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“Parasites in Our Country”: Eradicating Ants in the Surinamese Amazon as a Means of Colonial Enclosure

RESEARCH ARTICLE

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ABSTRACT

Suriname, considered the most forested country in the world, is home to a variety of Amazonian communities, both of Amerindian and African (Maroon) descent. The shifting cultivation that was required by their Amazonian environment has over the past centuries led to the emergence of intricate schemes to effectively manage common land resources. As this contribution shows, leafcutter ants have importantly served human communities by increasing and indicating levels of soil fertility and recommending the pace of shifting from one plot to the next. Over the past century, extractive activities (gold, bauxite and hydroelectricity) have set in motion a still ongoing process of ‘enclosing’ Suriname’s Amazonian space. Ant eradication programmes implemented in the 1940s and 50s by the Agricultural Research Centre of Suriname departed from a profoundly racialized belief in “essential” characteristics of different Amazonian communities. This contribution argues that ant–human coexistence became an instrumental argument to showcase the alleged ‘primitivity’, ‘ecological destructiveness’ or even the ‘parasitic nature’ of certain Amazonian communities, which aided in their marginalization and eventual resettlement.

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When humans expand into rainforest environments, interspecies interactions often follow a winner-versus-loser dynamic, in which humans diminish the presence and diversity of other species (McKinney & Lockwood, 1999). Leafcutter ants, however, escape this logic: their populations often proliferate in areas affected by deforestation (Dohm et al., 2011). When land plots are cut open in Neotropical rainforests, leafcutter ants can quickly expand in number and damage food crops planted by humans. Forest communities have developed strategies to mitigate this problem, including through shifting cultivation. Over the past century, as community lands became enclosed for "profit-oriented land management" (Bartoletti, 2022), age-old ant management strategies were abandoned and leafcutter ants started to be considered "pests" or "parasites". Colonial and neocolonial institutions played a key role in this transition. To illustrate this mechanism and its consequences, this contribution assesses how the Agricultural Research Centre (*Landbouwproefstation*) in late colonial Suriname advanced an agenda of ant eradication to "enclose" community-managed lands for agricultural "modernization" and infrastructural expansion.

"Enclosure", as it initially took off in Europe at the end of the Middle Ages, consisted of "the conversion of commonable lands [..] into exclusively owned parcels, and the concomitant extinction of property rights" (Blomley, 2007, p. 2). While Blomley and others (e.g., Linebaugh, 2014) emphasize how Enclosure entailed community dispossession, it has also been described as a precondition for "modern" private property and thus for supposedly more efficient and "rational" farming systems (a line of thought most famously advanced by Hardin, 1968).

Enclosure did not only centralize farmland in the hands of a few, but did the same with "wild lands" like forests and water bodies, which had hitherto been used to collect household resources like timber, firewood and food sources (Merchant, 1980). Especially forests, which provided the timber that allowed European nations to build ocean-faring ships and the charcoal that served as a key ingredient for iron, copper and glass industries, were key ingredients of colonialism, the Industrial Revolution, and therewith, capitalism.

Colonial conquest extended Enclosure beyond Europe (Jones, 2019), even if not in a linear process (Greer, 2012; Griffin, 2023). The "primitive accumulation" (Harvey, 2003) of land and natural resources by colonial powers was met with resistance by communities who responded by evading the colonial spaces and creating, in James Scott's (2009) words, self-governing "non-State spaces" (p. 13) at the margins of the colonial empires. Recent scholarship has broadened the concept of Enclosure, applying it to a range of settings at different scales (Jeffrey et al., 2011), such as the continuing incorporation of "non-commodified, self-managed social spaces" and ecosystems into the machinery of resource exploitation (Sevilla-Buitrago, 2015, p. 1006). These mechanisms often characterize situations where "modern" States expand their influence – for agricultural development, mineral extraction, or both – into areas controlled by so-called "Indigenous and Tribal Peoples" (e.g., Grandia, 2012; Svampa, 2015).

In the Amazon, from the 17th century onward, Indigenous populations have been rounded up ("enclosed") into export-oriented settlements ("missions", or "*aldeias*"; Hemming, 2008), which made them even more vulnerabe to the diseases sweeping through South America. In response, several Indigenous groups abandoned the easily accessible riverbanks and moved further inland. Enslaved Africans, brought into the region to replace the declining Indigenous labour force, likewise escaped the sugar, cacao and cotton plantations where they had been put to work (Acevedo and Castro, [1993] 1998; Van Stipriaan, 1993). Both Indigenous and African-descended fugitives regrouped in safer locations at some remove from the colonial project and its "enclosed" production sites. For them, the forest was more than a source of subsistence: it also offered protection from the reach of colonial power. While we should not romanticize the mechanisms developed by forest communities to manage common resources like land and environmental assets, there is extensive literature documenting the varying degrees of success in doing so achieved by local communities (e.g., Ostrom 1990), including in the Amazon (e.g., Bremner and Lu, 2006; Da Silva Medina et al., 2022).

This contribution zooms in at Suriname, a small republic at the northern fringe of the Amazon. Today, Suriname is the most forested country in the world (FAO, 2015). In this country, 630,000 people inhabit an area of over 160,000 km^2, making it one the least densely populated countries worldwide. The country's small population is heavily concentrated in a narrow strip along the coast. The vast forests in the country's interior (the '*Binnenland*') are ecologically part of the Amazonian biome and dotted with villages inhabited by communities of diverse ethnic origins. Over the centuries of their existence, these Amazonian communities have put intricate schemes in place with the aim of regulating the use of the land that they hold in common as village collectives.

During the years preceding Suriname's independence from the Netherlands in 1975, the colony's Agricultural Research Centre carried out reconnaissance activities regarding the farming practices of forest communities in the *Binnenland*. These activities were followed by attempts to impose agricultural "modernization" and eventually by resettlement of African-descended forest communities

to make place for large infrastructural projects. After independence, this forced migration contributed to the War of the Interior ("*Binnenlandse Oorlog*") that raged the country between 1986 and 1992, and into the current gold mining frenzy (Lobach, 2023a).

The first section of this paper provides a brief historical overview of Suriname and its Amazonian communities. Based on the available literature as well as field observations and interviews, it presents the methods of shifting cultivation prevalent in Suriname, and discusses the relations that emerged between humans and leafcutter ants in this space. In a brief excursion to southern Brazil, it then describes how ant proliferation provoked a, sometimes contested, answer in the form of the development of chemical tools to eradicate them. Returning to Suriname, the second section of this paper centres on the Agricultural Research Centre of Suriname and two of its main experts, both firm believers in chemical eradication technologies. It shows how these two men were involved in projects nominally meant to mitigate ant proliferation, but which also had hidden objectives, eventually opening the way to end century-old systems of land management in the Surinamese Amazon. The conclusion explores how ant eradication projects acted as a precursor to advance the Enclosure of Surinamese Amazonian communities.

HUMAN–ANT INTERACTIONS IN SURINAME AND OTHER SOUTH AMERICAN FORESTS

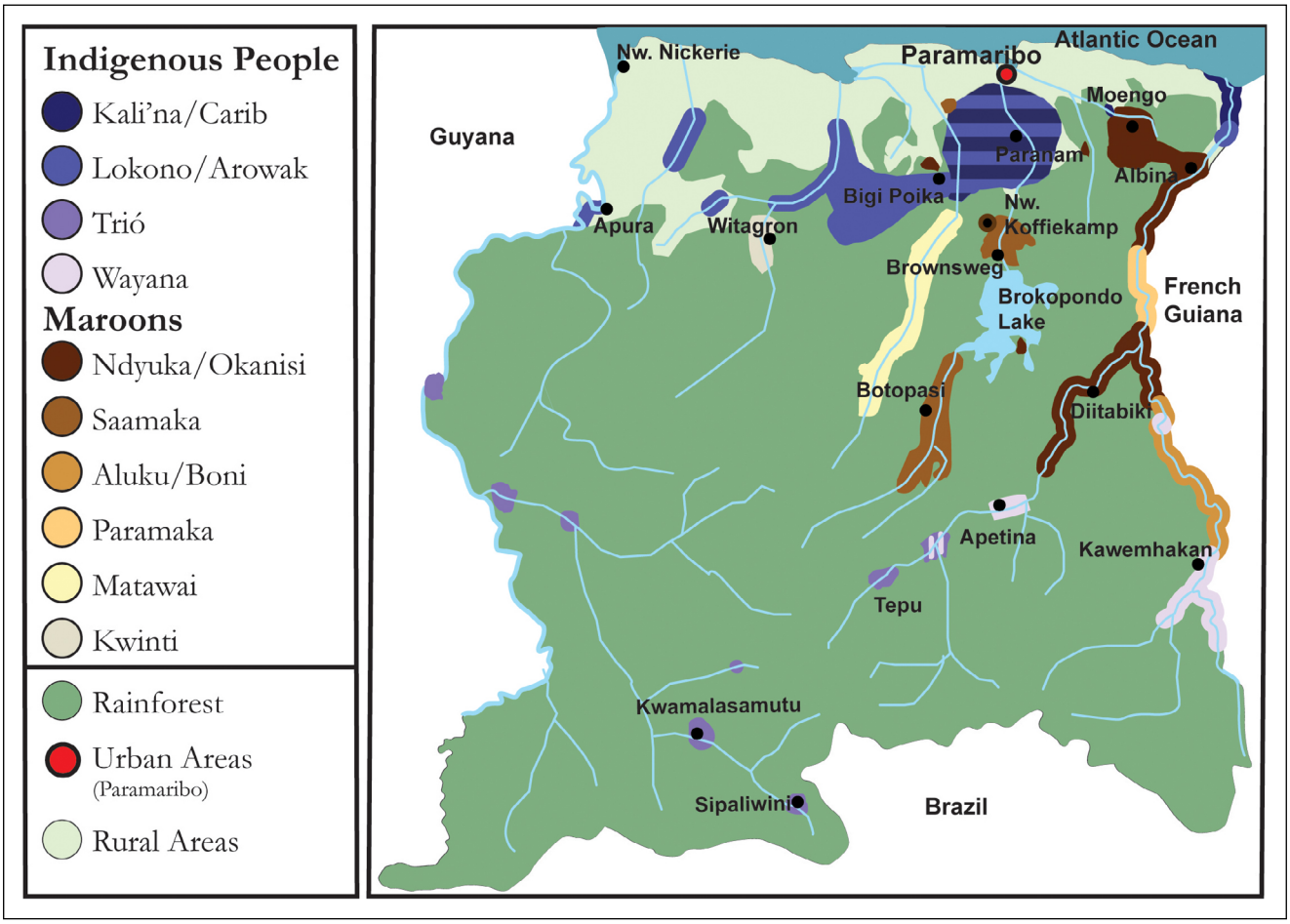
When the first European colonizers arrived at the 'Wild Coast' (as Suriname and its neighbours were called), this part of coastal Amazonia was inhabited by Arowak and Kali'na (Carib) groups. While certain communities (including the forebears of the present-day Wayana and Trió communities) lived off hunting and gathering in the Amazonian interior, the coastal area was home to a diversity of complex, sedentary societies (Rostain, 2008). Like elsewhere in the Americas, the arrival of Europeans led to the demise of many of these Indigenous communities, but some migrated away from the coast to settle in the forests at the margins of the emerging colonial society (including some of the forebears of the present-day Lokono/Arowak and Kali'na communities).

Suriname has been a Dutch colony since 1667. The export-oriented plantation economy was kept running by enslaved Africans, later followed by Asian contract labourers. The presence of the rainforest close to the plantations presented opportunities for enslaved individuals to flee their conditions. Fugitives from slavery, the so-called Maroons (or "Bush Negroes" in the colonial terminology), regrouped in the forest. As a result, several Maroon nations emerged in Suriname's interior, composed of formerly enslaved Africans who had learned to navigate their Amazonian environment with the help of local Indigenous communities. Numerous campaigns aimed to recover the fugitives were mostly unsuccessful, and in the 18th century, the different Maroon nations obtained, through a series of peace treaties, recognition of the territories under their control.

Maroons remain highly visible in Surinamese society today. In 2012, about 120,000 Maroons lived in Suriname (Menke, 2012), including 55,000 in their ancestral lands. While many have migrated to Paramaribo, French Guiana, or Europe, they continue to maintain a distinct cultural identity from coastal Surinamers of Creole, Asian, European, or mixed descent. The Indigenous population of Suriname still lives both on the outskirts of the coastal society and in the *Binnenland*, but these approximately 13,000 Indigenous Surinamers are heavily outnumbered by their Maroon neighbours.

Map 1 shows the living areas of the four remaining Indigenous nations of Suriname (Kali'na/Carib, Lokono/Arowak, Trió and Wayana), as well as the six Maroon nations (Ndyuka/Okanisi, Saamaka, Aluku/Boni, Paamaka, Matawai and Kwinti). These ten nations have for centuries resembled the "self-governing non-State spaces" described by Scott (2009) as "populations who live in the shadow of states but who have not been fully incorporated" (p. 325). The white areas on the map, except for the strip immediately parallel to the coast (which is where the country's capital, its permanent agricultural settlements, and most of its population can be found), are lands with no permanent human habitation.

Indigenous and Maroon farming is organized along similar land use systems. A fundamental "limiting factor" (Meggers, 1971) is the difficulty of maintaining the fertility of the sandy Amazonian soils of the *Binnenland*. To mitigate this challenge, communities of both ethnicities use slash-and-burn techniques and shifting cultivation. Under the most prevalent system, men are responsible for cutting down the biggest trees and burning the trunks and undergrowth, after which women plant crops such as cassava, rice and pumpkins on the newly opened plot. The charcoal from the burned forest provides enough fertilizer for a certain number of years, but once the soil fertility is exhausted, the plot is abandoned and a new plot cut open at a certain distance from the first. Forests are allowed to grow back on the abandoned plots, which can be reused after a given number of years. This use of "circular agriculture", managed out of sedentary villages, often obliges community members to walk considerable distances to tend to their land plots, or to set up temporary



Map 1 Communities of the Surinamese interior. Own elaboration, based upon: Heemskerk, 2009.

camps in their vicinity. Community members have detailed knowledge regarding the use history of different former and current plots existing in the wider area around their villages (Price, 2011; Duin, 2009).

But humans are not the only farmers of the Surinamese interior, nor were they the first. Leafcutter ants, comprising several species belonging to the genera *Atta*, *Acromyrmex* and *Trachymyrmex*, do not (like hunter-gatherers) feed directly on the leaves that they cut off plants. These ant species are not hunter-gatherers, but farmers: their diet is restricted to the only crop that their highly specialized guts can process: *Leucocoprineae* fungi. In a remote past, they may have found these fungi in the wild, but for the past 50 million years at least, leafcutter ants have lived in a symbiotic relationship with their fungi, which they plant, cultivate and tend to by themselves. In the current situation, neither the ant nor the fungus would be able to survive without the other (Hölldobler & Wilson, 2011).

For millions of years, leafcutter ants have carried pieces of leaves to their homes to fertilize their fungus gardens. Originally, ants in the Americas used material that they would just encounter lying around, such as vegetable debris, and small wilted plant remains. This continues being the case for several ant types, but around 10 million years ago, certain ant species (which are known in Suriname as *kumako*, *prasoromira* (parasol ant) and *wroko mira* (working ant) – names that may designate a number of related species, mostly *Atta cephalotes* and *Atta sexdens*) developed their mandibles up to the point where they were capable of cutting material (like leaves, stems, petals and flowers) directly from the living plants that form the Amazonian undergrowth. This "attine breakthrough" gave prominence to these species within local ecosystems. Relying on living plants in their territory, leafcutter ants concentrate the fertility of a large area in their antheaps (Hölldobler & Wilson, 2011).

The arrival of humans in the Amazon rainforest, occurring at least 12,000 years ago (Góes Neves, 2022), signified the end of leafcutter ants' position as the most complex societies in Amazonia. However, it worked to the ants' advantage that humans increased the area in the twilight zone at the forest fringes by establishing agriculture. In the dark space under the thick Amazonian canopy, undergrowth vegetation is scarce. When humans open up a part of the rainforest so that smaller plants can flourish, these new fringes provide ample low-to-the-

ground material for leafcutter ants to multiply quickly, while human hunting reduces the presence of animals predating on ants (such as the mammal bearing the self-explicatory name of anteater). Even if humans developed methods to slightly delay the arrival of leafcutter ants on their fields, such as using repellent plants (Posey, 1985) or crop layouts that redirected ants (Balée & Gély, 1989), humans were also drawn to antheaps, as they learned that abandoned antheaps concentrate nutrients (such as calcium, magnesium, potassium and phosphorus), while the ants' past excavation made soils easier to penetrate for the roots of fruit trees (De Carvalho Cabral, 2021). Certain Indigenous communities in the Brazilian Amazon have even been observed to deliberately add living ants to a mulch that they prepare for forest regeneration (Posey, 1985). As such, in the context of the shifting cultivation of Amazonia, attine and human agriculture came to be mutually beneficial.

In a 2021 conversation I had with the Kali'na Indigenous Surinamese author Reinier Artist (b. 1935), he explained this ant–human interaction as follows:

> "The ants are part of our existence; they are a precondition for our existence, but also a threat to our existence. Because the ants live off our gardens, they eat the young leaves so that we have less production. But on the other hand, says the Indian,[1] the ants are a necessary condition for the future, so that we remain inspired to open up new gardens, to keep moving, each time a bit further, so that the ants don't reach it – which isn't true, the ants do reach it, but as such we remain active as Indians. And ultimately, we discovered that the ants who ate our food, that we could eat them as well."[2]

Artist frames the arrival of ants not only as a threat to local communities' produce, but also as a factor that motivates communities to continue their shifting cultivation: to not overuse a certain land plot, but to keep moving and open new ones. Under this logic, Amazonian communities do not practice shifting cultivation because leafcutter ants oblige them to: the actual reason is the decreasing soil fertility. The ants act as a reminder, an indicator, of soil impoverishment, reminding humans that the time has come to move on. As such, leafcutter ants can be understood as making a positive contribution.

In the "enclosed" lands, among the people who cleared forests for large-scale, permanent, profit-based and export-oriented plantation agriculture, leafcutter ants were less popular. Based on a diversity of primary sources, historian Diogo de Carvalho Cabral describes in his paper on "human-ant negotiated landscapes" (2021) how 19th-century farmers in Southeastern Brazil were infuriated by leafcutter ants' apparent inability to distinguish between wild and cultivated plants, as they caused significant damage to several kinds of export crops, such as coffee. Cabral concludes that "humans have interpreted ants' foraging through linguistic conventions such as "theft" and "war"" and cites a physician who exclaimed that leafcutter ants seemed to interpret human crops "to be especially intended for their use", as if "the ants took humans for their servants" (De Carvalho Cabral, 2021, citing Nogueira Penido, 1858). As Cabral explains, leafcutter ants don't even particularly like coffee plants (caffeine hinders their fungus growth), but when humans cleared forests for monocultures, coffee became the only low-growing vegetation available, so that ants spread across plantations and became agricultural "plagues".

Despite warnings from thinkers like José Bonifácio de Andrade e Silva ([1821] 2013) that humans and ants were jointly turning forests into deserts, planters kept burning most of the Atlantic Forest to create monocultures, which in turn fuelled ant proliferation. In response, southern Brazil transformed into a laboratory for ant-control experiments, where European entomologists led eradication efforts while acknowledging that large-scale agriculture itself caused the ant problem. The German zoologist Hermann Eidmann (1897–1949), for example, observed that:

> "Human agriculture does not worsen the living conditions of the pest [the ants], but rather improves them. The leafcutter ant needs deep, heavy soils, exactly those that are also suitable for agriculture. She needs open terrain with sufficient root penetrations. Agriculture creates these conditions by removing the tropical forest and planting tree- and shrub-like crops. The constant renewal ensures a constant supply of young plants, which are particularly preferred by the pests [...]. A. sexdens is therefore a pronounced agriculture follower ("*Kulturfolger*"), and the agricultural development of South American states should by no means underestimate this challenge." (Eidmann, 1936, p. 264).

Eidmann (1936) outlined three types of approaches to eradicate leafcutter ants: i) "primitive" mechanical methods like digging out or flooding nests, or preventing young queens from founding new colonies; ii) the chemical methods that industries in various countries were developing, but which posed practical and safety issues, including for the human applier; and iii) biological methods targeting ants or their fungi, which Eidmann claimed had yielded no success. A few years earlier, however, his compatriot Johannes Wille

(1929) had been more optimistic, advocating for the use of chemical agents such as kerosene, potassium cyanide, and arsenic fumes.

In Suriname, it was the Agricultural Research Centre that would take the lead in projects to eradicate leafcutter ants from agricultural lands. This institution had since 1919 been led by Swiss botanist Gerold Stahel (1887–1955), one of the many Swiss biologists to take up leading positions in scientific institutions in Amazonia around that time (Sanjad & Güntert, 2015). Stahel had obtained a PhD from the University of Basel for his research on fungi (Stahel, 1911), which in that time was considered a subfield of botany. During his time in Suriname, he conducted research on the parasitic fungi that destroyed cocoa, rubber and banana plantations, before widening his scope to include microbiology and zoology (Reyne, 1955).

Stahel was missing an entomologist in his team, for which reason he had directed the younger Dutch biologist Dick Geijskes (1907–1985) to also obtain a PhD in Basel. After finishing his dissertation about the insect life in a Swiss creek (Geijskes, 1935), Geijskes moved to Suriname to join his mentor in the Agricultural Research Centre. His arrival coincided with widespread reports regarding damages caused by leafcutter ants to various crops, including Java cotton (*Ceiba pentandra*) and orange trees, especially in the coastal regions.[3] The challenge of eradicating these ants could potentially combine Stahel's old interest in fungi with Geijskes' expertise on insects (Stahel, 1938).

In 1940, the two men published a booklet titled *The Parasol Ants and their Mitigation* (Stahel & Geijskes, 1940a). In it, they described leafcutter ants' life cycle and the available methods for their mitigation (with water, carbon disulphide, or "other chemical means"). They did not limit themselves to the plantations along the coast, but also reflected about ant proliferation in the *Binnenland*, in passing proposing an explanation for their claim that leafcutter ants would target Maroons (whom they refer to as "Bush Negroes") more than Indigenous communities:

> "The Indians, the original inhabitants of this land, do not combat parasol ants, but avoid them. If their crops after 3–5 years suffer too much from these ants, they abandon their villages and gardens and erect a new settlement elsewhere in the primary forest.
>
> The Bush Negroes, on the other hand, have fixed settlements, with their gardens located around them. Every year, new gardens are opened, right next to the old or not very far away from them. As a result, they suffer more of the consequences of these ants than the Indians do." (Stahel & Geijskes, 1940a, p. 5).

This assessment may seem neutral, but the context that prompted the investigation, as well as the assumptions behind it, were less objective, as the next section will show.

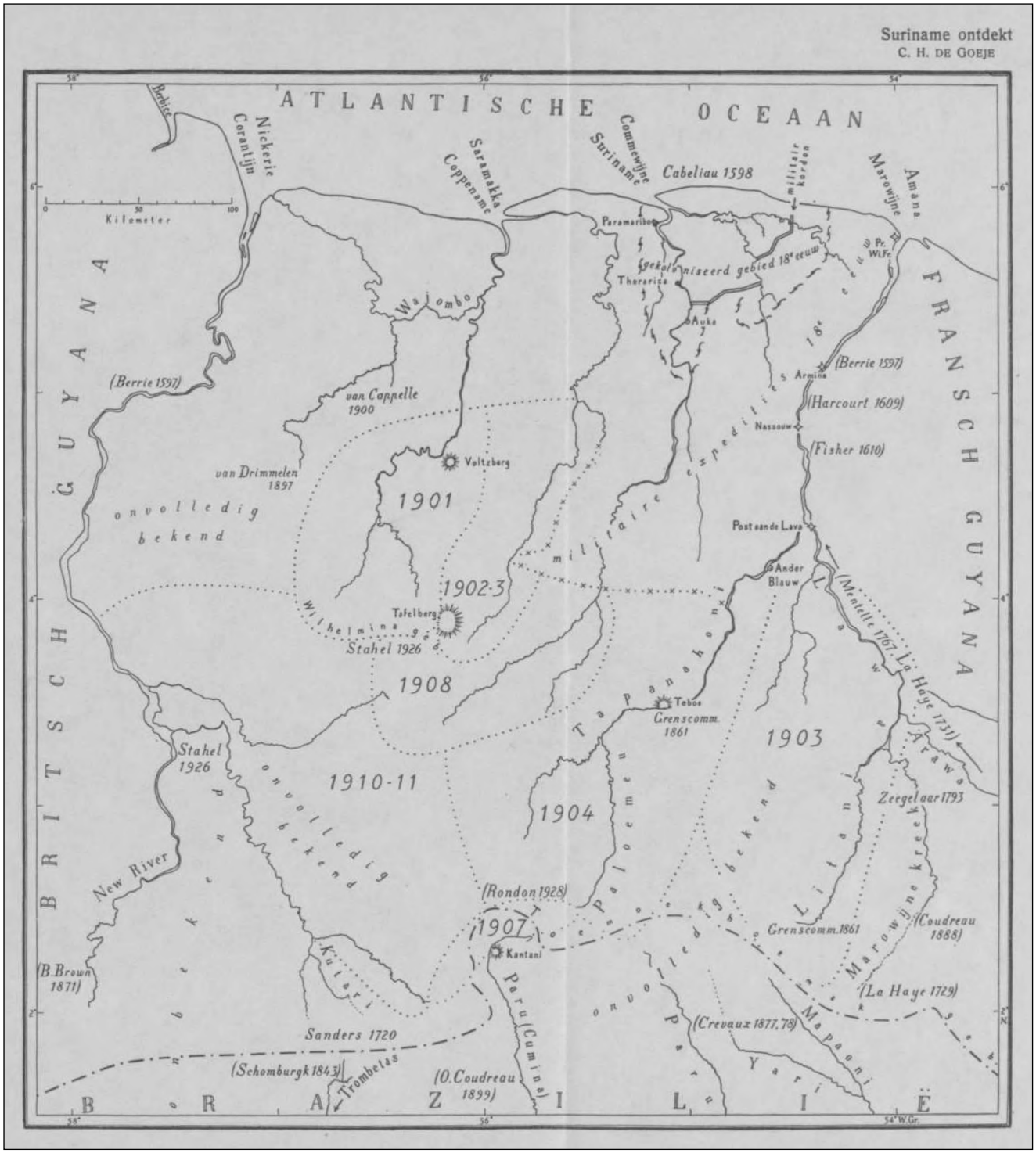
LEAFCUTTER ANTS AS LEVERAGE TO ENCLOSE THE SURINAMESE AMAZON

During his first years in Suriname, Geijskes was not only tasked with developing solutions to insect infestations. The colonial government of Suriname was attempting to increase the level of state control over the entire territory, and the Agricultural Research Centre was actively participating in the process. The watershed with the Amazon River basin was officially defined as Suriname's southern border, but Dutch colonial control was very limited outside the plantation strip along the coast. A map from 1934 (see Map 2) presented three quarters of the colony virtually as *terra incognita*, except for some names and years indicating spots reached by past Dutch, Brazilian and French expeditions (including one led by Gerold Stahel in 1926).

The colonial authorities had multiple reasons to increase their knowledge of the *Binnenland*. Firstly, several minerals had been discovered in the Surinamese interior, including gold in the 1880s (Van Lier, 1949) and bauxite in the 1910s (Lamur, 1983). Prospective miners interested in exploiting these natural resources depended entirely on Maroon helpers, who controlled the mineral-rich lands, decided whom they authorized to mine there, demanded a share of the profits, and were in charge of transporting miners to the sites (Scholtens, 1994). This frustrated colonial authorities and miners' collectives alike: Maroons were seen as "capricious" people, who were "bossing around in our upper rivers" (both cited in Lobach, 2023b).

No roads or waterways connected Suriname with Brazil, its southern neighbour, but the renowned Brazilian military explorer General Cândido Rondon (1865–1958) did conduct a "*inspecção de fronteiras*" (border inspection) from the south in 1928–30 (Cruls, 1938). With rising geopolitical tensions in the 1930s and Vargas's Brazil initially aligned with Nazi Germany, fears grew that Suriname's bauxite could serve Axis aluminium and aircraft production. This concern prompted the colonial government to tighten control over its little-known forest interior. Vice Admiral Conrad Carel Käyser (1876–1939) led a 1937–38 expedition to Suriname's southern border, which highlighted the need for detailed mapping of local Indigenous populations, especially communities moving between Suriname and Brazil (Duin, 2020; Van Lier, 1955).

The explorer and convinced Nazi Otto Schulz-Kampfhenkel (1910–1989), was known to also travel



Map 2 The colony of Suriname with limited information about the vast interior. Years and names indicate spots reached by earlier expeditions. Names and years on the lower half of the map mostly refer to explorers who reached Suriname's border from the Brazilian side. "onbekend" translates as "unknown", "onvolledig bekend" as "not fully known". Source: De Goeje, 1934, p. 82.

the border area, but from the Brazilian side. After seeing the documentary movie he launched about it (Glüsing, 2008), the Dutch government was left wondering about the German and Brazilian intentions on Suriname's southern border. It was concerned that the Wayana and Trió Indigenous populations of the border area would be coopted or instrumentalized for enemy activities. In this secretive context, scientific exploration of the border area by inconspicuous people like botanists and entomologists was seen as a strategy to gather military intelligence and information about these communities and their contacts. On that account, the Agricultural Research Centre got involved

in a series of trips to reconnoitre southern Suriname. When a Maroon with the name of Lodewijk Schmidt was sent to lead an Agricultural Research Centre expedition, the official purpose was to conduct ethnographic studies among the border communities, while posing as a Maroon trader. In reality, however, he had been given secret instructions to investigate any German or Brazilian activities taking place in the border area (Duin, 2020). Other expeditions were conducted by Geijskes, who had to quickly become an ethnologist of sorts, without any formal training in that discipline. His first such assignment came in 1939, when he was sent to a Wayana community near the Brazilian border, officially to collect plant and animal specimens.

In his travel diary, published much later (Geijskes, 1957), Geijskes describes how he travelled up the Maroni River to the Wayana lands at the Lawa River, close to the Brazilian border. As can be seen on Map 1, such an expedition first crosses the lands of Ndyuka, Paamaka, and ultimately Aluku Maroons. Geijskes was not alone: like today when travelling the Maroni River, all logistics (including muscle power to row and carry boats, luggage and supplies past the many waterfalls) were taken care of by Maroons. In his diary, Geijskes showed himself impressed with the Maroons' physical strength and knowledge of the terrain, but also often condescending and mildly entertained with their culture and customs. When the expedition eventually reached Wayana lands, Geijskes to his dismay found several villages almost deserted, as many inhabitants had travelled to goldmining sites in Maroon-controlled areas. Geijskes particularly noted the prevalence of leafcutter ants in the deserted villages: "they now have free rein" (Geijskes, 1957).

While collecting information about Maroons was not the purpose of his trip, Geijskes wound up spending quite some time in the company of Maroons and crossing Maroon lands. His travels convinced him that an essential distinction existed between Maroon and Indigenous societies. For Geijskes,

> "the Bush Negro is a trader, not an agriculturalist, and on top of that lazy and boastful. He buys everything that looks useful and nice, even if his own environment could provide him with as good an alternative" (Geijskes, 1957, p. 290).

Furthermore, he accused Maroons of corrupting their Indigenous neighbours by giving them access to "the conveniences and pleasures of civilization", bartering 'coastal' goods with them at disadvantageous terms, or employing them in goldmining operations. From his few encounters with Wayana Indigenous people, Geijskes concluded that:

> "The Indians form much more [than the Maroons] a forest people, living according to what their forest environment has to offer them. The Indian's demands are therefore moderate, his needs limited. People are living here, more than the Bush Negroes, in a communist state in the best sense of the word" (Geijskes, 1957, p. 290).

In October 1939, just months after his first expedition to southern Suriname, Geijskes returned to the border area – but this time the journey took hours instead of weeks. The KLM Fokker high-wing monoplane "De Snip", with both Stahel and Geijskes on board, attempted several landings in a Trió Indigenous village in the Sipaliwini savannah, but the terrain proved too rugged, so the plane returned to Paramaribo, the capital city of the colony. During the flight back, the two biologists observed the string of Maroon villages along the Suriname River. Comparing the Indigenous settlement in the savannah to the Maroon villages in the forest, Geijskes wrote in his journal: "There: harmonious adaptation to nature, here: the most reckless destruction of the forest". In Geijskes's assessment – made from an altitude too high to spot any insects – Maroons and leafcutter ants were jointly responsible for deforestation:

> "In between is a vast area of desolate, exhausted land, where the parasol ants and the Bush Negroes make sure that an adequate reforestation will be impossible" (Stahel & Geijskes, 1940b, p. 446).

Years before Geijskes's arrival, Stahel had studied both Indigenous and Maroon farming and noted only a small difference: "Bush Negroes" used each plot for one year and left it fallow for eight, while Indigenous people cultivated for two years, maintaining first- and second-year plots to avoid total crop failure (Stahel & Müller, 1933). After Geijskes joined the Agricultural Research Centre, his ideas about "deep" distinctions between the two groups may have influenced Stahel. In a 1944 publication, Stahel framed each group's agricultural methods as an essential feature of that community's ethnicity. To make this point (which I call his "essentialist hypothesis"), he provided his readers with a short history lesson. According to him, medieval Europeans once practiced similar shifting cultivation similar to Maroons' today. But as population pressure grew, Stahel continued (conveniently skipping over a few centuries), Europeans began using guano, fertilizers, and more efficient crop selection to reduce the amount of land needed for every mouth to feed. Stahel noted the absence of similar innovations occurring among the Maroons of Suriname, and blamed this "inefficient agriculture" on their African origin:

> "When the European powers starting founding colonies in Africa, they found numerous independent tribes who were constantly at war with each other, and thus prevented population growth. In spite of their wasteful agricultural practices, there was always a wealth of highly fertile forest land to build their gardens. Under European oversight, these wars came to an end and also the slave trade was stopped. As a result, the local population grew rapidly with the result that some regions are now overpopulated and diseases are taking the upper hand. Would these Negroes implement thrifty agricultural practices and use green manure, they would have enough arable land at their disposal for decades. [..] While thus in other places necessity has obliged people to use improved methods to increase the productivity per hectare, the Negroes in Africa react to the same necessity by moving elsewhere or by accepting hunger and shortage." (Stahel, 1944, pp. 3–6).

Stahel seemed to believe that the size of human populations in Africa was kept stable through violence and enslavement (factors he described as originating from within these communities and never imposed upon them). Stahel argued that in the absence of external constraints, African communities inevitably expand and start destroying their environment. Seeing Suriname's Maroons as Africans rather than Amazonians, he attributed their "wasteful" farming to inherited habits. The key difference between Maroon and Indigenous practices, he claimed, lay in how each understood leafcutter ants:

> "Based on centuries of experience, the Indians know exactly how the main enemy of agriculture in tropical America, the parasol ant, can be controlled, or actually, avoided." (Stahel, 1944, p. 3).

In short, Stahel believed that Indigenous people practiced shifting cultivation rationally (to avoid the proliferation of ants), whereas Maroons "accepted hunger and shortage" and only "moved elsewhere" once they had, with their attine accomplices, transformed their lands into barren deserts. For Stahel, the answer to this challenge was ant eradication programmes, allowing Maroons to use the same land plot year after year without needing to roam around in the forest opening new swiddens.

Stahel and Geijskes' analysis of soil impoverishment and ant proliferation around Maroon villages was not entirely wrong. Both phenomena may have been widespread in the 1940s and 50s, but without any relation to essential "African" or "Indigenous" character traits. A more likely explanation is that fallow periods shortened as rising food demand – caused by population growth, itself driven by improved health services for Maroon communities – increased pressure on the land. This did not occur among Indigenous groups in the colony's interior, where medical care was largely lacking and population densities remained low (Lobach, 2023b).

Stahel and Geijskes could easily test their "essentialist hypothesis" as a control group was available: the Indigenous communities close to the coast, like the Kali'na. Even though ethnically Indigenous, their ecological circumstances and challenges were very similar to the Maroons'. Therefore, if the same problems of soil impoverishment and leafcutter ant proliferation would also occur in their communities, this would falsify the "essentialist hypothesis". And indeed, when Geijskes visited the Kali'na village of Bigi Póika in 1950, he observed that the community faced the same problems as the Maroon settlements: population growth, shortened fallow periods, more land in use at the same time, ant proliferation, and soil impoverishment.[4]

Bigi Póika was also the village of origin of my Kali'na interviewee Reinier Artist. During our conversation about farming systems in the village, I asked him about this time period in the 1950s, when the villages were becoming too populous and fallow periods could no longer be respected. "Over a 30–40 year period", Reinier replied, "a village shifts a bit, to be closer to the gardens. A village can hold up to 500 people, otherwise you get problems with your gardens. In Bigi Póika we almost had that problem, being almost 500 people. So we had to start talking, maybe some people should move to a place a bit further away."[5]

His recollection shows that the Indigenous solution for the overpopulation problem would be to split the village in two – which was indeed a possibility, since Bigi Póika, unlike most Maroon villages, bordered stretches of rainforest land uninhabited by humans. But the Agricultural Research Centre had a different solution in mind – primarily because it did not frame the problem as soil overexploitation, but as ant infestation. When Geijskes and his team visited Bigi Póika in 1950, they argued that the ant infestation was:

> "such that their eradication with carbon sulphide would require an amount superior to 1000 guilders. We thus concluded that eradication on such a scale would be undoable, given that the gardens are located so far apart. Some gardens lie at half a day's canoeing distance. The Indians were therefore advised, like has happened elsewhere, to concentrate their gardens. Once that is done, the government can give them support."[6]

Geijskes's solution for leafcutter ant proliferation in this Indigenous village was to concentrate the community gardens immediately around the village, and to subsequently support the villagers with chemical ant eradication methods – the same procedure that the Agricultural Research Centre had also recommended to Maroon villages. Referring to these efforts by another employee of the Centre (botanist Heinrich Heyde – 1921–1993), the Surinamese press noted that in the Maroon village of Ganzee:

> "the gardens are very scattered, sometimes at one day travelling distance from each other. The flat-out rejection by the conservative inhabitants and village board of Ganzee of the proposal to abandon the circular agriculture system and to cut open a large open field instead, showed how Mr. Heyde has not been very successful yet".[7]

These fragments show how the Agricultural Research Centre saw the shifting cultivation system as the problem causing soil overexploitation, and proposed a concentrated agriculture system as the solution – which, in practice, equalled the replacement of the common land use systems in place by effective "Enclosure" of community lands. This suggestion was made regardless of whether the inhabitants were Indigenous or Maroons, in spite of the "essentialist hypothesis" that leading representatives of the Centre voiced in their publications. Officials from the institution knew that this concentration of agricultural land would make these villages even more vulnerable to leafcutter ants, but they planned to simultaneously provide them with the chemical tools to mitigate the insects. As such, they overlooked that the ants were only the symptom, not the disease. Even if chemical means would allow communities to combat leafcutter ants on permanent agricultural plots, the problem of soil fertility loss over time could only be mitigated with an ever-increasing use of fertilizers – which is how the proposals made by the Agricultural Research Centre would make Indigenous and Maroon villages dependent on farm chemicals.

Bigi Póika's overpopulation problem was solved in the end, as Reinier told me, but without splitting the village in two, and without ending the shifting cultivation system through Geijskes' concentration and ant eradication proposal. Bigi Póika's population eventually started declining because people started moving to Paramaribo after a road was constructed that linked their village to the capital. This road is central to Reinier's story for several reasons: his father died in 1960 while helping build a bridge for it (Artist, 2016).

The Agricultural Research Centre saw the migration of Maroons and Indigenous people to the coast as a potentially positive development, as the plantations along the coast were in need of workers. The Creole and Asian-descended Surinamers who had once harvested coffee, sugar and bananas there were moving to Paramaribo at unprecedented rates. Many solutions had been proposed, including an obscure 1947 plan to turn Suriname into a refuge for European Jews,[8] but Stahel looked for nearer-by solutions. After presenting some calculations regarding the forests that "Bush Negroes" were transforming into an "ant shrubland", the population growth to be expected among the Maroons given their sexual "morals and habits", and the number of them who would flock to the cities, Stahel revealed his simple solution: bring the Maroons to the plantations! With this proposal, Stahel showcased a lack of sensitivity, as Maroon's autonomy and their history of having fled the plantations a few centuries earlier were basic constituents of their identity. Stahel saw this differently and concluded that a controlled resettlement of Maroons to coastal plantations would allow them to "stop being Bush Negroes and parasites in our country" (Stahel, 1944, pp. 20–28).

Stahel's so-called "Coronie Plan" was never executed, but many Maroons ended up being forcibly resettled nonetheless. In 1964, an enormous hydroelectric dam blocked the Suriname River to generate the necessary electricity to transform bauxite into aluminium, a fundamental component of Suriname's industrialization plans with which it hoped to become prosperous and independent. Geijskes was hired to provide an ecological impact assessment for the project that would flood 1,500 km^2 of tropical rainforest. 5,000 to 6,000 Maroons were driven from their homes, including the inhabitants of the village of Ganzee. They were resettled in the overcrowded so-called "transmigration villages", where competition over land and forest resources made the old models of shifting cultivation impossible. Several decades of civil unrest followed, culminating in the War of the Interior (1986–92), which created lasting animosities between Maroon communities and Surinamers "from the coast". Today, Maroons are mostly active in the gold mining sector (Lobach, 2023a).

CONCLUSION

Multispecies approaches to history have expanded considerably in recent years (e.g. Bartoletti, 2022). Scholars like Lowenhaupt Tsing et al. (2019) encourage us to critically examine how relationships between humans and

other species are structured, to reveal their full complexity and unexpected linkages. As this paper shows, interactions between leafcutter ants and local communities are more nuanced than a simple winner-versus-loser dynamic, and even the idea of leafcutter ants being "plagues", "pests" or "parasites" is unsatisfactory. Instead, leafcutter ants can be interpreted as performing a positive role, as participants in the common land use systems managed by traditional communities in the Surinamese Amazon. For centuries, Indigenous and Maroon communities in the Surinamese Amazon managed soils and biodiversity as common resources, developing rich knowledge of how ants could be both threats and allies in soil fertility management.

This article has assessed the Agricultural Research Centre's involvement in ant eradication from the perspective of a common–enclosure dialectic (Jeffrey et al., 2011). The Centre's efforts, packaged as scientific expeditions to "discover" the *terra incognita* of the colony's interior, were also meant to increase government control over the interior of the colony and its populations. Speaking from a position of power and imagined superiority, scientific colonial actors, like the Agricultural Research Centre, suggested that local communities should abandon their unwritten methods of common resource management, deemed to be irrational.

Even if officially framed as ant eradication, the idea of centralizing agricultural plots around villages was an ill-concealed attempt to end the shifting cultivation methods within a commonly managed forest and to replace them with an "enclosed" system, in which agricultural plots were centralized and belonged to a single household. From the colonial perspective, such an "enclosure" of lands also had another advantage: the freeing up of large tracts of Amazonian lands for mining and infrastructure, and the transformation of Amazonian peasants into agricultural labourers for the dwindling plantation economy.

Amazonian communities resisted the proposal to "enclose" their commonly held lands, as they knew it would lead to diminishing returns or eternal dependence on chemical fertilizers. Their reluctance was framed by the Agricultural Research Centre as an innate desire of certain communities to transform forest resources in barren "ant shrublands". In this process, the reduction of leafcutter ants to "pests" or "parasites" was extended to equally depict, in similar terms, the human communities that coexisted with them. This insect-based stereotype decisively advanced the marginalization of Maroon communities who were believed to be, like ants, destructive or even parasitic in their essence. This imagery of humans and ants cooperating in a suicidal attempt to destroy their natural environments turned out to be a critical strategy to justify the dispossession of common lands, to the benefit of large infrastructural and mining projects.

NOTES

1 As per the terminology used by the interviewee, himself an Indigenous Surinamer.

2 Interview with Reinier Artist on 10 August 2021 in Oegstgeest (Netherlands). All translations are the author's.

3 "Kapok en parasolmieren", in: *De Banier van Waarheid en Recht: Surinaamsch Nieuws- en Advertentieblad*, 21 March 1936.

4 "Poika moet concentreren", *Het Nieuws*, 5 September 1950; and "Naar Bigi Poika", *De West*, 16 October 1950.

5 A similar process by which ants were a decisive factor in the process by which Amazonian communities would eventually split up into multiple villages has also been described by De Fautereau (1955).

6 "Poika moet concentreren", *Het Nieuws*, 5 September 1950; and "Naar Bigi Poika", *De West*, 16 October 1950.

7 "De landbouw op het dorp Ganzee", in: *De West: Nieuwsblad uit en voor Suriname*, 4 October 1951.

8 *Rapport over de mogelijkheid van kolonisatie van Joden in Suriname*. Report commissioned by the States of Suriname. Dutch National Archives, Collectie Drukwerk, Inventory number 10451.

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The author has no competing interests to declare.

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