as a result of unsanctioned skirmishes by French soldiers. French control of the Sahara, leveraged through the policing of trade routes and the appointment of \textit{Amenukals} (supreme chiefs) among the Tuareg, locked in a superficial social order: one that disguised socio-economic changes long since underway.\textsuperscript{21} Even before the French tests, Tuareg society was already in the midst of what Jeremy Keenan called a ‘complex, dynamic, and multi-faceted revolution’.\textsuperscript{22}


\textsuperscript{22} Keenan, \textit{Lesser Gods}, 22.
As a rare source of information about this society on the eve of the French tests, Odette helps us to situate the tests within both Keenan’s ‘revolution’ and the violence of the Algerian War. Despite never having visited the Touat, the ethnologist had learnt in detail about it on her desert travels with the azalaï, a salt caravan comprising over a thousand camels. She was aware, for example, that the employment of local labourers on nuclear bases would accelerate the demise of métayage, a system of agriculture in which cultivators known as barratin gave four-fifths of their harvest to Tuareg landowners. ‘What we do know’, she claimed on Mauritanian radio after the tests near Reggane, ‘is that the people of the oases had to flee into Moroccan territory, leaving behind their homes, palm groves, fields and herds. I’ve seen them, the women and children of Reggane and the Touat who have taken refuge in Tafilalt’. The ethnologist may have seen these refugees as victims of a violence comparable to that of French regroupement, where an estimated two million Algerians living in the north were displaced by counter-insurgency measures. In a similar manner to regroupement, the violence of testing was disguised by the socio-economic opportunities it promised. Just like the uprooting of northern communities, the tests represented to Odette yet another form of high-handed environmental engineering: a modernist project in which human–nature relations were violently restructured on the altar of metropolitan science. As a regroupé from the Atlas Mountains put it to a French officer, the violence of regrouping and testing seemed transferable: ‘why did you not detonate here, it would have simplified our problems?’

Since Odette’s opposition to French tests was motivated by her own interactions with colonial environments, it tended to materialise as a defence of an older set of colonial practices around the relationship between modern technology and nature. She was a ‘green imperialist’ for whom conservation of the desert and the authority of her own practice were interlinked. In this regard, she bemoaned shifts in colonial policy towards the Sahara, which went from being presented as an exotic place of oases and trade caravans to a void for minerals, oil and nuclear tests. ‘When propaganda was aimed only at the tourist trade’, she argued, ‘we were shown pictures of … handsome men and women, in decorative costumes, villages clustered around their minarets … But all that is finished. Derricks have replaced the minarets on barren yellow plains’.

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24 The economic opportunities opened up by the Reggane base also precipitated the demise of camel breeding based on the same model.
27 Grove, *Green Imperialism*.
29 Puigaudeau, ‘The Atomic Age’.
mining and strategic exploitation’. This repurposing of the Sahara performed a public denial of environmental knowledge while at the same time embracing this knowledge to further the interests of the French state. This was highlighted by the decision to conduct tests near the oasis region, which nuclear planners selected because of the same access to labour and water that they later downplayed. The selection of the test site was thus a prime example of ‘wastelanding’: the calculated denigration of a habitable environment in order to open it up for exploitation. Unlike Corsica, which was also considered as a test site, the relative isolation of the oases meant that planners were able to disguise the environmental erasure that this wastelanding performed. In pitting traditional colonial knowledge of the desert against pro-nuclear propaganda, Odette’s opposition to nuclear tests was also riven with tensions. Her anti-nuclear protest made her a defender not only of the desert environment, but also of the increasingly outmoded colonial order through which it had been studied, romanticised and preserved. In opposing nuclear tests, Odette was in effect supporting the prolongation of métayage, a system that relied on oppressed groups known as barratīn—who farmed the palm groves—and iklan, a word that closely resembles ‘slave’ in Tamahak, the Tuareg language. Ironically, the onset of French nuclear colonialism was decisive in the emancipation of around 1500 iklan, brought into the Algerian Sahara from the Sahel by Tuareg raiders and further subjugated under colonial doctrines of ‘white’ and ‘non-white’ Tuareg ethnic groups. In her role as a colonial figure, then, Odette’s anti-nuclearism was by definition complicit in competing practices of colonial domination. As the freedom of the iklan shows, such practices were also freighted with environmental and social problems for the Sahara and its inhabitants, if not in the same manner or to the same degree as nuclear tests. In this regard, the ethnologist’s passion for the desert environment was not pure and value-free. The desert she sought to protect was a colonial one: an environment in which traditional power relations around development, nature and technology were brought into conflict with those of post-war modernisation and the nuclear program. Through Odette, it becomes conceivable to talk of an anti-nuclear colonialism as much as a nuclear one.

As an insider to the colonial project, it is likely that Odette experienced the tests as an aberration or contradiction within French colonialism. Among the multiple interpretations that can be imposed back on the tests as colonial actions, her experience offers an historical one from which current definitions of nuclear colonialism can be informed. Odette’s portrayal of the tests as violent by-products of technological modernisation, pursued irrespective of the cost to nature and history, presents a dynamic perspective: one in which nuclear colonialism emerges out of a longer-term technological project to control and extract value from nature. The ethnologist therefore goes beyond legalistic approaches to nuclear colonialism, even though nuclear planners sought to manipulate ambiguities in Algerian sovereignty to achieve their aims. Instead, she explains the evolution of French colonialism in relation to shifting configurations of land and technology, in this case by tracking the French military’s struggle to translate the natural resources of the oases into forms of geopolitical domination.³⁵ In the nineteenth century, this domination took place through the strategic monopoly of these resources, a territorial colonialism in which environmental expertise was privileged and traditional life to an extent upheld. After 1945, it took place by rechannelling and sacrificing these resources to extractive industries and weapons programs, a nuclear or technological colonialism in which the spatial parameters and value of territory were redefined. As Odette goes on to indicate, this nuclear colonialism would precipitate another colonisation of sorts: the contamination of bodies and nature by the radioactive and toxic waste that the test operations generated and left behind.³⁶

Odette du Puigaudeau

Odette was born into a former slave-trading family of diminishing wealth in Saint-Nazaire, near Nantes, Loire-Atlantique, on 20 July 1894; her father, Ferdinand du Puigaudeau, was a painter of the Pont-Aven School, and her mother, Blanche Van den Brouke, a portrait painter of Flemish heritage. One can infer much of Odette’s later attitudes towards nature, technology and travel from her childhood and youth in Brittany, where she witnessed what one historian styled as the ‘courageous, independent and “noble” demise of local fishermen to “heartless” modern mechanised industry’.³⁷ Her upbringing—in which her father treated her as the son he never had—also pushed her to negotiate gender norms in a manner that inspired and shaped her

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travels, not least because these were shared as part of intimate relations with another woman: her lifelong partner, Sénones, whom Odette met in Paris in 1931. The core components of Odette’s identity—her sexuality, social class and seafaring heritage—all became powerful points of cultural translation in her encounters with Mauritania and the Western Sahara. Her deep-rooted scepticism of technological modernisation also took on strong resonances in colonial environments, particularly after the Second World War, when the French Fourth Republic embarked on a program of ‘development drives’ between 1946 and 1958.38

Odette’s sensibility for the environment, refined through nature drawings and evening classes in oceanography, also fed into and gained expression through her ethnographic practice: her literary and material representations of ethnic groups in the Western Sahara. Her travel and writing were motivated by a curious blend of personal factors and the orientalist structures of French imperialism following the Paris Colonial Exhibition of 1931. The impulsive character of Odette’s research, which she likened to plunging into ‘nature, living with the nomads and adopting their manner of life’, reflected a wider enchantment with colonial adventure in metropolitan France.39 This exotic, orientalised Sahara also seemed to coalesce with her sexuality. Her travels arguably formed a queer geography, where the otherness of the desert provided an ideal space for her romance with Sénones.40 Odette’s renaming of Sénones—whose birth name was Marcelle-Borne-Kreutzberger—was also suggestive of how the women perceived their first voyage to Mauritania: an opportunity for reinvention, where old identities could be shrugged off and new ones embraced.41 Yet the defining features of Odette and her research—particularly her sexuality and uncommon interest in native life—still operated within and never transcended the colonial framework of modern travel from France. She remained spellbound by the idea of the colonial epic and the knowledge it could produce.42

The brand of orientalism that inspired Odette was also perpetuated in her ethnography, which when wielded through colonial power relations presented what Edward Said defined as a means to ‘dominate, restructure and have authority over’ the desert.43 As Ould Cheikh has explained, Odette’s first trip to Mauritania in 1934 occurred

39 Puigaudeau, Barefoot, 2–3.
41 Odette’s predilection for reinvention provoked suspicions of espionage amongst campaigners against French nuclear weapons tests. Odette du Puigaudeau to April Carter, 1 July 1959. INF 9068529, Fonds Odette Du Puigaudeau. BNF.
at ‘the acme of the imperial legitimacy of Europe’. For him, the timing of this visit, 30 years after the French conquest of Mauritania, marked an opportune moment for European researchers, at least from the perspective of a colonial ethnography that sought to assess the effects of colonisation on ‘the natives’. This timing also resonated with what Sylvain Venayre has described as the ‘modern mystique’ of adventure: a phenomenon in which the allure of exotic travel lessened as the ‘unknown’ was gradually demystified through colonial knowledge and modernisation.44 By 1934 ‘the colonial albinocratic hierarchy’ that welcomed Odette ‘was firmly established’, according to Ould Cheikh, ‘while the pockets of “civilisation” that she feared would have deleterious effects on the “authenticity” of local lifestyles had not yet spread their tentacles’. In short, ‘it was still possible to enjoy the desert and to suffer, without excessive danger, the “innocent” importunity of its inhabitants’.45

Odette’s orientalism was also reflected in and reinforced by the colonial institutions and networks that facilitated her travels. Before embarking on each of their three expeditions to Mauritania, for example, Odette and Sénones had to obtain ‘mission titles’: permits issued on behalf of metropolitan organisations such as the Natural History Museum and Museum of Mankind, as well as on behalf of French ministries for the Colonies, National Education and Overseas France. The two women also relied on the practical support of General Henri Gourard, who had overseen the conquest of Mauritania and wrote the prefaces to Odette’s books, *Barefoot through Mauritania* and *The Great Date Fair*.46 Odette and Sénones therefore behaved—and were treated—as French dignitaries. They became skilled at queering borders and boundaries, with Odette performing a range of gender roles in order to gain access to geographical and social spaces that were otherwise off-limits. For Ould Cheikh, she cultivated a ‘masculine valance’, whether this was as a sailor, shipped down on her first trip to Mauritania by the Breton fishermen she had befriended, or as a méhariste, inspired by the camel cavalries that brought about French colonisation. Among nomadic societies, Odette expected, in the words of Caroline Stone, to be ‘treated as a chief’: ‘emphatically male, not female’.47 Yet she also mocked male travellers for what she saw as their habit of dramatising the hardships of desert travel.48

Odette’s research for the Natural History Museum and the Museum of Mankind was particularly formative for her ethnographic practice and perspectives on the Sahara. The conservational orientation of this work encouraged in Odette an antiquarian sense of temporality, one that corresponded with her more instinctual urge to live in harmony with the rhythm of nomadic life. While the museums in which she exhibited tended to curate such collections to reveal the ‘backwardness’ of desert societies, the ethnologist did not pursue this linear model of progress in her own

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46 Ibid.
practice. Rather than defining nomadism in relation to the modern, she defended and took shelter in the temporal disjunction it presented. This approach could be equally orientalist and problematic, as it threatened to suspend nomadic societies in their otherness. Odette’s method of dealing with this otherness, based on what Ould Cheikh described as ‘mimicry’ and an ‘osmotic absorption of the elements’, was never enough to generate meaningful relations with those she studied, nor a positive affirmation of their values. Indeed, because ‘natives’ were more ‘authentic’ at a distance, it could be said that Odette, who never mastered any Tuareg languages, remained ‘at ease … sitting on a solid core of incommunicability’.  

Odette’s ethnography is thus marked for Ould Cheikh by an ‘amiable irony’ in which she presumes to know the world of her subjects better than they did. The locals were fixed under her gaze, destined to remain in a prism of ‘barbarism, cunning and exoticism’, and only occasionally showing signs of the ‘fundamental and “true” humanity’ that the westerner may have looked for in the first instance. This objectification of the Tuareg, as if their social peculiarities were on a par with a museum artefact or exhibit, was laid bare in her anti-nuclear writing, which in one short passage reveals a troubling inclination for eugenics. In her ‘Atomic Age Reaches the Oases’, she described how ‘it will be difficult to make ignorant and wandering nomads understand the extent of the dangers and menace’ of nuclear weapons tests. They were a ‘catastrophe’, unleashed by ‘powerful French interests’ on ‘poor ignorant people’. The ‘nomad’ here was interpreted not only in the colloquial meaning of the word—a traveller from place to place with no permanent home—but in the original meaning coined by Immanuel Kant: one who stood outside of philosophy and science. From this perspective—the native as a body outside of time and progress—Odette suggested that the ‘atomic experiment will permit interesting medical and genetic observations … hard to come by in Europe’. To this end, she reflected a growing interest in ‘salvage anthropology’, the practice of archiving the material cultures of societies in decline. As Joanna Radin notes, this salvaging project took on a biological component during the nuclear arms race, when western biologists sought to establish a ‘baseline’ of contamination by which ‘the citizen of modernity could measure his pollution by technoscientific society’.

50 Ibid.
51 Odette du Puigaudeau to André Ulmann, 28 October 1958. INF 9068529, Fonds Odette Du Puigaudeau. BNF.
53 Puigaudeau, ‘The Atomic Age’.
The sourcing of items for museums encouraged Odette to go beyond the intuitive, literary mode that took precedence in her work. As suggested by the quotation used in the title of this article, her writing possessed a penchant for the fantastical, which spoke in turn to both the cult of modern technology and the quasi-mystical cultures of the desert environment. Particularly from her second expedition onwards, however, Odette became increasingly object-centred. In the words of Jeanne Sébastien, her attention to the quantity and style of objects echoed ‘the development of the notion of “terrain” in nascent ethnology’. In a similar manner to ethnologists from the Museum of Mankind, which provided the mission title for her second trip, she began to conduct surveys with local communities. Her journalism, which was invested in spiritual explanations for nature, and her materialism, which was rooted in environmental sciences, combined in a manner that presaged, albeit loosely, current interests in forms of Indigenous land management and environmentalism. While Odette’s credentials as a scientist never received the professional recognition she felt they deserved, her practice does seem to fall into the amateur category of ‘butterfly chasers’ and ‘soft sciences’ that Elizabeth DeLoughrey has highlighted as being so critical to the environmental humanities, not least because of Odette’s background in drawing butterflies as a draughtswoman in Paris.

In her politics as much as her professional life, Odette also remained an outcast. Despite her embrace of anti-colonial politics after the Second World War, this stance largely reflected her opposition to French modernisation programs, which she felt were corrosive to the traditional cultures of the Western Sahara—particularly after she witnessed the effects of the development drives on her third expedition between 1950 and 1951. Neither did Odette’s support for Mauritanian independence from France equate to support for a Mauritanian nation state: perhaps because the postcolonial state, more than any other political assemblage, was an instrument of the modernisation she abhorred. Revealingly, the Breton preferred the idea of a Greater Morocco: a loose federalist structure in which nomadic societies, and the elevated role she enjoyed within their structures, would be left alone. Odette’s anti-colonialism was therefore contingent and opportune; it was not a fully thought-through political position, since her support for a Greater Morocco was based on the ongoing subjugation of national liberation struggles within the Western Sahara. On the eve of French nuclear weapons in the Sahara, this ‘aventurière inclassable’ had marginalised herself from almost all of her political networks—from colonial allies, Mauritanian nationalists and eventually from the Mouvement de la Paix, the main source of potential opposition to the Saharan tests in France.

56 Sébastien, ‘Des chameaux et des hommes’.
58 Sébastien, ‘Des chameaux et des hommes’.
One figure with whom Odette did maintain a meaningful relationship was Théodore Monod, the French naturalist who mentored her and whose field research bore structural resemblances to her own.\(^{60}\) Unlike Odette, Monod described himself in a letter to the mayor of Paris as being in favour of modernisation, despite ‘the lack of experience in Saharan life at the level of the real man’, including ‘captains of industry, diplomats and geopoliticians’.\(^{61}\) Although Odette would have resisted Monod’s positive association between modernisation and ‘the real man’, she would have been more receptive to his stress on the distinctiveness of the Sahara. In the letter, he underlined the region as possessing a community ‘unique in the world’: one that simply required sensitive support in adjusting to the twentieth century life that was descending upon it.\(^{62}\) In a similar manner to Odette, Monod was particularly concerned about the implications of modernisation for his own work, with test preparations even leading to the cancellation of one of his proposed projects. ‘It is not fair play to make the geographer atone for the misdeeds of the Christian’, he wrote in a letter to Odette. While he resented being forced to ‘mix politics and ethics’, he impressed on Odette the importance of circulating an anti-nuclear petition among French universities—a protest thwarted by French censorship.\(^{63}\)

In a letter entitled ‘A Sahara without the Saharans’, Odette did collaborate in an initiative ‘among those who participate in the work of France in the Sahara’ to lobby the Fourth Republic against the proposed tests. Alongside Monod, members of l’Académie des Sciences d’Outre-Mer and military and scientific personalities, Odette signed a statement that pleaded for a compromise: that the minerals and oil of the Sahara be exploited without jeopardising the nomadic environment. In line with Odette’s orientalism, the signatories lauded nomadism for ‘the human values that inspire it’. They called for a French policy that respected pastures and water resources; one that reserved space for a ‘traditional life’, which they paradoxically hoped to ‘improve’ through medical assistance and an education system that would send ‘the best elements’ on scholarships to France. In a ruse that reflected more their own fears about social collapse than those of French officials, they pointed to the upheaval that French tests might instigate. By destabilising the structures of oasis nomadism, the tests could provoke a ‘considerably accelerated proletarianisation and detribalisation’. Neither should the Sahara be treated as a ‘no man’s land, uninhabited and disposable’, its future decided ‘without its population’.\(^{64}\) In other words, the signatories of the letter wanted a policy in which French hegemony of the desert and its social order

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61 Théodore Monod to G. Salvy. 12 April 1956. INF 9068529, Fonds Odette Du Puigaudeau. BNF.
63 Léone Georges-Picot to Théodore Monod, 27 September 1959, ibid.
64 ‘Un Sahara sans les Sahariens?’ (n.d.), ibid. Monod was also active in lobbying influential diplomatic figures such as Léone Georges-Picot, private secretary to the Prime Minister of France, Pierre Mendès France. Jean-Noël Jeanneney, ‘Léone Nora, de «l’Express» à l’aventure Mendès France’, L’Obs, 5 March 2021.
was prolonged. In seeking to uphold this order against the socio-economic pressures occurring around and within it, the signatories could be seen as more colonial than the nuclear colonialists themselves.

The atomic age and the oases

From the moment that the Prime Minister, Michel Debré, announced on 4 May 1959 that French nuclear weapons tests would take place near Reggane, Odette set out to counteract official depictions of the test site as being based in an environment ‘as bleak as the moon’. The Breton acknowledged that there ‘are empty regions’ of the Sahara, but emphasised that these were ‘crossed by centuries old trails from the Mahgreb in the north to Soudan [Mali] in the south’. In contrast to French planners, who portrayed the test site as part of the Tanezrouft, a barren plain to the south of the oases, she stressed its proximity to a green belt in which ‘there is water, vegetation, and consequently, people’. ‘This green belt was the Touat, ‘one of the most fertile oasis regions of the Sahara’ and ‘the middle point of a great area of valleys’, which includes the Gourara and the Tidikelt. The valleys of the Touat, the Gourara and Tidikelt are brought into confluence by water running off the Atlas and Hoggar Mountains and Tademait plateau, as well as subterranean rivers, known as wadi, which fill and drain again with each torrent of rainfall in the spring.’ In Odette’s essay, ‘The Atomic Age Reaches the Oases’, she elaborated on the pattern of this landscape, beginning with the Touat. ‘Starting from the seven villages and 300,000 palm trees of Figuig, a line of uninterrupted verdure, called the “Great Date Route”, descends towards the South, across the sands, following the wadis of Ghir, Zouzfana, Saoura and Messaoud’. It joins, ‘at Adrar-Timmi, another “Date Route”, that of the Gourara … [and] then turns at a right angle … through the palm groves of the Tidikelt … and ends at In Salah’.

The geographies of the test site were contested through the production and use of maps, with French officials arranging to have detailed depictions of the oasis region withdrawn from libraries in France. Odette responded by designing her own map, which was modelled on a colonial map of the Département de la Saoura in Algeria (Map 1). This had been commissioned by the Société de Géographie and was used by colonial administrations in Algeria and West Africa. The map’s provenance can be traced back to the Flamand–Pein expedition of 1899, which, when attacked by Kel Ahaggar, provided a pretext for military intervention and led to the incorporation of the oasis region into French Algeria by 1902. The expedition, a scientific mission specialising in geology, encompassed three strands of cartographic power, each of

65 Puigaudeau, ‘The Atomic Age’.
66 Ibid.
67 Trumbull, ‘Body of Work’.
68 Puigaudeau, ‘The Atomic Age’.
69 Ira Morris to April Carter, 24 June 1959. DAC 5/7/2. JBPL.
which proved instrumental to colonial rule—the mapping of the oasis region as an environment of scientific interest, as a launchpad for resource extraction in the desert, and as a pivot from which to shape the wider geopolitics of the Sahara. In basing her design on the 1902 map, Odette mobilised an earlier paradigm of colonial knowledge about the oases against a nascent one that revolved around nuclear power. While knowledge of the oases’ resources and water was still indispensable to colonial rule in the desert, the proponents of this new, nuclear paradigm sought to minimise this knowledge for the sake of public legitimacy and secrecy. Odette, by contrast, sought to pronounce how this erasure of the desert’s nature was the by-product of a nuclear colonialism: colonialism in which the natural environment was surrendered to technological progress.

Map 1. Odette’s map of the oasis region, 1959.
Source: DAC 5/7/1. JBPL.

By stressing the diversity and richness of the oasis environment, as well as the scale of human life it supported, the map produced by Odette was extremely striking. As she claimed in correspondence with April Carter, secretary of the DAC: ‘Even the most resolute [defender of the tests] may be unsettled by the evidence [the map] contains’. The map draws attention to the strings of oases in the valleys, with each black dot representing a village, yet ‘only the most important oases’ are named, according to Odette. The map also highlights the proximity between Hammoudia, Reggane and the Touat, the Gourara and the Tidikelt. The test site at Hammoudia lay only 150 km from the oasis of In Salah, a settlement consisting of 11 Arab villages, 58 km from Aoulef and between 15 and 20 km to the south of Tinghirt. According to Odette, the valleys were home to almost 200 villages, or ksours as she called them: 75 in the Touat, 60 in the Gourara and 40 in the Tidikelt. In most cases, the ksours contained a zawiya—a ‘kind of Mohammadan monastery’ founded by early Islamic tribes such as the Chorfa and Kounta, and serving as a political and religious centre. In other cases, the ksours also possessed Arabic forts that protected ‘against marauding bands from the true desert’. In sum, Odette calculated that 200,000 Africans, Arabs, Berbers and Jews depended on the oases, a figure that included not only permanent inhabitants, such as the 17,000 living in the Touat, but also nomads on the trans-Saharan trade route.

The patterns of settlement and travel in and around the oasis region revolved around the farming of palm groves: a ‘date superhighway’ of ‘two million magnificent trees’ and an annual yield of around ‘200,000 hundredweight [9000 tonnes] of dates’. Odette explained how ‘generations of peasants’ have ‘for centuries … planted these palm groves and cultivated them, irrigating them at the cost of tremendous labour, toiling with pick and basket’. She neglects to mention that these ‘peasants’ were dependent cultivators and forced labourers, preferring instead to use the term ‘ksourians’. The wage labour offered by Reggane became a major route by which iklan could unshackle themselves from métayage, even though Tuareg continued to exact dues from iklan and press them into work at nuclear bases on their behalf. Jean Bellec, a member of the Special Weapons Group who served in Reggane between 1960 and 1962, paints a vivid picture of the impact of the base on the oasis economy. He recalled visiting Taourirt, ‘a palm grove with a village of a hundred inhabitants’: ‘a market was held on Sunday mornings where … workers and soldiers … came to buy … crafts and imported goods … sold by oasis merchants and nomads attracted

71 Odette du Puigaudeau to April Carter, October 1959. DAC 5/7/2. JBPL.
72 Puigaudeau, ‘The Atomic Age’.
73 Ibid. A 1906 census, referred to in the Encyclopaedia Britannica, revealed that the oasis region had a population of 134 Europeans and 49,873 ‘natives’. Four places had over 2000 inhabitants: Adrar (Timmi), 2686, and Zanier-Kunta, 3090, in the Touât; Insalah, 2837, in Tidikelt; and Timimun, 2330, in the Gourara. Nine other places had between 1000 and 2000 inhabitants. By ethnicity (excluding soldiers), there were ‘19,654 Arabs, 5470 Berbers, 4374 negroes, 191 Jews (professing Islam) and 19,412 persons of mixed blood’. Frank Richardson Cana, ‘Tuaat’, in Encyclopaedia Britannica, ed. Hugh Chisholm (Cambridge: Cambridge University Press, 1911).
74 Keenan, Lesser Gods, 64.
by the purchasing power … of the military’.75 This socio-economic upheaval may have been even more disruptive near the base at In Ekker, with locals at M’Guel referring to the desertion of oases, as well as to harratin who took possession of Tuareg gardens.76

Particularly when set against the stereotype of the desert as arid and unforgiving, a notable feature of Odette’s writing is her frequent references to water, marked out on her map in the proliferation of ‘oued’ or wadi that flow into lakes and marshlands, including the Oued Messaoud that lies immediately to the east of the test site. While this water reached ground level only during rainfall in the mountains, it was underpinned by the Continental Intercalary, an enormous aquifer of porous sandstone that holds water around 2–6 m beneath the earth’s surface.77 In her anti-nuclear essays, Odette pays special attention to water catchment structures known as foggara: a sophisticated system by which cultivators could plug into the aquifer and channel subterranean streams to irrigate their crops. Bellec described the prevalence of these at the gardens of Taourirt, where under the date palms grew vegetables and wheat, all of which were supplied by networks from foggara: ‘underground channels at a depth of about 5 to 10 metres’, themselves linked to wells about 30 m apart from one another. Bellec also described how these structures were adapted to—and challenged by—the base at Reggane, with inhabitants reinforcing these ‘delicate’ structures with ‘excess cement’ that had fallen from French trucks.78 The region’s foggara were a prime example for Odette of how technological innovation could be adapted in harmony with, rather than in opposition to, the desert environment. In order to translate their genius for a modern audience, she quoted the colonial geographer Émile-Félix Gautier as having likened their complexity to ‘the underground railway system of a great capital city’.79

Since the weapons tests required large, restricted spaces, it must be remembered that French forces actively sought to make the adjoining desert ‘empty’ rather than simply portraying it as such: emptiness and remoteness were as much military objectives as they were rhetorical constructs. In this regard, the struggle to create in the Sahara an ‘800-[square] kilometre playground’, as Odette put it, does not seem too far removed from the counter-insurgency measures pursued in the Algerian War. The effects of turning the Sahara into what Odette described as a “polygon-shaped” testing ground for radio-guided and jet-propelled missiles’ may have even overlapped with regroupement tactics, especially on the northern fringes of the desert, where 400,000

78 Bellec, ‘Palmeraies du Bas Touar’.
nomads ‘suffered particularly disastrous regrouping’.\(^80\) In this part of the Sahara, the French ensured that those who passed through the plains of the Tanezrouft were ‘whisked out of sight’, to quote Odette. The salt caravans she so romanticised were also brought to a halt through frontier controls, a measure that also reduced the trafficking of slaves for the oases.\(^81\) Alongside the *harratin* and *iklan* who toiled on the palm groves, a whole cast of desert wanderers was brought into new economic relationships around the base at Reggane, with Odette writing of ‘miners at 29 Francs per hour, nomads who … have been left stranded … and “goumiers” (Arab scouts) needed for police “mopping up” operations’. ‘Why police’, she asked, ‘if the desert is empty?’\(^82\)

Just as Odette sought to show how the oases were pivotal to the ecosystem of the Sahara, she also sought to show how the Sahara performed a similar role for much of the African continent. In a claim that echoed the concerns of scientists from the Universities of Ghana and Ibadan in Nigeria, she suggested that Saharan winds, particularly from the Harmattan into West Africa, could ‘carry off the contaminated sand, to let it fall like death-bearing rain’. In a radio broadcast of February 1962 entitled ‘The nuclear peril does not spare Mauritania’, she informed her listeners that ‘the Rifi wind will bring you the poison which, from the water and grass, will pass into the milk of your hosts and even into the bones of your children’.\(^83\) She also claimed that ‘it would be foolish to consider metropolitan France immune, for when the north-east wind subsides, the south wind will take its place and very possibly carry the red dust over the Mediterranean’.\(^84\) French maps of radioactive fallout, declassified for the purpose of compensating veterans who participated in the tests, have revealed the substance of her warnings. Following the first test on 13 February 1960, an increase in radiation levels was detected across the Mediterranean and down to central Africa (Figure 2).\(^85\) ‘The UK–Nigerian Scientific Committee, formed to quell discontent by monitoring the tests from Nigeria, reported in private that the tests could become increasingly hazardous, given the meteorological conditions.\(^86\)

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81 As a major route between the Maghreb and *l’Afrique Noire*, the oases were deeply enmeshed in histories of the slave trade. Nehemia Levtzion and J. F. P. Hopkins, ed., *Corpus of Early Arabic Sources for West Africa* (New York: Marcus Wiener, 2000), 303–4.

82 Puigaudeau, ‘The Atomic Age’.


Despite her worries about the threat of radioactive fallout to the Sahara, Odette did not offer direct evidence of environmental or health effects from French tests. Although she was intrigued by data relating to the ‘biological effects of nuclear poisons’, she claimed in her 1962 broadcast that the nuclear elite would keep this ‘silent as long as they can’. For Odette, a new science of archiving the desert had emerged, one that displaced her own colonial authority and operated through the esoteric medium of statistical abstraction. While the Breton was unable to either access or appraise this new science, her vivid illustrations of the environmental and socio-economic settings in which French tests took place remain useful. Odette’s stress on the more mundane, non-nuclear impacts of French bases is especially refreshing, particularly in

view of the temptation to focus on military radiation. Her stress on desert and oasis ecosystems also offers a rare insight into the potential pathways of radiation during the tests. In turn, this provides a rich context in which to interpret later reports and testimonies about nuclear legacies in the Sahara. The findings of a 1999 study on Reggane and In Ekker by the International Atomic Energy Agency (IAEA) also points towards the value of Odette’s expertise. While the study concluded that the sites did not need environmental remediation, it also noted that assessing ‘doses to migrant and nomadic people’ required ‘a more accurate and quantitative description of their lifestyles’. Perhaps more so than any other figure from the test period, Odette provides an historical window into those lifestyles and the natural environments with which they were entwined.

**Conclusion**

The onset of French nuclear tests in the Sahara must have represented for Odette the conjuncture of a series of trends in colonial rule—the convergence of a masculine trend to triumph over the desert environment, a militarist one to secure the desert as a site of strategic geopolitics, a modern one to ‘regroup’ desert communities in their relationship with nature, and a scientific one to extract knowledge and resources for the instrumental purposes of metropolitan France. While she never referred to or fully theorised these colonial trends as ‘nuclear colonialism’, it is clear that the tests were seen by Odette as the culmination of a wrong turn in the historical development of the colonial project. Above all, the tests reified for Odette an idea of nature—and a relationship between nature and technological progress—that seemed endemic to colonialism in the region, whether masculine, militarist, modern or scientific. In official propaganda about the tests, this idea of nature operated through public denial of the Sahara’s diversity and vitality, even though the oases were indispensable to the test bases and operations themselves. For Odette, however, this repositioning of nature was not merely superficial: it reflected a deeper set of power relations in which the natural environment carried no weight beyond its utility to the test program. In colonial relationships with the Sahara, the desert’s nature—its agriculture, trade

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88 In the aftermath of the tests, such impacts could often be conflated with the environmental problems of military construction. Bellec, for example, describes how toppled palms were often attributed to nuclear blasts, when the real reason for their collapse related to increased pressures on the aquifer from the base at Reggane.

89 A report in *Nuclear Monitor* claimed that Tuarégs began to trade copper cables left over at the test sites across the Sahara. Allegedly, these desert traders often died after recovering the metal, which they stripped of its plastic coatings before melting and selling it in Morocco. Julius Caland, ‘French N-Tests in the Algerian Desert’, *Nuclear Monitor* 387–8 (1993). It has also been reported that an accident during the Béryl test on 1 May 1962 caused the death of 17 inhabitants in Mertoulate, a significant site for prehistoric rock art about 60 km from In Ekker. See Keenan, *Lesser Gods*, 187.

routes and water systems—was bypassed and rendered subordinate to an abstract, self-enclosed logic of technological progress: ‘the men of today’ would ‘lose the world’ by trying to steal ‘fire from the sky’.91

By marginalising the desert environment, this tightening of colonial land and nature relations around French nuclear weapons also threatened to marginalise Odette herself. This new, nuclear colonialism was superseding the orientalist colonialism in which the ethnologist herself specialised. In this colonialism, it seemed to Odette that colonial relationships with the desert had afforded far more space to nature, treating the breadth of its life forms, landscapes and material cultures as entry points rather than subordinates in the production of colonial knowledge. As in nuclear colonialism, however, these orientalist practices, though far more invested in the desert’s protection, were still underwritten by colonial force and violence. In this respect, the desert world that Odette sought to save—the Sahara of fragile ecosystems, prehistoric rock art, and trade caravans—may have been just as much a laboratory for the orientalists as it was for nuclear planners: a living museum in which French rule held the desert in a state of peculiar suspense for the colonial gaze. From this perspective, the decision to test in the Sahara was not, as Odette would have her readers believe, simply a stark endorsement of the ‘modern’ desert—bleak, sterile and uniform—over that of the ‘oriental desert’—colourful, exotic and mysterious. Odette’s oriental colonialism had been a stepping stone for the nuclear colonialism she loathed. Despite her opposition to the tests, for instance, she still thought they would ‘permit interesting medical and genetic observations’.92 As the ethnologist recognised in her Mauritanian broadcast, however, those observations were beyond her reach. What it meant to archive the desert—and which French experts had the authority to do so—had passed on to an emerging set of specialists, ones whose expertise gave rise to new knowledge relations between colonialism and nature in the desert.

If nuclear colonialism emerged for Odette out of deeper-rooted environmental impulses within the colonial history of the Sahara, then she also understood that this colonialism could have its own malign legacies for the environment she cherished. To this end, she touched on nuclear colonialism not only as a problematic web of power relations around technology and nature, but also as a producer of radioactive waste capable of enacting its own colonisation of the desert environment. While the ethnologist had neither the data nor the expertise to evaluate fallout from the tests, her detailed descriptions of the desert ecosystem provide a useful indicator of its environmental patterns and their implications for desert societies. These descriptions are more valuable in reconstructing the social rather than the scientific properties of the environmental risk from the tests. Particularly because Saharans had also been upended by the construction of the nuclear bases and test sites, the indeterminate threat posed by residual radiation must have reinforced a sense of dislocation: a sense

91 Verité, Odette du Puigaudeau, 342.
92 Puigaudeau, ‘The Atomic Age’.
of reckoning with nuclear colonialism as ‘an everyday presence and process’. More than 60 years since the first French test on 13 February 1960, the date farming to which Odette drew attention remains a contested symbol of Saharan trade. Moroccan farmers, dismayed by expropriations of their land in the Figuig oasis on the border with Algeria, have even raised the possibility of ‘radioactive dates’ coming from their neighbours. As Odette forewarned, the spectre of residual radiation has since the tests become a mediating factor of desert life, perceptions of its uncertain effects stalking the food chains, water systems and ancient trade routes that pass through the oasis hubs of the Touat, Gourara and Tidikelt.
