Jews and Climate Science in Palestine, 1897-1948



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To Benjamin

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Short Abstract

My doctoral project is situated at the intersection of modern Jewish history and the history of Zionism, climate and environmental history, the history of knowledge, colonial history and transnational history. It focuses on Jewish experts who examined the ramifications of climate on the success of the Zionist project in Palestine from the establishment of the Zionist Organisation in 1897 to the founding of the State of Israel in 1948.

Through the prism of climate, I explore processes of knowledge production that took place within Jewish and Zionist thought in the fields of medicine, science, and technology. By doing so, I also explore the political, social and cultural ideas and conventions that have constructed and informed professional and popular knowledge concerning climate. This knowledge developed partly in relation to existing Western scientific and colonial ideas and practices. However, Zionist knowledge about climate also contained a variety of cultural perceptions which were unique to Jewish history and identity and reflected a long tradition of awe and wonder towards the Land of Israel. It is through the examination of this complex combination of ideas and practices that I propose a new – spatial and environmental – perspective on the evolution of a modern Jewish national, racial and cultural identity.

Long Abstract

This thesis focuses on the ways in which climate was imagined, understood and managed by Jewish European settlers in Palestine from the formation of the Zionist Organisation (ZO) in 1897 to the establishment of the State of Israel in 1948. Through the lens of climate, I examine the ways in which Jewish experts and laypeople, mostly coming from a Central European academic and cultural background, transported knowledge to a space within which their expertise allowed them to participate in a colonial development project which was also a cultural project of settler nation-building.

Historians agree that the history of the Jewish national movement began not only with the movement possessing little knowledge about the natural and social conditions in Palestine itself, but also with little experience of how a national identity could be constructed in relation to nature. Indeed, Zionist approaches towards the climatic conditions in Palestine were not always consistent. On one hand, the aim of establishing a settler nation was based on a romantic belief in an autochthonous belonging to the land. Thus, at the turn of the twentieth century many Zionist leaders and thinkers attempted to highlight what they perceived as the 'natural' relations between the Jewish people and the environmental conditions in Palestine. On the other hand, following the actual encounter of Jewish settlers with the natural realities of Palestine and especially after the establishment of the British Mandate and the emergence of the Arab-Jewish conflict, discussions on climate gradually lost their romantic attributes and instead became increasingly associated with colonial scientific ideas on the perceived dangerous implications of non-temperate climes on European bodies and minds.

In my thesis, I argue that the varying approaches of Jews to climate in Palestine reflected not only their transition in space which resulted in their encounter with a new and unfamiliar physical reality, but also their transition between old and new political, social, cultural and racial identities. In other words, while in Europe Jews perceived themselves – and indeed were perceived by others – as an Oriental minority in the Occident, their attempts to obtain a non-European territory led them to see themselves as an Occidental minority in the Orient.

Although the existing literature on the formation of the Jewish community in Palestine is quite abundant, until recent years environmental issues have received little attention with climatic issues generally being neglected. This thesis is, therefore, the first major study examining the ways in which climate was perceived and contended with by Jewish settlers in Palestine. In addition, existing studies conducted on Zionist environmental history in Palestine often refrain from using the colonial analytical framework. In so doing, these studies overlook a decisive element which influenced the Jewish settlement project and its relation to the environment in Palestine.

In contrast, environmental issues, and especially those related to climate, have received substantial attention in studies of colonial history. Specifically, historians often understood the encounter of Westerners with new and unfamiliar climates as the first step in environmental transformation and as a cause for the emergence of new scientific paradigms which subsequently impacted ideas on race and medicine in the colonies as well as in metropoles. By drawing from approaches honed by historians of colonialism for the first time in this context, my thesis offers a more thoroughly historicised rethinking of the early Zionist relationship with the environment of Palestine.

The main scientific disciplines that dealt with the question of climate in Palestine were climatology and meteorology, medicine and race sciences, botany and agriculture, and architecture and planning. Experts in these fields oversaw the management of health, food, housing and productivity which were perceived as indispensable elements for the establishment of a sustainable colony. These are also the disciplines at the heart of this investigation. In addition, I examine general popular perceptions concerning climate among Jewish European settlers, thus discussing in tandem the cultural construction of expert knowledge as well as the interchange between professional and popular discourses.

My thesis is divided into two main parts. The first part, entitled 'Distant Gazes', focuses on the role of climate within Jewish and Zionist intellectual and scientific discourses before the Zionist colonisation of Palestine and during the first decades of the ZO. This section aims to contextualise Zionist notions of climate within a larger European tradition and specifically in relation to its colonial heritage which was intrinsic to the general development of climate research.

Chapter One, 'Climate and the Jews: An Intellectual History', provides an introduction to climate theory and its evolution from the eighteenth century to the beginning of the twentieth century. This theory, which was strongly connected to European encounters with new geographies and unfamiliar environments, aimed to explain the existence of a variety of indigenous ecosystems and people through the different climates they inhabited.

Fredrick Cooper and Ann Stoler claim that modern Europe was formed by its imperial projects, just as various colonial realities were shaped by events and conflicts in Europe itself. Thus, starting from the eighteenth climate theory began to be utilised to explain the physical and mental traits of Jews – Europe's internal Other.

Simultaneously, European Jews also began to use climate theory in order to discuss their own identity and race while advocating diverse and sometimes contradictory ideas concerning the desired future and destiny of European Jewry. Those who wished to stress the potential feasibility of Jewish emancipation and integration in Europe usually argued that because Jews shared the same climate as Europeans, their constitutions were absolutely identical. Others viewed climate as a source of Jewish dissimilarity to Europeans and employed it to justify Zionist ideology. Influenced by European nationalism and Romanticism, nineteenth-century Jewish intellectuals and race scientists utilised climate theory to stress the so-called organic link between Jews and the natural conditions in Palestine. According to them, the Jewish people was created in Palestine and thus its 'return' to the biblical homeland would match its physical and moral traits.

Whereas the first chapter of this thesis focuses on the intellectual aspects of climate and race discourses, the second chapter, 'Knowing Climate', examines the science of climate investigation itself – mainly in the fields of climatology and meteorology – and its colonial aspects, specifically in the Jewish-Zionist context. Bruno Latour writes that the only way to understand the reality of science studies is to follow what science studies do best, that is, to pay close attention to the details of scientific practice. Thus, the aim of this chapter is to follow processes of knowledge production on climate as distinct from their subsequent utilisation in other fields of expertise.

During the nineteenth century, data on climate was collected by a large number of experts with diverse interests. In this chapter, I analyse Zionist climate investigations in Palestine as well as in other destinations considered for Jewish colonisation during the first half of the twentieth century. I demonstrate that, before 1918, climatological and meteorological investigations had relatively little impact upon the practical

decision making within the ZO. Rather, the importance of climate research during this period resided in its capacity to present the ZO as an entity that possessed the requisite knowledge to pursue a rational colonisation enterprise. It was only after the mass Jewish colonisation of Palestine became a reality, following the Balfour Declaration that this scientific discipline became truly relevant to examining the potential success of the Jewish settlement project.

Besides climatology and meteorology, which were intrinsically occupied with the investigation of climate, other scientific fields that were significantly engaged with this subject in Palestine were medicine, botany and architecture. Thus, the second part of my thesis, 'Confronting Climate in Palestine', deals with the role of climate within the aforementioned fields of expertise. While this part of the thesis includes scientific approaches to climate in Palestine under Ottoman rule, its main focus is on the British Mandate since it was during the latter period that these fields of expertise began to develop in earnest.

Chapter Three, 'Agriculture, Botany and Climate', presents the ways in which local climate in Palestine was understood and managed by British and Zionist agricultural and forestry experts. Planting trees and forests in Palestine was viewed as a way of improving the air quality, increasing rainfall and lowering average temperatures. This notion, which has been ingrained in Western traditions since antiquity, asserted that deforestation was responsible for the evolution of warm climates while, conversely, forestation generated cool climates.

In Palestine, however, the link between climate and forests received an additional local interpretation. Improving climate through afforestation was related to the Edenic image of the country in the Judeo-Christian tradition, which according to the British and Zionists, needed to be restored. The discrepancy between the imagined

biblical land ('the land of milk and honey') and its disappointing present-day reality became an important subject of scientific examination and an incentive for afforestation. The chapter also focuses on the transfer of forestry and agricultural ideas and practices as well as the transportation of seeds and plants between different colonial or 'modernising' contexts and their reception in Palestine.

Zionists believed that the successful acclimatisation of crops required knowledge and experience but more importantly they also thought it required the use of advanced technologies which made it less vulnerable to local constraints. Thus, this chapter also examines the irrigation solutions which were introduced into Palestine during the first half of the twentieth century as a response to its climatic challenges. It also stresses the important role of irrigation in enhancing the materially and conceptually imbalanced power relations between Jews and Arabs in Palestine, reflected in their access to and utilisation of water.

Chapter Four focuses on climate and medicine in Palestine. European colonialist usually tied to maintain and protect their own health in the colonies while aiming to 'cure' indigenous populations from various local disease. In the Zionist context, however, it was the Jewish colonists who were considered in need to be cured first. This resulted from their perceived position as racially inferior to non-Jewish Europeans. Yet, at the same time, Zionist physicians also stressed the necessity of protecting themselves from the local climate as they gradually came to perceive themselves as superior in relation to the indigenous people.

Zionist medical interest in climate mainly manifested itself in two medical branches – tropical medicine and medical climatology. Tropical medicine concerned health issues that were associated with tropical and subtropical regions and was usually based on 'Mansonian' medicine, typically defined as the research of vector-borne

parasitic diseases. Medical climatology, on the other hand, concerned the various physical and psychological effects of general climatic and weather factors on human beings. In their research, Jewish physicians in Palestine conducted experiments that were designed to examine whether and how local climate would affect the physical and mental nature of the Jewish body. At the same time, they aimed to find solutions to counter the climate's perceived ill effects. These solutions mainly concerned hygienic practices and were designed to instruct the population on how to live, how to dress and what to eat and drink.

However, medical concerns about the effects of climate on Jewish European bodies were not unique to physicians. Jewish architects similarly devoted considerable thought to questions of climate and health in planning residential buildings. 'Healthy houses', 'healthy streets' and 'healthy cities' were commonly used terms in relation to climate in architectural professional publications. Therefore, in Chapter Six, 'Architecture and Climate', I present and analyse the various solutions proposed by architects to alleviate the heat within the built environment in Palestine. In so doing, I refer to urban planning and the architecture of residential spaces, while also discussing technical considerations such as building materials and roof shapes.

Today, climate and especially climate change have become central issues. However, before the cultural and political dimensions of this new condition can be truly understood, a fuller investigation of the history of human conceptions of climate is required. Hence, this study aims to answer questions such as: how have people perceived and experienced climate in the past? And how have notions on climate been established by scientists and laypeople?

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List of Abbreviations of Archives

BAA – Beit Aaronsohn Archive

CAHUJI – The Central Archives of the Hebrew University of Jerusalem

CZA – The Central Zionist Archives

GSJHA – The German-Speaking Jewry Heritage Museum Archives

HHA – Haganah Historical Archives

ISA – Israel State Archives

LBICJH – Leo Baeck Institute in the Center for Jewish History

TNA – The National Archives (United Kingdom)

List of Abbreviations

CEP – Committee for the Exploration of Palestine

DCA – Department of Civil Aviation

GPA – German Palestine Association

JCA – Jewish Colonisation Association

JNF – Jewish National Fund

MRU – Malaria Research Unit

PEF – British Palestine Exploration Fund

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Introduction

People's comfort, their strength to work, and their health all depend on climate. This opinion is accepted by all. Directly and indirectly climate can also determine the faith of men. Climate regulates the quality of the soil, vegetation, and of course agriculture. Much of the economic condition of a society depends on it, its cultural level and political strength. In fact, it seems that all developments of a nation are bound up with climate.[1] (Jacob Seide)

Concepts of Climate

This thesis focuses on the encounter of Jewish European settlers with the unfamiliar climate of Palestine[2] and the ways in which it was imagined, understood and managed by experts and laypeople starting from the establishment of the Zionist Organisation (ZO) in 1897 to the founding of the State of Israel in 1948.

Contemporary discussions on climate are often associated with the discourse of climate change and its scientific, political, economic and ethical implications. However, as historian Mike Hulme writes, before the cultural and political dimension of climate change can be truly understood a fuller investigation of the history of human conceptions of climate is required. In this context historians ought to ask how have people perceived and experienced climate in the past? And how have notions on climate been established by scientists and laypeople? [3]

[1] Jacob Seide, *Briut Ha-Am: Ha-Teva, Ha-Aklim, Ve-Ha-Briut Be-Yisrael* (Jerusalem: Reuven Mas, 1954), 22.

[2] In my thesis, I use the term Palestine to refer to the geographical region that throughout different periods in history is included in what is today's Israel, the West Bank, the Gaza Strip, and in some definitions, parts of western Jordan. This region consisted mostly of the territory historically referred to as the Land of Israel or the 'Holy Land'. Indeed, the boundaries of this region and its name have changed throughout history. The name Palestine was used by the ancient Greeks and Romans. The Ottomans named provinces in the Empire after their capitals. Thus, during the Ottoman period, this geography was no longer called Palestine. However, the name continued to be used unofficially. Although Jewish settlers occasionally referred to this geography as Palestine, they usually preferred calling it by its Hebrew name – *Eretz Israel* (the Land of Israel). The name Palestine was officially revived with the establishment of the British Mandate. My choice to refer to this geography as Palestine throughout the period addressed in this study is aimed to facilitate a coherent discussion and is not meant to undermine the differences between the distinct periods and administrative rules in the land.

[3] Mike Hulme, *Weathered: Cultures of Climate* (Los Angeles: Sage Publishing 2017), xii.

Typically, historical narratives of climate do not only refer to the dimension of time but also to the dimension of space. While time and space can be interpreted in numerous ways in relation to the history of climate, this thesis focuses less on changes in climate over time and more upon changes in the ways in which it was perceived. Moreover, this study places its emphasis on the transfer of peoples between different climatic spaces which stimulated fundamental disputes about the human ability to adapt to new climates; about the understanding, predicting and even taming of climatic phenomena; and about the relations between climate and culture, politics and economy.

Despite the centrality of climate to human history and our recent fascination with it, climate tends to receive relatively little attention in general historical accounts. Nevertheless, climate not only affects those who depend on it for a livelihood such as, for example, farmers, pilots and sailors. It affects entire populations. It influences the way we dress, what we eat, and how we feel, and it is an integral part of our social practices, symbolic rituals, emotions and identities. As a concept, climate also helps humans mediate between the experience of ephemeral weather and a sense of stability in daily life. As Hulme puts it, the weather humans experience often fails to meet their expectations, but the fact that people do have these expectations is attributable to the idea of climate. Climate introduces a sense of cohesion and normality into what otherwise would be a chaotic and disturbing experience. Holding on to climate as a normalising idea offers humans a certain sense of security.[4]

This kind of security was traditionally obtained in native societies through collective sentiments concerning climate which had accumulated over decades and centuries and reflected remembered experiences of the weather phenomena in specific times and places. Anthropologists Zali Gurevitch and Gideon Aran claim that native

[4] Ibid., 4.

people tend to maintain 'a practical overlap between *the place* in the physical sense […] and *the Place* as a world of meanings, of language, memory and faith'.[5] Contrary to native cultures, settler societies often experience a breach between the physical *place* and the *Place* of meaning. Indeed, Jewish settlers who arrived in Palestine from the late nineteenth century onwards usually lacked a collective sentiment of climate within this geography. Hence, scientific investigation turned into a central tool through which to become familiarised with the local environment and climate.

Nevertheless, as I demonstrate in this thesis, Jewish accumulation of knowledge concerning climate in Palestine was not entirely based on 'pure' scientific investigation nor was it detached from climatic sentiments – imagined, foreign and distant as they were. As historians of nationalism have demonstrated, the consolidation and evolution of national identities are prolonged and intricate processes, which include, among other things, the creation of collective narratives to describe the history of a nation as well as the link between the nation and the territory that it claims. Territory, landscape and the natural environment are essential components of national identity. They provide the nation with boundaries; they are perceived as the nation's habitat and they offer the nation a backdrop for both real and imaginary historical scenes.[6]

On encountering the environment in Palestine, Jewish settlers evoked and constructed collective sentiments that would assist them in confronting the alien reality of their new homeland. These collective sentiments (or ways of thinking of climate) can be divided into three forms. The first collective sentiment concerning climate in

[5] Zali Gurevitch and Gideon Aran, "On Israeli and Jewish Place: Israeli Anthropologie," in *On Israeli and Jewish Place* (Tel Aviv: Am Oved, 2007). Italics added by Netta Cohen.

[6] Benedict Anderson, *Imagined Communities: Reflections on the Origin and Spread of Nationalism* (London: Verso, 1983). Anthony D. Smith, *Nationalism: Theory, Ideology, History* (Cambridge: Polity, 2010). Ernest Gellner, *Nations and Nationalism* (Oxford: Blackwell, 1983); Noga Kadman, *Erased from Space and Consciousness: Israel and the Depopulated Palestinian Villages of 1948* (Bloomington: Indiana University Press, 2015), 33-35.

Palestine was based on the descriptions of the Land of Israel in religious texts which had prevailed both in Jewish as well as in Christian traditions throughout the centuries. The second collective sentiment related to the climates with which Jewish settlers were familiar in their countries of origin which were frequently compared to the climate in Palestine. The third form of collective sentiment was related to the European colonial experience of warm climates. These collective sentiments prevailed both in the scientific as well as in the popular accounts of climate in Palestine and were manifested (to changing degrees) in all the fields of expertise discussed in this thesis – climatology and meteorology, medicine and race, botany and agriculture, and architecture and planning. In the following pages, I provide the historical background of each of these constructed sentiments.

Throughout history, popular knowledge on climate often stemmed from or was influenced by religious tropes. For many centuries, extreme climate events in Western culture were understood as a reaction of the divine forces. For example, in his classic account 'The Storm' from 1704 Daniel Defoe described the Great Storm of November 26th - 27th, 1703 which damaged many parts of southern England. Defoe wrote:

> Nature plainly refers us beyond herself, to the mighty hand of infinite power, the author of nature, and the original of all causes … When the sins of a nation are very great and prevailing, it is God's unusual method to pronounce destruction on the nation.[7]

Jews similarly often interpreted immediate weather events as a divine response. However, their understanding of the climatic conditions in Palestine was first and foremost influenced by a longstanding textual tradition that debated the status of the Land of Israel and its physical and metaphysical conditions. Jews had been dispersed from their ancestral homeland and subsequently settled around the globe prior to the

[7] Quoted in: Mike Hulme, "The Conquering of Climate: Discourses of Fear and Their Dissolution," *The Geographical Journal* 174, no. 1 (2008): 7.

first century BCE. Nevertheless, the position of the Land of Israel continued to maintain an important role in their tradition and culture throughout successive generations. For most Jews living in Europe, Northern Africa and the Middle East, the Land of Israel was 'a source of longing, an idealised, sacred terrain that was connected with the coming of the messiah'.[8]

However, the question of whether Jews should feel at home in this land or rather should respect and fear it stood at the heart of an old discussion among diaspora Jews. The arguments for and against Jewish resettlement in Palestine were often intertwined with claims concerning its positive and negative natural characteristics. Isaiah Horowitz, a Jewish scholar who lived in the sixteenth and seventeenth centuries, quoted the biblical story of the twelve spies who described the Land of Israel as 'a land that eateth up the inhabitants thereof.'[9] According to Horowitz, it was not only the enemy that should be feared in this country, or the consequences of sin but also the place itself and its natural conditions. In a similar vein, medieval Jewish scholar Moses Ibn Esra asserted that Jews began to flourish culturally only after being exiled from the Land of Israel and moving to dwell in other climatic regions.[10]

On the other hand, many Jewish medieval philosophers, including Judah Halevi and David Kimhi (RaDak), asserted that the Land of Israel not only offered a temperate, and thus, desirable climate but also that this climate had facilitated physical and intellectual perfection among the ancient Israelites.[11] In the sixteenth century, Rabbi Judah Moscato developed this notion even further by claiming that the country was

[8] Sandra M. Sufian, *Healing the Land and the Nation: Malaria and the Zionist Project in Palestine, 1920-1947* (Chicago, Ill.: University of Chicago Press, 2007), 13.
[9] Kristine Harper, *Weather by the Numbers: The Genesis of Modern Meteorology* (Cambridge, Mass.; London: MIT, 2008), 13,32.
[10] Avraham Melamed, "Eretz Yisrael Ve-Ha-Teoria Ha-Aklimit Ba-Mahshava Ha-Yehudit," in *Erertz Yisrael Ba-Hagut Ha-Yehudit Be-Yamei Ha-Benayim*, ed. Aviezer Ravitzky (Jerusalem: Yad Ben Zvi, 1991), 58.
[11] Ibid., 56, 63.

indeed of good quality. However, according to him, this quality revealed itself to the People of Israel alone.[12] Similar religious debates continued well into the nineteenth and twentieth centuries among influential religious Zionist figures such as Zvi Hirsch Kalischer, Samuel Mohilewer, Isaac Jacob Reines and Abraham Isaac Kook.[13]

Throughout most of Jewish history, rabbinical literature was often more central to Jewish tradition and culture than the Hebrew Bible. According to Yaacov Shavit and Mordechai Eran, it was only during the second half of the nineteenth century that the Hebrew Bible became *the* formative book for the construction of a Jewish cultural and national identity. It was at this point that Jews began to regard this text 'as their most important asset and heritage, as a shared foundation of values and world view, and as their great contribution to human-kind'.[14]

The Zionist utilisation of the Hebrew Bible as an indispensable part of Jewish history and the harnessing of its stories and myths for the narration of a Jewish national past was identified neither as a truly religious act nor as a scientific one. Rather, it was a secular search for the nation's cultural sources, which were also meant to unify Jews from different countries and diverse cultural backgrounds and enhance their connection to the territory that was identified as the ancient Land of Israel. German-Jewish physician Elias Auerbach wrote in 1936 'to understand the history of Israel, one needs

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[12] Aviezer Ravitzky, "Eretz Hemda Ve-Harada: Ha-Yahas Ha-Du Erki Le-Eretz Yisrael Be-Mekorot Yisrael," in *Eretz Yisrael Ba-Hagut Ha-Yehudit Ba-Et Ha-Hadasha*, ed. Aviezer Ravitzky (Jerusalem: Yad Ben Zvi, 1998).

[13] Avinoam Roznek, "Ha-Bavli, Ha-Yerushalmi, Ve-Torat Eretz Yisrael Ha-Nevuit Be-Mishnat H.R.A.Y.A Kook," in *Eretz Yisrael Ba-Hagut Ha-Yehudit Ba-Mea Ha-Esrim*, ed. Aviezer Ravitzky (Jerusalem: Yad Ben Zvi, 2004), 26-71, 233.

[14] Yaacov Shavit and Mordechai Eran, *The Hebrew Bible Reborn: From Holy Scripture to the Book of Books: A History of Biblical Culture and the Battles over the Bible in Modern Judaism* (Berlin New York: Walter de Gruyter, 2007). A new approach to the Bible is already notable in the writings of eighteenth century *maskilim* who wished to replace "'the twisted rabbinic commentary of the scriptures' and 'to introduce a rational exegesis'." Yet, the growing importance of the Bible specifically in the late nineteenth century related to its role as a founding narrative in the development of a Jewish national identity. Moshe Pelli, *Haskalah and Beyond : The Reception of the Hebrew Enlightenment and the Emergence of Haskalah Judaism* (Lanham, Md.: University Press of America, 2010), 30-31.

to observe it – just like contemporary history – in a secular manner. It shall not only be viewed as a "holy story" but as the history of a genius people'.[15]

A very important role in the transformation of the biblical mythology into a national culture was assumed by the new Hebrew literature, which relied not only on the language of the Bible but also on its stories, metaphors and literary conventions. The revived Hebrew language and its modern literature, thus, also had the role of re-establishing the connection between the Jewish people and the territory which they identified as the Land of Israel, including its climate and environment. According to literary scholar Eric Zakim, 'literature offered the type of reflexive discursive that would accommodate the problems of a de-territorialised nation searching for environmental appropriateness and belonging'.[16]

The renowned poet Hayim Nahman Bialik, for example, wrote numerous nature poems about the desired homeland before arriving in Palestine. These early poems were influenced by textual memories more than they were influenced by an actual familiarity with the country. In his poem 'To the Bird' from 1891, Bialik wrote:

> Greetings on your return, lovely bird,
> to my window from warmer climes—
> how my soul longed to hear your voice,
> in the winter when you left my dwelling.
>
> Sing to me, tell me, dear bird
> from far-off wondrous places,
> there in that warm and beautiful land,
> do evil events and calamities happen too?
>
> […]
>
> And the Sharon Valley and the hills of myrrh—
> do they give their spikenard and spice?

[15] Elias Auerbach, *Wüste Und Gelobtes Land: Geschichte Israels Von Den Anfängen Bis Zum Tode Salomons* (Berlin Schocken Verlag, 1936), x.
[16] Eric Stephen Zakim, *To Build and Be Built : Landscape, Literature, and the Construction of Zionist Identity* (Philadelphia, Pa.: University of Pennsylvania Press, 2005), 3.

Does the ancient forest, the old Lebanon,
awake from its slumber?

Does the dew fall like pearls upon Mount Hermon,
or does it descend like tears?
And how fares the Jordan and its bright waters?
And each mountain and hill?[17]

However, the growing centrality of the Bible in Jewish culture at the late nineteenth century and its impact upon the geographical and environmental images of Palestine were also the result of external influences, and, more specifically, of the renewed Christian interest in the country. The weakening power of the Ottoman Empire beginning from the mid-nineteenth century led to a period of reformation, which included the 'capitulation system' in Palestine. The capitulations were a series of bilateral contracts between the Ottoman and European powers that granted the latter rights and privileges, especially in the sphere of trade and goods. This development marked an increase in Western interventions into Palestine. Bolstered by the improvements in global transportation, this period was also followed by a significant increase in the number of travellers, explorers and pilgrims who visited the region. These travellers were usually interested in visiting the sites they had read about in the New and Old Testaments or the places that had been toured by others before them. The knowledge gained about the country in this context was, therefore, not only a result of the actual encounters of Westerners with the country itself but also, as historian Issam Nassar describes it, a 'textual' knowledge that was 'continuously shaped and reshaped by what the visitors themselves were writing'.[18]

However, to the great surprise of travellers, the physical conditions in Palestine were often different to those they had expected. One traveller wrote:

[17] Avner Holzman, ed. *Haim Nahman Bialik: Ha-Shirim* (Or Yehuda: Dvir, 2004), 14-17.
[18] Nassar Issam, "In Their Image: Jerusalem in Nineteenth-Century English Travel Narratives," *Journal of Palestine Studies*, no. 6 (2003): 7.

Jerusalem the Golden
With milk and honey blest;
Where is that milk and honey?
It seemed to have gone West.[19]

Renowned American writer Mark Twain, who visited Palestine in 1866, wrote in his travel book *The Innocents Abroad*:

> It is seven in the morning, and as we are in the country, the grass ought to be sparkling with dew, the flowers enriching the air with their fragrance, and the birds singing in the trees. But alas, there is no dew here, nor flowers, nor birds, nor trees. There is a plain and an unshaded lake, and beyond them some barren mountains.[20]

As historian Tamar Novick demonstrates, the notion of the 'land flowing with milk and honey' was central to Western perceptions of the country.[21] Therefore, most travellers refused to accept the country's contemporary environmental and demographic conditions, rather interpreting them as an environmental decay which had developed since biblical times. Moreover, the discrepancy between the imagined past and the disappointing present of the country became a subject for scientific examination in itself.

As we shall see, these ideas were often internalised by Jewish settlers who aimed to improve the environment in Palestine and restore its alleged biblical conditions. As was the case with Gentile travellers, Jewish settlers also understood the scriptures as sources containing an 'original' description of the country, and inevitably these descriptions were compared with the settlers' encounters of the natural conditions

[19] 'A Sand Grouse' published in *Chronicles of the White Horse*, quoted by: Eitan Bar-Yosef, *The Holy Land in English Culture 1799-1917: Palestine and the Question of Orientalism* (Oxford: Clarendon, 2005).
[20] Mark Twain, *The Innocents Abroad* (New York ; Oxford: Oxford University Press, 1996 [1896]), 486-87.
[21] Tamar Novik, *Milk & Honey: Technologies of Plenty in the Making of a Holy Land, 1880-1960* (PhD Dissertation: University of Pennsylvania, 2014), 2.

and landscapes in Palestine. However, unlike the Gentile discourse which aimed to explain the alleged discrepancy between the country's past and its present conditions through religious, colonial and scientific accounts, Jewish settlers in the first decades of the twentieth century were also inclined to clarify this very same contradiction via national, romantic and agrarian notions and aspirations. Eventually, the historical and geographical gap between the People of Israel and the Land of Israel, and their so-called renewed unification, similarly gave rise to notions of the need to redeem the country (as well as the people) from its long 'neglect'.

Philosopher Edward S. Casey writes that places are embodied in human action, for 'we are not only *in* places but *of* them'.[22] Thus, the second collective sensibility about climate in Palestine was related to the climates with which Jewish settlers were familiar with in their countries of origin which were frequently compared to the climate in Palestine. In referring to the American landscape, historian William Cronon asserts that settlers' descriptions of the natural environments in new destinations usually contained a comparison with their old homelands.[23] In the Jewish case, the comparison of the climate in Palestine to the climates of other homelands usually also reflected Jewish settlers' difficulties in adjusting to their new environment.

This comparison was especially common in written documents during the 1930s and 40s following the Nazi party rise to power in Germany and the displacement of European Jewry in the following years. It was during these years when Jewish refugees who were often not Zionist ideologists arrived in Palestine in masses and had to grapple with what seemed to them as unfavourable natural conditions. In an article titled

[22] Edward S. Casey, "How to Get from Space to Place in a Fairly Short Stretch of Time: Phenomenological Prolegomena " in *Senses of Place*, ed. Steven Feld and Keith H. Basso (Santa Fe: School of American Research Press, 1996), 19.
[23] William Cronon, *Changes in the Land: Indians, Colonists and the Ecology of New England* (New York: Hill and Wang, 1983), 19-20.

'Displaced in the National Home: Jewish Reparation from Palestine to Europe, 1945-1948', Ori Yehudai analyses applications to the United Nations Relief and Rehabilitation Administration by those Jewish refugees who arrived in Palestine shortly before or during World War II and who sought to return to their countries of origin following the end of the war. These applications contained important information on the various reasons why Jewish settlers were seeking to return to Europe. According to Yehudai, most of the Jewish refugees were motivated by issues such as the 'climate conditions, health problems, economic distress, language hurdles, desire to reunite with family members abroad, and general feelings of estrangement.'[24]

Climate seemed to have been one of the main complaints expressed in the letters of application. For example, Margaret Bergel, a German-Jewish refugee wrote in her application:

> In 1933 I immigrated to Palestine from Germany; already in 1935, it appeared that my health suffered seriously from the local climate, and therefore I returned for a few years to Germany in 1936 where I felt perfectly healthy from the very first day. Of course, for the well-known political reasons, I could not stay there, and returned to Palestine having no other possibilities. Very soon, I fell sick again but never had the means of going abroad on a trip again. The war broke out, every summer here meant a crisis to my health, and all doctors whom I consulted agreed that I […] cannot stand the climate of Palestine, and ought to go back to Europe as quickly as possible, 'immediately after the war', they said.[25]

In 1942, renowned poet Leah Goldberg demonstrated her ambiguous feelings of alienation from and familiarity with Palestine while highlighting her longing for the natural environment and landscapes of central Europe.

> The landscape [in Palestine] is very nice but it is not heartwarming. Dry, burned, scarce. Overly decorated. I wanted a forest, actual green, some softness and pine aroma [...] I am not sure I will suceed. I am not acclimatising in this landscape.[26]

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[24] Ori Yehudai, "Displaced in the National Home: Jewish Repatriation from Palestine to Europe, 1945–48," *Jewish Social Studies* 20, no. 2 (Winter 2014): 71.
[25] Quoted in: ibid., 95.
[26] Rachel Aharoni and Arie Aharoni, eds., *Lea Goldberg's Diaries* (Bnei Brak: Ha-kibbutz Ha-meuhad, 2005), 276.

Goldberg wrote numerous poems on the capability of landscapes to evoke feelings of belonging. One of her most famous poems entitled *Pines* (1954) compared between the landscapes of her old and new homelands.

Here I will not hear the voice of the cuckoo.
Here the tree will not wear a cape of snow.
But it is here in the shade of these pines
my whole childhood reawakens.

The chime of the needles: Once upon a time –
I shall call the snow-space homeland,
and the green ice at the river's edge -
the poem's grammar in a foreign place.

Perhaps only migrating birds know -
suspended between earth and sky -
the heartache of two homelands.

With you I was transplanted twice,
with you, pine trees, I grew -
roots in two disparate landscapes.[27]

In my thesis, I show how throughout the period between 1897 and 1948 Jewish settlers tried to 'embellish' and transform the environment in Palestine in order to make it fit their understanding of a 'civilised' and familiar landscape and nature. In this context, in which pines indeed play a major role, I discuss Zionist afforestation schemes, attempts to acclimatise foreign plants and seeds and endeavours to implement the garden city model into new towns in Palestine.

However, such efforts – fundamental as they were – usually did not affect the climate in Palestine, which remained a 'stubborn' environmental characteristic and which, unlike other characteristics, could not be easily tamed. As a result of this reality,

[27] Leah Goldberg, *Poems*, vol. II (Tel Aviv: Sifriyat Poalim, 1973), 143. Translation based on: https://forkedtongues.dreamwidth.org/560.html

Jewish settlers gradually understood that in order to prosper in this landscape, they would need to acclimatise to it both physically and mentally, rather than the other way around.

As in other languages, the term 'acclimatisation' in Hebrew contains a dual meaning. The first meaning serves as a metaphor to discuss the mental adaptation of humans to new places and the second relates to the physical adjustment of organisms to new environments. Accordingly, while the Greek word for climate [*Klima*] had already entered the Hebrew language [*Aklim*] during the Middle Ages through the Arabic word [*Iklim*][28], the Hebrew term for acclimatisation [*Iklum*] seems to have penetrated Hebrew texts only around the 1930s. As I demonstrate in the following chapters, in addition to the mental challenges involved in individuals acclimatising to Palestine, Jewish acclimatisation in this country also served as a central scientific discourse during the first half of the twentieth century. The study of acclimatisation in Palestine was mainly manifested in the fields of medicine and botany and it largely influenced Jewish physicians' attempts to construct and reinforce social conventions and living standards through hygienic practices as well as botanists' efforts to introduce new and economically profitable crops into the country.

Located at a latitude of 29°–33° northern to the equator, Palestine has a Mediterranean climate with long, warm, dry summers and relatively short, cool, rainy winters. Its climate is influenced by the subtropical aridity of the Sahara and the Arabian deserts in the south, and the subtropical humidity of the Levant and the eastern Mediterranean in the north. The climatic diversity of this relatively small territory was frequently referred to as one of the land's unique characteristics. At the same time, it

[28] Eliezer Ben-Yehuda, *Milon Ha-Lashon Ha-Ivrit: Ha-Yeshanah Ve-Ha-Hadashah* (Jerusalem, Berlin: Langenscheidt, 1908), 373.

also encouraged the comparison of Palestine with other 'more familiar' geographies. British explorer Charles William Wilson wrote in 1873:

> owing to the peculiar formation of the country, there is great variety of climate: That of the Lebanon may be compared with that of *the Alps*, that of the Hill Country with *Italy*, and that of the Jordan Valley with the *Tropics*.[29]

Similarly, in a letter sent by the Zionist botanist Otto Warburg to the leader of the ZO, Theodor Herzl, in 1899 Warburg wrote that in order to understand the climate in Palestine one should imagine the weather in other Mediterranean places such as France, Algeria, Italy and Egypt.[30] Furthermore, in the 1930s, a Jewish meteorologist presented a table with data on solar radiation comparing Jerusalem and the Dead Sea with Helsinki, the Zugspitze, Davos, Nice, Chicago, New York and Miami.[31]

The reason for these common comparisons was not only the result of the so-called climatic resemblance between Palestine and other geographies. It was, moreover, due to the Zionist aspiration to internalise the technological examples which had been set by other Western administrations in arid regions. This tendency often also led Jewish experts to transport knowledge and practices on climate from Western countries, rather than, for example, from Palestine's neighbouring countries.

Furthermore, a close examination of Jewish publications on local climate during the first half of the twentieth century reveals a unique working pattern. First, the authors of the scientific articles outlined the local climatic conditions of Palestine, then, they usually compared them to similar climatic conditions in other 'developed' regions and, finally, they suggested technological solutions to overcome local natural constraints. Thus, while the investigation of climate in Palestine initially aimed at increasing Jewish

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[29] Charles William Wilson, "On Recent Surveys in Sinai and Palestine," *Proceedings of the Royal Geographical Society of London* 17, no. 5 (1873): 328. Italics added by Netta Cohen.
[30] Jakob Tahon, *Warburg's Book* (Tel Aviv: Masada, 1948), 77.
[31] Rudolf Feige, "Hea'rot Al Ha-Klimatologia Ha-Shimushit Be-Eretz Yisrael," in *Ha-Adam Ve-Ha-Aklim Be-Eretz Yisrael*, ed. S. Rosenbaum (Tel Aviv Olympia, Unknown), 25.

familiarity with the country by minimising the breach between the physical *place* and the *Place* of meaning, ironically the study of the local climate gradually became a tool to negate local climate as well as the traditional Palestinian methods of confronting it.

Yet, Western knowledge and practices were also transferred to Palestine when they did not necessarily fit with the local climate and environment. A preference for Western ideas and methods over local ones was evident in contemporary critical publications. For example, in an article from 1936 which focused on Jewish architecture in Palestine, Jewish architect Leo Adler remarked:

> almost all the buildings of new Tel Aviv, Haifa's new districts or Jerusalem's new neighbourhoods might just as well have been erected in the cities of Germany, Austria, or the Netherlands, [...] despite the fact that, in the most important respects, the conditions here are entirely different.[32]

The third collective sentiment that influenced climate research in Palestine was related to the European colonial experience of warm climates. In my thesis I argue that the Zionist preoccupation with the climatic conditions in Palestine was not derived merely from empirical observations that showed that Palestine was particularly 'cold' or 'hot'. Rather, this discourse was deeply grounded in a much wider colonial discourse of anxiety about 'radically different' climates in the colonies, and it relied upon European knowledge and expertise to confront and ameliorate the alleged enervating influence of climate on European bodies.

Climate investigation was strongly connected to European encounters with new geographies and unfamiliar environments and, therefore, it was ingrained in colonial expansion. During the eighteenth century an increasing importance was assigned to the study of climate as a result of a number of reasons. The scientific revolution of the seventeenth century which included the invention of the thermometer and the barometer

[32] Leo Adler, "Ha-Adrikhalut Be-Artzenu," *Gazit: Art and Literary Journal* 8-9 (1936): 63.

led to a growing interest in gathering empirical data and gradually encouraged modern climate research. In addition, as the spirit of the enlightenment gained popularity during the eighteenth century, scholars were inclined to prefer natural accounts for human variability over supernatural ones.

Moreover, the growing transportation of useful medical plants and profitable spices (such as tobacco, sugar, tea, pepper and cinnamon) between the metropoles and their colonial holdings, as well as the enormous financial possibilities enabled by global and imperial commerce, led European trading companies to hire experts to study the environmental and climatic conditions required to improve crops. These experts were usually medical botanists, that is, physicians or apothecaries who served as consultants for trading companies and were responsible for both bodily and botanical affairs.[33]

When confronted with the unfamiliar natural environment in Palestine, Zionists tended to absorb colonial ideas and practices related to climate research. Nevertheless, these ideas and practices were by no means monolithic. During the first half of the twentieth century, Zionist approaches to climate in Palestine reflected a gradual shift from imperial approaches to non-temperate environments to a growing reliance on scientific approaches, which were common in former settler colonial contexts (specifically in California and Queensland). While the first approach generally aimed to protect Europeans from the so-called enervating influence of warm climates, the latter emphasised the need for Europeans to adapt and acclimatise to their new environments.

This shift manifested itself most vividly during the 1930s and reflected three interconnected political developments of the time. First was the rise of fascist

[33] Richard Grove, *Green Imperialism: Colonial Expansion, Tropical Island Edens and the Origins of Environmentalism, 1600-1860* (Cambridge: Cambridge University Press, 1995), 14, 76. Londa Schiebinger and Claudia Swan, eds., *Colonial Botany: Science, Commerce, and Politics in the Early Modern World* (Philadelphia, Penn.: University of Pennsylvania Press, 2005), 2-7.

movements in Europe and the limitations imposed on Jewish immigration to the United States and the United Kingdom during the interwar period which transformed Palestine from a marginal destination for Jewish immigration into a central one – a development which contributed to the consolidation of the *Yishuv* (the Jewish community in Palestine). Second was the consolidation of the Jewish national movement in Palestine and, as a result, a growing rejection of British administrative rule. The third development which influenced Zionist experts' preference for ideas and practices developed in settler states starting from the 1930s was the intensification of the Arab-Jewish conflict.

As mentioned, the so called imperial scientific approach of Zionist experts to climate was manifested mainly during the first decades of the twentieth century. Historian Derek Penslar writes that during the first two decades after the establishment of the ZO 'Zionists unsure of their fledging efforts at colonisation bolstered their confidence by drawing comparisons with the social and colonial policies of the great powers'.[34] As part of the movement's attempt to be recognised as a political organisation representing European Jewry, it internalised the rhetoric of Western governments, which was intertwined with an imperial one. For example, at the beginning of the twentieth century the ZO established a colonial bank which was intended to fund agricultural research and development and invest in capitalist companies in Palestine, which were expected to yield profits for their shareholders.[35] Similarly, the director of the Palestine Office of the ZO and former director of the Bureau for Jewish Statistics and Demography, Arthur Ruppin, suggested to implement German programs of internal colonization in Palestine.[36]

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[34] Derek Jonathan Penslar, *Zionism and Technocracy: The Engineering of Jewish Settlement in Palestine, 1870-1918* (Bloomington: Indiana University Press, 1991), 7.
[35] "Zionism, Colonialism and Postcolonialism," *Journal of Israeli History* 20, no. 2-3 (2001): 86.
[36] *Zionism and Technocracy: The Engineering of Jewish Settlement in Palestine, 1870-1918*, 94-95.

The adoption of systematic colonial research and the transfer of professional models between different colonial contexts were central to climate investigation during the period that preceded the 1930s. For example, during the first decade of the twentieth century, the ZO preferred hiring British, French and German colonial experts for its scientific expeditions. However, the few Jewish experts who did participate in these scientific expeditions were usually not exceptions to a broader colonial network of experts and knowledge. At the turn of the century, Jewish experts generally acquired their higher educations in European universities, where they were often exposed to colonial sciences. In addition, some of these experts had even participated in British and German colonial enterprises before joining the Zionist movement, and in some cases, they retained other colonial affiliations even after becoming Zionists. Penslar writes that

> technical expertise served two hallowed goals of the Zionist movement: It offered guidance for the great social restructuring that was to accompany mass immigration to Palestine, and it epitomized the secular knowledge that many Zionists felt would existentially transform the Jews into people like all nations.[37]

In 1917, the British government issued the Balfour Declaration - a public statement announcing its support for the establishment of a 'national home for the Jewish people' in Palestine, which was then an Ottoman region with a small minority Jewish population. Following the establishment of the British Mandate in Palestine by the League of Nations in 1920, this support was translated into an official policy. During the first decade of the British Mandate, *Yishuv* institutions and experts often enjoyed British assistance and cooperation. Accordingly, during this period Zionists continued to imbibe imperial knowledge.

[37] ibid, 7

However, following the increasing tension between Arabs and Jews in Palestine and, in particular, following the Arab riots of August 1929 as a result of a dispute over Jewish claims to the Western Wall, British policy towards the Zionist cause shifted. Historian Hillel Cohen indicates this moment as a fundamental turning point in the Arab-Jewish relationship in Palestine as he defines 1929 as year zero of the conflict.[38] The Passfield White Paper (a formal policy statement) published in October 1930 as a response to the riots, declared a dual British commitment to both the Jewish and the Arab inhabitants of Palestine, thus, expropriating the *Yishuv* institutions of their arguably former privileged status. Furthermore, the White Paper also restricted land sales to Jews and severely limited Jewish immigration to Palestine. This shift in British policy caused Jewish protests and enhanced Jewish national feelings.[39] From this point onwards, the *Yishuv* became more aware of its need to justify its settlement project and to reconceive its settlements in terms of ancient nativism. This was also the moment the *Yishuv* institutions began overpowering the ZO institutions which were still mostly operating in Europe. I argue that it was at this moment when the Zionist impetus moved from absorbing imperial colonial ideas and practices concerning climate research to adopting settler colonial ones.

Sociologist Gershon Shafir claims that the unique characteristics of the *Yishuv* and later of Israeli society were the direct result of a response to the conflicts and encounters of Jewish European settlers with the indigenous Arab of the land. Similarly, in my thesis, I claim that the Jewish attitude towards the natural conditions in Palestine

[38] Hillel Cohen, *Year Zero of the Arab-Israeli Conflict 1929* (Waltham, Massachusetts: Brandeis University Press 2015).
[39] Anita Shapira, *Israel: A History* (Waltham, Massachusetts: Brandeis University Press, 2012).

and, specifically, its approach to climate was also, to a great extent determined by this political reality.[40]

As a result of the growing Jewish hostility towards the Arab population in Palestine, alongside its increasing distrust of the British government, Jews in Palestine gradually came to identify themselves as European settlers who wished to wrest themselves free from metropolitan control while pushing local Arab-Palestinians back beyond an ever-expanding frontier. Simultaneously, during this period, Jewish scientists began looking for alternative models of inspiration to confront the climate in Palestine. Jewish physicians and agronomists who addressed climate investigation in their scientific work compared Palestine to places such as California in the United States and Queensland in Australia and aspired to learn from these former settler colonies how to overcome the hazards of warm climates. In my thesis, I demonstrate how Jewish scientists not only shared similar climates with Americans and Australians, but also how they saw themselves as sharing similar experiences such as demographic and territorial interests and concerns as well as viewing the new territory as a promised land.

One of the main scientific objectives that was shared by settler societies during the nineteenth and twentieth centuries was the earlier mentioned aspiration to acclimatise in their new territories. Historian Michael Osborne argues that acclimatisation was *the* paradigmatic colonial science for the French and British, who were preoccupied with the transportation of flora, fauna and humans between the metropole and its colonial holdings. Osborne also claims that although the process was practised within the entire empire, acclimatisation mostly concerned settler colonies

[40] Gershon Shafir, *Land, Labor and the Origins of the Israeli-Palestinian Conflict, 1882-1914* (Berkeley, Calif.; London: University of California Press, 1996), 6.

(and former settler colonies) in warm climates and it influenced the politics, settlement schemes, regulation of transportation and hygiene of European settlers in warm regions.[41] I argue that the consolidation of the Zionist project in Palestine during the 1930s along with its shifting attitude towards the British and the local Arabs was one of the main causes of increasing investigations into the physical implications of the Palestinian climate on Jewish settlers' health, housing and food production.

Placing Zionist climate investigation within the context of colonial relations and manifestations is relevant to the wider analysis of the history of Zionism for two main reasons. First, it emphasises the global and transnational dimension of Zionist processes of knowledge production which I discuss in depth throughout the following chapters. Second, the absorption of colonial ideas on climate allows us to trace the Jewish-Zionist cultural transformation from perceiving itself (and indeed being perceived by others) as an Oriental minority in the Occident into observing itself as an Occidental minority in the Orient – a process which took place during the first half of the twentieth century. Susannah Heschel writes that 'Jews were both targets of an antisemitic rhetoric in Europe that labelled them as foreign Orientals and, at the same time, agents constructing oriental images of their own creation'.[42] In my study, I claim that between the late nineteenth century and the mid-twentieth century Jews were caught in the liminal condition of an anti-colonial ethnic group aspiring to liberate itself from a long history

[41] Michael A. Osborne, "Acclimatizing the World: A History of the Paradigmatic Colonial Science," *Nature and Empire: Science and the Colonial Enterprise* 15 (2000): 135. For further literature on acclimatisation in both botany and medicine, see: Alfred W. Crosby, *Ecological Imperialism: The Biological Expansion of Europe, 900-1900*, 2nd ed., new ed. ed. (Cambridge: Cambridge University Press, 2004). Corey Ross, *Ecology and Power in the Age of Empire: Europe and the Transformation of the Tropical World* (Oxford: Oxford University Press, 2017). Jessica Howell, *Exploring Victorian Travel Literature: Disease, Race and Climate* (Edinburgh: Edinburgh University Press., 2015). N. David Livingstone, "Human Acclimatization: Perspectives on a Contested Field of Inquiry in Science, Medicine and Geography," *History of Science* 25, no. 4 (1987).

[42] Susannah Heschel, "The Rise of Imperialism and the German Engagement in Islamic Studies," in *Colonialism and the Jews*, ed. Ethan Katz, Lisa Moses Leff, and Maud Mandel (Bloomington: Indiana University Press, 2017), 75.

of persecution and oppression on the one hand, and absorbing colonial ideas and practices as part of their attempt to obtain a non-European territory on the other.[43]

Structure

This study addresses Jewish-Zionist scientific approaches to climate in Palestine from 1897 to 1948. Each chapter in this thesis is devoted to a different scientific field of expertise and its corresponding approach to climate in Palestine. These fields of expertise include climatology and meteorology, medicine and race, botany and agriculture, and architecture and planning. Yet, while the separation between the different disciplines is intended to serve the comprehensibility of this thesis, it is important to note that climatologists, physicians, agronomists, architects and other experts frequently exchanged knowledge among themselves on the 'right' ways to manage the local climate. For example, physicians often discussed the suitability of Jewish architecture to the climate conditions in Palestine, while botanists commented on the Jewish body and its adaptability to the local climate.

Furthermore, in my thesis, I address the cultural construction of experts' knowledge as well as the ways in which processes of knowledge production refracted through and built upon the interchange between professional and popular discourses.

[43] In defining Zionism also as an anti-colonial movement, I rely on the work of Susanne Heschel, Christian Wiese, Derek Penslar, Ethan Katz, Lisa Moses Leff and Maud Mandel who have argued that beside colonial theory, postcolonial theory can also serve as a useful instrument to explain the condition of European Jewry at the turn of the twentieth century. Postcolonialism in this context refers not only to the relationship between colonising and colonised nations, but also to the relations between ethnic or cultural majorities and minorities within Europe. Christian Wiese, *Challenging Colonial Discourse: Jewish Studies and Protestant Theology in Wilhelmine Germany* (Leiden; Boston: Brill, 2005), 1-3, 25-26. Susannah Heschel, *Abraham Geiger and the Jewish Jesus* (Chicago; London: University of Chicago Press, 1998), 3. "The Rise of Imperialism and the German Engagement in Islamic Studies." Ethan Katz, Lisa Moses Leff, and Maud Mandel, "Introduction: Engaging Colonial History and Jewish History " ibid. (Indiana Univeristy Press). Derek Jonathan Penslar, "Is Zionism a Colonial Movement?," ibid., ed. Ethan Katz, Lisa Moses Leff, and Maud Mandel (Indiana University Press).

Therefore, alongside experts' knowledge I also focus on Zionist intellectual notions and general popular perceptions concerning the climate in Palestine among European Jews.

My thesis is divided into two main parts. The first part entitled 'Distant Gazes' primarily focuses on the role of climate within Jewish and Zionist intellectual and scientific discourses which reflected the general preparation towards a Jewish colonial enterprise. This section aims to contextualise Zionist notions of climate within a larger European tradition, and specifically, in relation to its colonial heritage which was intrinsic to the general development of climate research in the nineteenth century.

Chapter One, 'Climate and the Jews: An Intellectual History', provides an introduction to climate theory and its evolution from the eighteenth century to the beginning of the twentieth century. This theory, which was strongly connected to European encounters with new geographies and unfamiliar environments, aimed to explain the existence of a variety of indigenous ecosystems and people through the different climates they inhabited.

Fredrick Cooper and Ann Stoler claim that modern Europe was formed by its imperial projects, just as various colonial realities were shaped by the events and conflicts in Europe itself.[44] Thus, during the eighteenth and nineteenth centuries climate theory began to be utilised to explain the physical and mental traits of Jews – Europe's internal Other. Simultaneously, European Jews also began to use climate theory in order to discuss their own identity and race while advocating diverse, and sometimes contradictory ideas concerning the desired future and destiny of European Jewry. Those who wished to stress the potential feasibility of Jewish emancipation and integration in Europe usually argued that because Jews shared the same climate with Europeans, their

[44] Frederick Cooper and Ann Laura Stoler, *Tensions of Empire: Colonial Cultures in a Bourgeois World* (Berkeley, Calif.; London: University of California Press, 1997).

constitutions were absolutely identical. Others viewed climate as a cause for Jewish dissimilarity to Europeans and employed it to justify Zionist ideology. Influenced by German Romanticism, nineteenth century Jewish intellectuals and race scientists utilised climate theory to stress the so-called organic link between Jews and the natural conditions in Palestine. According to them, the Jewish people were created in Palestine and thus its 'return' to the biblical homeland would match its physical and moral traits.

Whereas the first chapter focuses on the intellectual aspects of climate and race discourses, the second chapter, 'Knowing Climate', examines the science of climate investigation – mainly in the fields of climatology and meteorology – and its colonial aspects, specifically in the Jewish-Zionist context. Bruno Latour writes that 'the only way to understand the reality of science studies is to follow what science studies does best, that is, paying close attention to the details of scientific practice'.[45] Thus, the aim of this chapter is to follow processes of knowledge production on climate distinct from their subsequent utilisation in other fields of expertise.

Generally, during the nineteenth century, data on climate were collected by a large number of experts with diverse interests. However, while the amount of reliable data during this period increased tremendously, not much actual use was made of it until the end of World War I.[46] In this chapter, I analyse Zionist climate investigations in Palestine as well as in other destinations that were considered for Jewish colonisation during the first half of the twentieth century. I show that before 1918 climatological and meteorological investigations had, in fact, relatively little impact on practical decision making within the ZO. The importance of climate research during this period was in

[45] Bruno Latour, "Circulating Reference: Sampling the Soil in the Amazon Forest," in *Pandora's Hope: Essays on the Reality of Science Studies* ed. Bruno Latour (Cambridge, Mass: Harvard University Press, 1999), 24.
[46] Frederik Nebeker, *Calculating the Weather: Meteorology in the 20th Century* (San Diego; London: Academic Press, 1995), 83-119. Harper, 2.

presenting the ZO as an entity that possessed the required knowledge to pursue colonisation in the first place. It was only after colonisation in Palestine became a reality following the Balfour Declaration that this scientific discipline became truly relevant within the *Yishuv* to examin the potential success of the Jewish settlement project.

Besides climatology and meteorology, which were intrinsically occupied with the investigation of climate, other scientific fields that engaged significantly with this subject in Palestine were medicine, botany and architecture. The importance of climate to these scientific fields was related to their fundamental objectives of enabling health, food, housing and productivity in the new settlement. Realising the effects of climate on Jewish European settlers was regarded as an indispensable aspect for the establishment of a sustainable colony.[47] Thus, the second part of the thesis 'Confronting Climate in Palestine', deals with the role of climate within the aforementioned fields of expertise. While this part of the thesis does include scientific approaches to climate in Palestine during the late Ottoman period, its main focus is on the period of the British Mandate.

Chapter Three, 'Agriculture, Botany and Climate', presents the ways in which the local climate in Palestine was understood and managed by British and Zionist agricultural and forestry experts. Planting trees and forests in Palestine was viewed as a way to improve the air quality, increase rainfall and lower the average temperatures. This notion, which has been ingrained in Western traditions since antiquity, asserted that deforestation was responsible for the evolution of warm climates, while forestation generated cool climates.

[47] As Martin Mahoney and Georgina Endfield have demonstrated health, planting and planning were also central to the experience of other European colonial entities in warm climates. Martin Mahony and Georgina Endfield, "Climate and Colonialism," *WIREs Climate Change* 9 (2018).

In Palestine, however, the link between climate and forests received an additional local interpretation. Improving climate through afforestation was related to the Edenic image of the country in the Judeo-Christian tradition which, according to the British and Zionists, needed to be restored. The discrepancy between the imagined biblical land ('the land of milk and honey') and its disappointing contemporary reality became a central subject of scientific examination and an incentive for afforestation. Furthermore, Chapter Three focuses on the transfer of forestry and agricultural ideas and practices as well as the transportation of seeds and plants between different colonial or 'modernising' contexts and their reception in Palestine.

Zionists believed that the successful acclimatisation of crops required knowledge and experience but, more importantly, they thought it required the use of advanced technologies which made it less vulnerable to local natural constraints. Thus, this chapter also presents the irrigation solutions which were introduced into Palestine during the first half of the twentieth century as a response to its climatic challenges. In this chapter, I also stress the important role of irrigation in enhancing the materially and conceptually imbalanced power relations between Jews and Arabs in Palestine reflected in their access to and utilisation of water.

Chapter Four focuses on the relationship between climate and medicine in Palestine. Unlike in other European colonial enterprises where the indigenous population were often the subject of medical intervention and the colonialists tried to maintain or protect their own health, in the Zionist context it was the Jewish colonists who were considered in need of cure. This approach resulted from their perceived position as racially inferior to non-Jewish Europeans. Yet, at the same time, Zionist physicians also stressed the necessity of the Jewish colonists in protecting themselves

from the local climate as they gradually began to perceive of themselves as superior to the indigenous people.

Zionist medical interest in climate mainly manifested itself in two branches of medicine – tropical medicine and medical climatology. In 1899, the Scottish physician Patrick Manson founded the London School of Tropical Medicine, marking the commencement of a new field of study. Tropical medicine was based on recent developments in germ theory and was linked with Britain and France's expansion into newly acquired tropical regions, especially in Africa. Scholars agree that this medical knowledge and authority were used to claim that white colonisers and their cultures were intellectually and racially superior to the colonised ones. Among other things, tropical medicine unveiled the 'fallacy of miasma', a medical theory emphasising the influence of the air on the generation of disease.[48]

Medical climatology, on the other hand, concerned the various physical and psychological effects of general climatic and meteorological factors on human beings. In their research, Jewish physicians in Palestine conducted experiments that were designed to examine whether and how local climate would affect the physical and mental nature of the Jewish body. At the same time, they aimed to find solutions to counter the climate's perceived ill effects. These solutions mainly concerned hygienic practices and were designed to instruct the population on how to live, how to dress, and what to eat and drink.

[48] For further reading on the link between imperialism and tropical medicine see for example: Michael Worboys, "Manson, Ross and Colonial Medical Policy: Tropical Medicine in London and Liverpool, 1899-1914," in *Disease, Medicine and Empire: Perspectives on Western Medicine and the Experience of European Expansion*, ed. Roy M. MacLeod and Milton James Lewis (London: Routledge, 1988). Michael Worboys, "The Colonial World as Mission and Mandate: Leprosy and Empire, 1900-1940," *Osiris* 15, no. 1 (2000). David Arnold, *Warm Climates and Western Medicine: The Emergence of Tropical Medicine, 1500-1900* (Amsterdam: Rodopi, 1996); Worboys. Michael A. Osborne, *The Emergence of Tropical Medicine in France* (Chicago; London: University of Chicago Press, 2014). Ryan Johnson, "Networks of Imperial Tropical Medicine: Ideas and Practices of Health and Hygiene in the British Empire, 1895-1914" (University of Oxford, 2009).

However, medical concerns relating to the effects of climate on Jewish European bodies were not unique to physicians. Jewish architects similarly devoted considerable thought to questions of climate and health in planning residential buildings. 'Healthy houses', 'healthy streets' and 'healthy cities' were commonly used terms in architectural professional publications.[49] In the final chapter, 'Architecture and Climate', I present and analyse the various solutions proposed by architects to alleviate the heat within the built environment in Palestine. In so doing, I refer to urban planning and the architecture of residential spaces, while also discussing technical considerations, such as building materials and roof shapes.

In addition to addressing experts' knowledge, this chapter also examines Jewish dwellers' experiences of the newly built environment in Palestine and their responses to the degree of thermal comfort indoors, thus, manifesting the frequent tensions and discrepancies between professional and popular knowledge concerning local climate.

The organisation of space and landscape in Palestine has played a crucial role in the Zionist project throughout the period addressed in this thesis and beyond. As I demonstrate in this chapter, attempts to counter and mitigate the enervating influence of local climate went hand in hand with colonial ideas and practices. This tendency was manifested in visible attempts to dissociate the Hebrew building style from the local Arab one and, furthermore, to maintain a spatial separation – for 'health' and security reasons – between the two communities. More than any other field of expertise discussed in this thesis, architecture left a physical imprint of climatic notions in the

[49] For further reading on colonial architecture, climate and health: J. H. Chang and A. D. King, "Towards a Genealogy of Tropical Architecture: Historical Fragments of Power-Knowledge, Built Environment and Climate in the British Colonial Territories," *Singapore Journal of Tropical Geography* 32, no. 3 (2011). A. J. Njoh, "Colonial Philosophies, Urban Space, and Racial Segregation in British and French Colonial Africa," *Journal of Black Studies* 38, no. 4 (2008). Kimberly Kramer, "Applying the Lessons of Indian Vernacular Architecture: The Bungalow as Example of Adaptive Climatic Response," in *PLEA2006 - The 23rd Conference on Passive and Low Energy Architecture* (Geneva, Switzerland6-8 September, 2006).

Jewish built environment in Palestine. Houses, streets and towns planned between the years 1897 and 1948 which are still in use today serve as a powerful material evidence for Jewish architects' processes of knowledge production in what concerns contemporary notions on climate.

Sources

In my research I draw upon a variety of primary sources – both professional and popular – which address the topic of climate. My key corpuses are the professional writings and publications of physicians, race scientists, climatologists, meteorologists, architects, botanists and agronomists as well as the publications of Zionist leaders and thinkers.[50] In addition, I rely on private correspondence and private archives whenever possible.[51]

The continuing transference of professional models between different 'modernising' or colonial contexts, as well as their influence on the formation and transformation of different fields of knowledge, play a key role in my project. For this reason, my thesis includes primary sources which reveal the experience and knowledge absorbed by experts (Jewish as well as British) before arriving in Palestine.

Indeed, Jewish and Zionist thought in the fields of medicine, science and technology developed in relation to existing Western scientific and colonial ideas and

[50] To mention only a few important primary sources: Theodor Zlocisti, *Klimatologie Und Pathologie Palaestinas* (Tel Aviv: Omanuth Co.Ltd, 1937). Maurice Fishberg, *The Jew: A Study of Race and Environment* (New York & Melbourne: The Walter Scott Publishing Co.Ltd, 1911). Max Blanckenhorn, "Zum Klima Von Palästina " *Zeitschrift des Deutschen Palästina-Vereins* 33, no. 2/3 (1910); Alexander Levy, *Vom Bauen Und Wohnen Im Neuen Palästina* (Berlin: Palästina Baugesellschaft, Welt-Verlag, 1920). Dov Karmi, "Ha-Orientatzia Shel Ha-Dira Be-Tel Aviv," *Building in the Near East* 9-10 (November 1936). Otto Warburg, "Die Nichtjüdische Kolonisation Palästinas," *Altneuland* 2 (Feb. 1904). S. E. Soskin, *Small Holding and Irrigation: The New Form of Settlement in Palestine* (London: Jewish National Fund, 1920).

[51] For example: Meteorologist Rudolf Feige's private collection in the German-Speaking Jewry Heritage Museum Archives (GSJHA), the professional correspondence of climatologist Dov Ashbel in the Central Archives of the Hebrew University of Jerusalem (CAHUJI), the personal files of Otto Warburg, Aaron Aaronsohn and other Zionist leaders and experts in the Central Zionist Archives (CZA).

practices. However, this thought also contained a variety of political, social and cultural attitudes and perceptions which were unique to Jewish history and identity and reflected a long tradition of awe and wonder towards the Land of Israel. Therefore, in my thesis I use traditional Jewish sources which address the issue of climate in Palestine while occasionally employing modern sources which similarly allude to these sources.

While my analysis mainly focuses on the production of knowledge concerning climate among experts, I am also interested in tracing the circulation of knowledge on climate between experts and laypeople. The interplay between professional and popular knowledge was possible, among other things, because medicine, agriculture and planning were what Michel Callon defines as 'open air' sciences, that is, knowledge practices that necessarily involved a negotiation between experts and other heterogeneous groups in their very making and certification.[52]

From the 1960s onwards, historians and sociologists have developed the notion of scientific 'constructivism' which refers to the ways in which scientific knowledge is constructed through social and cultural knowledge. This approach, which has become accepted by historians of science, views scientific knowledge as a human creation conditioned by specific material and cultural resources and which reflects the beliefs, values and techniques shared by members of a given community, rather than simply the revelation of a natural order which is independent of human action. This approach is not meant to undermine the significance or veracity of scientific research, but rather to place it in a larger historical, political, social and cultural context. [53]

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[52] Michel Callon, Pierre Lascoumes, and Yannick Barthe, *Agir Dans Un Monde Incertain: Essai Sur La Démocratie Technique* (Paris: Editions du Seuil, 2001), 136.

[53] Jan Golinski, *Making Natural Knowledge: Constructivism and the History of Science* (Chicago, Ill.; London: University of Chicago Press, 2005), 6. Other important works on scientific constructivism include: Barry Barnes, *Scientific Knowledge and Sociological Theory* (London: Routledge and Kegan Paul, 1974). Peter L. Berger and Thomas Luckmann, *The Social Construction of Reality: A Treatise in the Sociology of Knowledge* (New York, NY: Open Road Integrated Media, 1966). David Bloor, *Knowledge and Social Imagery* (London: Routledge and Kegan Paul, 1976). Karin D. Knorr-Cetina, *The Manufacture of Knowledge: An Essay on the Constructivist and Contextual Nature of Science* (Oxford:

Scientists use a specific language to describe their activities and this language is distributed through what David Wade Chambers and Richard Gillespie refer to as polycentric communication networks which include laboratories, journals, public and private funding agencies, museums, libraries, educational institutions, and administrative reports.[54] Scientists tend to be portrayed as exceptionally rational. However, their activity also involves many other people and interests that, as Latour and Woolgar point out, eventually turn a unique set of events into a universally recognisable fact.[55] Within this frame of reference, I am interested in asking what were the social, cultural and political traditions that influenced the production of knowledge on climate in Palestine? What gave this knowledge authority? And how was knowledge on climate produced and consumed by both scientists and the general population?

To address the cultural construction of expert knowledge, I use widely circulated daily newspapers and magazines which assist me in placing the professional discourse into a wider context. Newspaper articles in the *Yishuv* frequently demonstrated the centrality of climate in daily life and often focused on the health hazards which were associated with it. In addition, newspaper articles reflect the evolution of the *Yishuv* in defining its social conventions and living standards in Palestine. An article in the *Haaretz* newspaper from 1930 asked, for example:

> In what other […] country, are children imprisoned in school classes until mid-August? Where, in what country, at the heat of 28-30 degrees [Celsius], are children expected to complete their homework after spending six hours at school?[56]

Pergamon, 1981). Bruno Latour, *Science in Action: How to Follow Scientists and Engineers through Society* (Milton Keynes: Open University Press, 1987). Bruno Latour and Steve Woolgar, *Laboratory Life: The Social Construction of Scientific Facts* (Beverly Hills; London: Sage Publications, 1979). Steven Shapin, Simon Schaffer, and Thomas Hobbes, *Leviathan and the Air-Pump: Hobbes, Boyle, and the Experimental Life* (Princeton, N.J.: Princeton University Press, 1985).

[54] David Wade Chambers and Richard Gillespie, "Locality in the History of Science: Colonial Science, Technoscience, and Indigenous Knowledge " *Osiris* 15 (2000): 231.

[55] Latour and Woolgar.

[56] Dr A. Binyamini, "Ha-Behinot U-Veriut Yeladeinu," *Ha-aretz* July 24th, 1930, 3.

Other important media of knowledge exchange between experts and laypeople were popular medical and scientific guidebooks. The former sub-genre was intended to educate the masses into maintaining a better state of health in their new physical conditions while often focusing specifically on the dangerous implications of local climate.[57] The latter introduced the principles of different scientific disciplines and their evolution over time to the public. Popular scientific books pertaining to the subject of climate usually included *Yediaat Ha-aretz* textbooks. The literal meaning of this term in Hebrew is 'knowing the land'. This genre was meant to acquaint Jews in Palestine with the climate, landscapes, history, flora, geography and geology of the Land of Israel from a young age. A few popular scientific publications were dedicated solely to the subject of climate.[58] In the process of simplifying professional knowledge and making it more accessible, authors of popular science books often also expressed their preconceptions of the climate in Palestine. For example, in explaining the climate of Jerusalem, the author of *Naturgeschichte Palästinas* (The Natural History of Palestine), Fritz Kahn, portrayed the warm eastern desert winds as a 'devil' and the cool sea wind as a gentle water animal (see figure 1.).

[57] For example: Hillel Yafeh, *Shmirat Ha-Briut* (Jaffa: A. Atin Print, 1913). Unknown, *Beriut Ha-Oleh: Madrich La-Oleh He-Hadash Be-Inyanei Higyena U-Vriut* (Jerusalem: Kupat Holim Amamit Ve-mahleket Ha-aliya Shel Hasokhnut Ha-yahudit, 1939). Zlocisti. Seide. Dafna Hirsch, moreover, addresses the role of nurses in conveying basic hygiene principals to the Jewish population in Mandate Palestine. According to Hirsch, the significance of nurses in the circulation of medical knowledge did not only take place in hospitals and medical centres. Nurses often participated in house visits and had an educational duty in schools. Dafna Hirsch, *'We Are Here to Bring the West': Hygiene Education and Culture Building in the Jewish Society of Palestine During the British Mandate Period* (Sde Boker: The Ben-Gurion Research Institute for the Study of Israel and Zionism, 2014), 282-83. See also: Jessica Howell, "Nursing the Tropics: Nurses as Agents of Imperial Hygiene," *Journal of Public Health* 35, no. 2 (2013).

[58] For example: Dov Ashbel, *Avir Artzenu* (Tel Aviv: Omanut Ba'am, 1940).

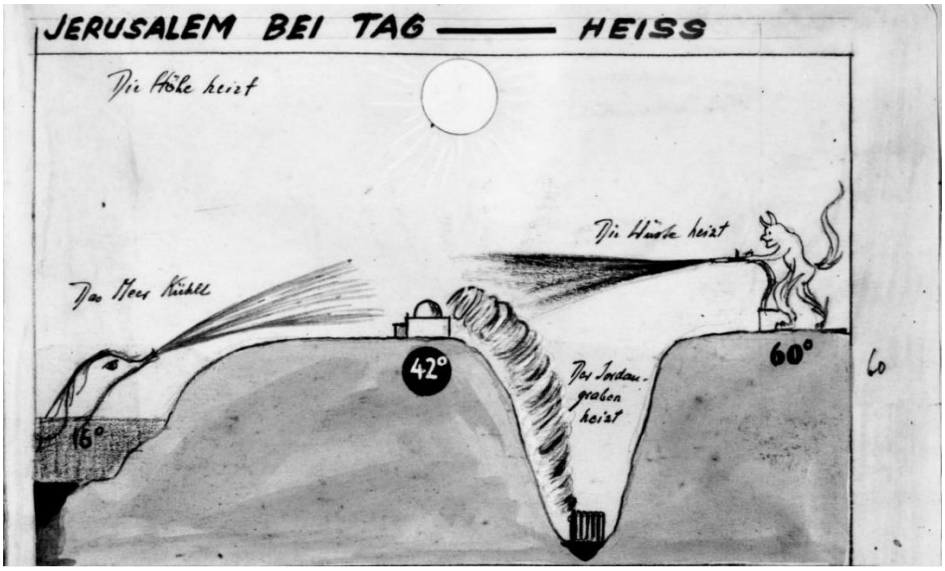


Figure 1. 'Jerusalem by Day - Hot', Illustration by Fritz Kahn, 1936

In addition, popular science books were able to raise questions that professional scientific publications did not attempt to challenge. In the same manuscript, Kahn discussed the role of statistics in the study of climate. He wrote:

> Numbers and curves make too great of an impression. They balance fake [information] and deceive people. […] [Statistics] are indeed uncontroversial and yet – they tend to be wrong. […] Nature does not discuss a 'state of health', the 'average age', the middle temperature, isotherms, and any other types of climatic terms. These terms exist only in the minds of scientists. If you tell a farmer – and a good farmer knows the meaning of weather –[…] 'your farmyard has the median temperature of 16 degrees', he will laugh at you because *he* knows – what scholars and scientists often forget – that a middle temperature does not exist.[59]

By disputing common scientific premises in climatology, medicine, agriculture and architecture, popular discourses on climate also allow us to witness and discover the conventions, tensions, and conflicts which were part of the construction of cultural and scientific knowledge concerning climate within the Jewish community in Palestine.

[59] Fritz Kahn's manuscript *Naturgeschichte Palästinas*, 1930s, LBICJH, AR 7144/MF 746, II,4, 2:42. Italics added by Netta Cohen

In this study, I follow processes of knowledge production by those who according to Bernard Cohn, 'entered a new world that they tried to comprehend using their own forms of knowing and thinking'.[60] According to Cohn, the structure and practice by which colonial knowledge was compiled can teach us many things about the underlying approaches of colonialists to a given place. Just as the census in India created social categories that were previously non-existent or vague and made it easier to control the population, climatic surveys and the development of climatology created distinct categories of natural phenomena that could be measured and addressed and even more importantly could be used to ensure productiveness and profit in other spheres of life.[61] Kathrin Anderson writes that 'the atmosphere, like empire, required discipline on a monumental scale', thus, providing the ground for a new relationship between meteorological science and the state as mutually strengthening models of rational order.[62]

However, when discussing popular or non-scientific forms of knowledge within the colonial framework, indigenous knowledge cannot be ignored. In my thesis, I address traditional Palestinian methods of confronting local climate through the eyes of their Jewish contemporaries. My decision to approach indigenous knowledge obliquely derives from the premise of this study which asserts that the study of climate was interconnected with colonial expansion. In other words, while Jews aspired to study the new and unfamiliar environment in Palestine in order to confront, manage and tame it, the local Arabs who had lived in the country for centuries did not share the same aspiration or concern. When referring to Palestinian methods of confronting the local

[60] Bernard S. Cohn, *Colonialism and Its Forms of Knowledge: The British in India* (Princeton, N.J.; Chichester: Princeton University Press, 1996), 4.
[61] Ibid., 7-8.
[62] Katharine Anderson, *Predicting the Weather: Victorians and the Science of Meteorology* (Chicago, Ill.: University of Chicago Press, 2005), 284.

climate, Jewish experts occasionally expressed a belief that the indigenous population possessed 'secret' knowledge on how to manage the climate.[63] However, in most cases they dismissed this knowledge as unscientific and, hence, invaluable. Moreover, during the 1929 uprising Arabs destroyed Jewish meteorological stations in Beer Sheva, Jericho, and Beit Shean, thus, linking between the Zionist enterprise and meteorological investigation. The destruction of Jewish meteorological stations suggests that this scientific field was perceived by local Arabs as foreign and colonial. [64]

Moreover, besides examining the production of Jewish-Zionist knowledge on climate in relation to political, cultural and social contexts, this thesis also analyses the material aspects which were intertwined with the study of climate in Palestine such as food production, food consumption, water management, building materials, labour routines, living standards and hygiene practices. In doing so, I aspired to follow the work of Walter Johnson in his pioneering book *River of Dark Dreams* and William Cronon in *Nature's Metropolis: Chicago and the Great West*.[65] These historical accounts, different as they may be, present exceptional examples to be emulated in their integration of a wide range of subjects into a historical analysis of a natural or spatial phenomenon.

[63] For further reading on the tension between science and indigenous knowledge: Kapil Raj, *Relocating Modern Science: Circulation and the Construction of Knowledge in South Asia and Europe, 1650-1900* (Basingstoke: Palgrave Macmillan, 2007); Helen Watson-Verran and David Turnbull, "Science and Other Indigenous Knowledge Systems," in *Handbook of Science and Technology Studies*, ed. Sheila Jasanoff, et al. (Thousand Oaks, Calif.: Sage Publications, 1995). Chambers and Gillespie. Arun Agrawal, "Dismantling the Divide between Indigenous and Scientific Knowledge," *Development and Change* 26, no. 3 (1995).
[64] Ashbel, 14-16.
[65] Walter Johnson, *River of Dark Dreams: Slavery and Empire in the Cotton Kingdom* (Cambridge, Massachusetts: Belknap Press of Harvard University Press, 2013). William Cronon, *Nature's Metropolis : Chicago and the Great West* (New York; London: Norton, 1991).

Methodology and Argument

Studies on the concept of the Jewish race in intellectual history and in the history of science have long been central to the historiography of modern European Jewry. Moreover, renowned historians such as John Efron, Mitchell Hart and Sander Gilman have highlighted the contribution of some Jews to this scientific discourse.[66] Although these historians cite climate as one of the elements which was understood to have influenced racial theory in the past, they typically focus on the evolution of biological and eugenicist paradigms which later authorised the destruction of European Jewry by fascist regimes. In doing so, these scholars anachronistically neglect the role of climatic and environmental accounts in fin-de-siècle race discourses as well as the tendency of Jews to prefer them as explanations for their 'otherness'. My chapter on the role of climate within Jewish and Zionist intellectual discourses on race addresses this historiographical lacuna.

Historian Warwick Anderson rightly asks, 'why is the history of ideas about nature so rarely combined with the history of racial thought given that for most 19th century intellectuals race and circumstance, blood and soil, were so frequently compounded?'[67] Indeed intellectual history has so far rarely focused on this conceptual link. On the contrary, environmental historians as well as historians of medicine have often addressed the link between race, health and climate in the colonial context. Scholars such as Richard Grove, Mark Harrison, David Arnold, David Livingstone,

[66] John M. Efron, *Defenders of the Race: Jewish Doctors and Race Science in Fin-De-Siecle Europe* (New Haven; London: Yale University Press, 1994); *Medicine and the German Jews: A History* (New Haven; London: Yale University Press, 2001); Mitchell Bryan Hart, *The Healthy Jew: The Symbiosis of Judaism and Modern Medicine* (Cambridge: Cambridge University Press, 2007); *Social Science and the Politics of Modern Jewish Identity* (Stanford, Calif.: Stanford University Press, 2000); Iris Idelson-Shein, *Difference of a Different Kind: Jewish Constructions of Race During the Long Eighteenth Century* (Philadelphia: University of Pennsylvania Press, 2014); Sander L. Gilman, *The Jew's Body* (New York; London: Routledge, 1991).

[67] Warwick Anderson, *The Cultivation of Whiteness: Science, Health and Racial Destiny in Australia* (Carlton, Vic.: Melbourne University Press, 2005), 4-5.

Eric Jennings, Michael Osborne, Warwick Anderson and many others have contributed tremendously to our understanding of cultural and scientific concepts of climate in medical thought. As these studies suggest, the evolution of climate as a field of intense medical and scientific study was largely a result of European encounters with climates outside the so-called 'temperate zone'. [68] Their research has focused both on the ways in which climate shaped colonial enterprises, as well as on how ideas about climate informed colonial ideologies. Historians in this field have shown how European expansion was vindicated by theories of racial superiority, which were frequently associated with ideas of climatic determinism.[69] Simultaneously, the colonial spaces offered novel 'laboratories' where ideas about acclimatisation and climatic improvement could be tested on the ground.[70]

While the history of medicine has focused on how notions of climate informed imperial medical ideas and practice, emerging scholarship in environmental history, history of science and historical geography has focused instead on the 'material and cognitive practices by which the climates of colonial spaces were made known and dealt with in fields such as forestry, agriculture and architecture'.[71] These areas of historical inquiry, traditionally viewed as separate from climate, carry great

[68] Grove. Mark Harrison, *Climates & Constitutions: Health, Race, Environment and British Imperialism in India, 1600-1850* (Delhi ; Oxford: Oxford University Press, 1999). Arnold. N. David Livingstone, "Race, Space and Moral Climatology: Notes Towards a Genealogy," *Journal of Historical Geography* 28, no. 2 (2002). Eric T. Jennings, *Curing the Colonizers: Hydrotherapy, Climatology, and French Colonial Spas* (Durham, N.C.; London: Duke University Press, 2006). Michael Osborne, "Resurrecting Hippocrates: Hygienic Sciences and the French Scientific Expeditions to Egypt, Morea and Algeria," in *Warm Climates and Western Medicine: The Emergence of Tropical Medicine, 1500-1900*, ed. David Arnold (Rodopi: Brill 1996). Anderson.

[69] Climatic determinism asserts a correlation between moral, mental and cultural traits of societies and the climatic conditions that they are surrounded with.

[70] Mahony and Endfield, 1.

[71] Ibid.

contemporary relevance for studies on the ways in which climates were understood, debated and adapted to in the past. [72]

In my thesis, I address the ways in which the environment and, specifically, climate were imagined, understood and managed by Jewish European settlers in Palestine. I argue that the encounter of European Jews with an alien natural environment was a decisive component in the evolution of a novel Hebrew national, cultural and spatial identity. The resemblance of Zionist notions of climate in Palestine to those of Europeans in the colonies, aligned with the allusions of contemporary Jewish experts to the success or failure of other Europeans in adjusting to warm climates in the colonies, provides another justification for why the Zionist project should be analysed through its colonial features.

To this end, this study is inspired by what Ethan Katz, Lisa Moses Leff and Maud Mandel defined as the 'Jewish Imperial Turn'.[73] In recent decades, there has been a growing debate among historians and social scientists on whether the Zionist movement should be viewed as a national movement or as a colonial movement. I believe that the underlying political connotations of this debate do not reduce its scholarly significance. Moreover, as Yoav Peled and Gershon Shaffir point out, characterising Zionism as a colonial movement is not meant to ascribe blame or judgement to it. Rather, this definition corresponds to some Jewish settlement patterns in Palestine and it may assist scholars in understanding Jewish and subsequent Israeli

[72] For example: Richard Grove, *Ecology, Climate and Empire: Colonialism and Global Environmental History, 1400-1940* (Cambridge: White Horse, 1997). Greg Barton, *Empire Forestry and the Origins of Environmentalism*, Cambridge Studies in Historical Geography (Cambridge, U.K.; New York: Cambridge University Press, 2002). Deborah R. Coen, "Climate and Circulation in Imperial Austria," *The Journal of Modern History* 82, no. 4 (December, 2010). Martin Mahony, "For an Empire of 'All Types of Climates': Meteorology as an Imperial Science," *Journal for Historical Geography* 51 (2016). Hulme, *Weathered: Cultures of Climate*. Chang and King.
[73] Katz, Leff, and Mandel, 3.

cultural, social and political developments that took place during the twentieth century.[74]

As anthropologist Dafna Hirsch claims, the Zionist aim of locating a non-European territory for Jewish settlement (that is a territory which was not owned by Jews and was hardly inhabited by them at the end of the nineteenth century) would not have been possible without European colonisation and could not have been accomplished without European imperialism. Even if the relations of the *Yishuv* with the British local government were not always stable and sometimes even conflicted, the Zionist project in Palestine was indeed sponsored by Britain as well as by Jewish organisations external to the country.[75]

Within colonial studies there has been a clear distinction between the ideas and practices of imperial colonialism and those of settler colonialism. The first category usually refers to the expansion of Western powers into non-Western territories, the acquisition of territories and their exploitation for political and economic profit. Fundamental to imperial colonialism is its reliance on indigenous labour and local administration, while the colonisers maintain the position of external rulers. The second category of settler colonialism refers to historical cases in which societies invaded and occupied foreign lands in order to settle them, while usually being inspired by utopian ideals of creating new and improved societies with the aim of replacing indigenous populations and taking over their lands and resources.[76] Tracey Banivanua-Mar argued

[74] Gershon Shafir and Yoav Peled, *Being Israeli: The Dynamics of Multiple Citizenship* (Cambridge: Cambridge University Press, 2002), 27.
[75] Hirsch, 20-22.
[76] Patrick Wolfe, "Settler Colonialism and the Elimination of the Native," *Journal of Genocide Research* 8, no. 4 (2006). Rachel Busbridge, "Israel-Palestine and the Settler Colonial 'Turn': From Interpretation to Decolonization," *Theory, Culture & Society* 35, no. 1 (2018).

that settlers, in the end, tended 'not to emigrate to assimilate into indigenous societies, but rather […] to replace them'.[77]

Edward Cavanagh and Lorenzo Veracini claim that 'even if colonialism and settler colonialism interpenetrate and overlap, they remain separate as they co-define each other'.[78] Indeed, the distinction between imperial colonialism, settler colonialism and even nationalism is important to our discussion since it enables us to frame the political, social and cultural history and present reality of the Zionist project. However, despite their differences, these categories should not be understood as ones that cannot intersect or exist in juxtaposition.

When writing about the Zionist project, Shafir, for example, demonstrates how a settler colonialist society can also be part of a national movement. He defines settler colonialism as an economy based on white labour 'which together with the forcible removal or the destruction of a native population allows the settlers to regain a sense of cultural or ethnic homogeneity identified with European concepts of nationality'.[79] Historian Sandra Sufian similarly points out that 'Zionism evolved alongside the rise of European national movements and colonialism, drawing upon the former in its search for political and national autonomy and the latter for its methods of implementation.'[80]

Moreover, within the colonial framework of analyses, the Zionist ideology can also be understood as a form of anti-colonial movement. As Tara Zahra reminds us, the rise of Zionism coincided not only with European nationalism and colonialism but also with one of the greatest waves of mass emigration in modern history, as millions of Jews left eastern and central Europe at the turn of the twentieth century as a result of

[77]Tracey Banivanua-Mar and Penelope Edmonds, *Making Settler Colonial Space: Perspectives on Race, Place and Identity* (Basingstoke: Palgrave Macmillan, 2010), 2.
[78] Edward Cavanagh and Lorenzo Veracini, "Editors Statement," *Settler Colonial Studies* 3, no. 1 (2013): 1.
[79] Shafir, 8.
[80] Sufian, 11.

growing anti-Semitic discrimination and violence against them.[81] In recent years, some historians of Zionism who accept the 'imperial turn' and have contributed to its scholarship, have begun to simultaneously discuss Zionism as an act of resistance by a culturally colonised people. Derek Penslar argues that prior to 1948 the Zionist project can be historically and conceptually situated between colonial and anti-colonial discourses and practices. He writes that European Jewish intelligentsia's historical struggle from the Jewish Enlightenment until the twentieth century aimed to defend Jewish culture from the dominant Christian society through strategies which were similar to those employed by the colonised intelligentsia of Asia and Africa. [82]

Katz, Leff and Mandel write that in the case of modern Jewish historiography 'we cannot simply borrow from established methods of analysis and neatly apply them to the Jewish case'.[83] Indeed, in my thesis, I argue that Zionist science, medicine and technology between the late nineteenth century and the mid-twentieth century were composed of both colonial (imperial as well as settler colonial), anti-colonial and nationalist ideas and practices which reflected the development of distinct experiences, beliefs and ideologies among different Jewish groups both in Europe and in Palestine at different historical moments.

In recent years there has been a growing interest in the history and sociology of Zionist science, medicine and technology in Palestine. Influenced by global scholarly

[81] The most well-known pogroms at the turn of the century that propelled Jewish mass migration were the pogroms of 1881-1882 in the Pale of Settlement in the Russian Empire and the Kishinev Pogroms in 1903. Zahra defines the mass emigration of eastern and Central Europeans to South America and Africa as 'emigrant colonies' which aimed to create self-sufficient farms and preferred enclosed communities rather than assimilating into their new environments. Zahra links Zionism to these types of colonies. Tara Zahra, "Zionism, Emigration, and East European Colonialism," in *Colonialism and the Jews*, ed. Ethan Katz, Lisa Moses Leff, and Maud Mandel (Bloomington: Indiana Univeristy Press, 2017), 166-67. 74.
[82] Derek Jonathan Penslar, "Is Zionism a Colonial Movement?," ibid. (Indiana University Press), 276. In addition, Penslar claims that after 1948 the State of Israel translated the anticolonial rhetoric of victimisation into a triumphant postcolonial discourse.
[83] Ethan Katz, Lisa Moses Leff, and Maud Mandel, "Introduction: Engaging Colonial History and Jewish History " ibid. (Indiana Univeristy Press), 7.

trends in these sub-disciplines, historians of Zionism have begun to view science, medicine and technology in Palestine as culturally, socially and politically constructed with many of them highlighting that the transportation of Western knowledge and ideas to Palestine was part of a larger process of modern Jewish-Zionist culture-building. Most significant in the field of medicine is the work of historian Sandra Sufian who has inquired into the socio-political dimensions of public medicine and focused mainly on the Jewish and British battle against malaria in Palestine. In her book, *Healing the Land and the Nation,* Sufian investigates how medical knowledge transformed the landscape and demography of the country and how contemporary Jewish medical discourses were influenced by Zionist images of both the country itself as well as the Jewish and Arab inhabitants living in it.[84] Another important scholarly work in Zionist medical history is Dafna Hirsch's pioneering research on hygiene education in the Jewish community in British-ruled Palestine which demonstrates how the organised effort to disseminate hygienic practices was designed to achieve 'rational' and 'scientific' regulations of everyday behaviour and differentiate the Jewish settler community from the Arab population.[85] While Sufian and Hirsch both mention climate as part of the Jewish medical discourse in Palestine, they do not address it as a subject on its own nor do they elaborate on its centrality within contemporary medial discourses.

Similarly, recent scholarship on Jewish architecture and planning in Palestine has revealed the extensive use of European colonial models in formulating an ethnic stratification within the Jewish community itself as well as in relation to the Arab population.[86] The architecture historian Or Aleksandrowicz has devoted some of his

[84] Sufian, 4-5.
[85] Hirsch. Other studies on Zionist medicine in Palestine: Raphael Falk, *Zionism and the Biology of the Jews* (New York, NY: Springer, 2017). Nadav Davidovitch and Shifra Shvarts, "Health and Hegemony: Preventive Medicine, Immigrants and the Israeli Melting Pot," *Israel Studies* 9, no. 2 (2004).
[86] For example: Haim Yacobi, *Constructing a Sense of Place: Architecture and the Zionist Discourse*, Design and the Built Environment Series (Aldershot, Hants, England; Burlington, VT: Ashgate, 2004).

work to discussing the employment of climatology in architecture and planning. However, so far, his published work has mainly focused on the second half of the twentieth century and has generally abstained from linking the Jewish architectural discourse with more broader perceptions on the matter of warm climates, mainly in the colonial and medical contexts.[87]

Historical studies on Jewish agriculture in Palestine have also focused on its role as an effective instrument in defining the settler-colony's economic, demographic and political structures.[88] Nevertheless, similarly to the aforementioned fields of expertise, so far climate has not played a central role in these historical accounts, that is, despite its prevalence in Jewish-Zionist professional and popular primary sources. In addition, thus far no comprehensive research has been conducted on the history of Zionist climatology and meteorology.

Although the existing literature on the history of Zionist science, medicine and technology in Palestine is quite abundant, until recent years environmental issues received only little attention, with climatic issues generally being neglected.[89] By drawing on approaches honed by colonial historians for the first time within this context, my thesis offers a more thoroughly historicised rethinking of the early Zionist relationship with the environment of Palestine.

Alona Nitzan-Shiftan, "Contested Zionism – Alternative Modernism: Erich Mendelssohn and the Tel Aviv Chug in Mandate Palestine," *Architectural History* 37 (1996). Sharon Roṭbard, *White City, Black City: Architecture and War in Tel Aviv and Jaffa* (Cambridge, MA: MIT Press, 2015). Mark Levine, *Overthrowing Geography: Jaffa, Tel Aviv and the Struggle for Palestine 1880-1948* (Oakland: University of California Press, 2005).

[87] Or Aleksandrowicz "Appearance and Preformance: Israeli Building Climatology and Its Effect on Local Architectural Practice (1940-1977)," *Architectural Science Review* 60, no. 5 (2017).

[88] For example: Shafir; Penslar, *Zionism and Technocracy: The Engineering of Jewish Settlement in Palestine, 1870-1918*. Nahum Karlinsky, *California Dreaming: Ideology, Society, and Technology in the Citrus Industry of Palestine, 1890-1939* (Albany, NY: State University of New York Press, 2005). Ravit Hananel, "Zionism and Agricultural Land: National Narratives, Environmental Objectives, and Land Policy in Israel," *Land Use Policy* 27 (2010).

[89] The only articles published on climate in Palestine: Anat Helman, "European Jews in the Levant Heat: Climate and Culture in 1920s and 1930s Tel Aviv," *Journal of Israeli History: Politics, Society, Culture* 22, no. 1 (2010). Aleksandrowicz

Nevertheless, this thesis also aspires to contribute to the broader field of colonial history. As Katz, Leff and Moses argue, 'Jews offer an exceptionally rich entry point for new efforts to write comparative and transregional accounts of empire'.[90] In addition, Jewish history raises critical terminological issues for colonial history and the uncertain, contradictory position of Jews may also subsequently reveal new aspects within colonial history. In other words, considering the 'in betweenness' of Jews as part of the colonial story enables us to rethink imperialist ideas and practices through its periphery. Finally, because Zionism emerged in an imperial context and assumed colonial and anti-colonial stances and alliances at various moments, studying it requires grappling with the ambiguity of colonial history and demands the rethinking of binary categoric terms such as 'metropole' and 'colony', and 'coloniser' and 'colonised'.[91]

[90] Katz, Leff, and Mandel, 10.
[91] Ibid., 13-15.

Part I: Distant Gazes – Climate as a Cause for Jewish and Zionist Actions

The first part of this thesis addresses the issue of climate in intellectual and scientific inquiry and focuses on its role within Jewish and Zionist circles before and during the formative years of the Zionist movement in Europe. This section aims to contextualise Zionist notions of climate within a larger European tradition and, specifically, in relation to its colonial heritage which was intrinsic to the general development of climate research.

Chapter 1. Climate and the Jews: An Intellectual History

Since antiquity, climate has been routinely invoked in explanations of the moral and physical variations of humans. The Hippocratic treatise *De aere, aquis, locis* (*Air, Waters and Places*), from the fourth century BC, is considered to be the first essay discussing the relation between climate, health and ethnography. Although throughout the next centuries, climate theory transformed and at times waned, the revival of ancient Greek and Roman texts during the Renaissance as well as European encounters with unfamiliar realities in the New World starting from the fifteenth century reintroduced this concept into Western thought.[92] By the mid-eighteenth century, with the further expansion of colonial conquests into tropical regions, climate began to be perceived as the main cause of human variability and disease. During this period, notions of climate were increasingly also utilised to explain the moral and physical characteristics of the Jewish people. In other words, these notions were usually applied by Gentiles in order to stress the allegedly fundamental dissimilarity of Jews to Europeans.

Nonetheless, Jews themselves often used climate theory in order to discuss their own identity and to advocate diverse and sometimes contradictory ideas concerning the desired future and destiny of European Jewry. This chapter addresses the evolution of modern European ideas concerning climate and their perceived role in influencing the physical and psychological nature of individuals and societies. As climate was utilised to explain both the nature of Jews – Europe's internal 'Other' – as well as the nature of Europe's external 'Other' in the colonies, this chapter demonstrates the transfer of ideas that occurred between metropoles and their colonies and emphasises the innate link that existed between Jews and colonial subjects in the development of racial thought. In

[92] Grove, *Green Imperialism: Colonial Expansion, Tropical Island Edens and the Origins of Environmentalism, 1600-1860*, 154.

doing so, this chapter also introduces underlying Western ideas concerning climate and human variations which were later absorbed and developed by Zionist thinkers.

The first section of this chapter focuses on the growing importance of climate theory during the period of the European Enlightenment. It later follows the ways in which this theory continued to evolve during the age of imperialism in the nineteenth century. Climate theory enabled Europeans to not only explain the Otherness of foreign ecosystems and people, but at its early stages it also legitimised the notion of 'racial passing'[93], therefore, providing evidence for the potential adaptation of Europeans to non-temperate climates. In this section I demonstrate the general meanings and connotations of climate theory in European thought prior to the rise of biological race sciences.

In addition, as mentioned earlier, during the late eighteenth century climate theory also began to be utilised to explain the physical and mental traits of Jews. As a result of its fluidity, climate theory often served to provoke both feelings of attraction and alienation towards Jews. However, as I demonstrate in this chapter, the prominence of climate theory did not escape Jewish scientific thought. Thus, in the second section of this chapter I present the general influence of Enlightenment ideas on the *Haskalah*[94] movement while focusing on the ways in which climate theory was utilised by Jewish thinkers to advocate the Sameness of Jews in relation to Europeans in the years that preceded the proclamation of emancipation.

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[93] I borrow the term 'racial passing' from Dror Wahrman who argued that during the eighteenth century human complexion and skin color were understood to be predicated on climate, culture and civilization. Dror Wahrman, *The Making of the Modern Self : Identity and Culture in Eighteenth-Century England* (New Haven, Conn.; London: Yale University Press, 2004), 85.

[94] The Haskalah, also known as the Hebrew enlightenment was a literary, cultural and social movement which represented the gradual penetration of modernisation (and to some extent of secularisation) into Jewish intellectual circles starting from the late eighteenth century in Germany and ending in the 1880s in eastern Europe. Its proponent were known as *Maskilim* who advocated in their writings for humanism, tolerance and reason. However, while promoting these changes the *maskilim* also wished to remain faithful to their Jewish tradition "arguing in effect that they wish to restore Judaism to its original, pristine state". Pelli, 9.

The third section discusses the rise of biological race theory in Europe during the second half of nineteenth century and its gradual replacement of climate theory in explaining human variation. This new scientific paradigm, which served, among other things, as a response and a reaction to Jewish emancipation and integration, simultaneously influenced Jewish thinkers who adopted it and sought to explain through it what they perceived as a Jewish racial decay. Yet, during the second half of the nineteenth century, climate theory did not simply disappear. According to historian Mark Harrison it rather transformed into a view that still accepted the effects of climate, but drew these out over many generations, thereby, transforming them into a remote influence on human development. Indeed, as I demonstrate in the following pages, most Jewish scientists, including those who believed in race theory, were inclined to prefer environmental, historical and cultural explanations to discuss the development of Jewish characteristics and to advocate for Jewish colonisation in Palestine.

Climate Theory in European History

The rise of climate theory during the mid-eighteenth century was related, among other things, to the scientific revolution of the seventeenth century and, subsequently, to the growing interest of Westerners in gathering empirical data which also encouraged experimentation and laid the foundation for material accounts of unfamiliar geographies. One of the most important scientific fields in this context was the study of botany. Developments in this field were accompanied by the increasing professionalisation and standardisation of research methods and interest in transporting

crop plants from one country to another. These developments were inseparable from the systematic study of climates.[95]

Another important channel that contributed to the distribution of climatic accounts within racial discourses during this period was the deluge of travellers' accounts that began to appear in the early eighteenth century and continued to be prevalent throughout the century. Written descriptions of new environments in this literary genre tended to emphasise the role of climate, not only in relation to flora but also with respect to the physical attributes and moral behaviours of indigenous people.[96] Historian Snait Gissis has argued that it was during this time that the discourse on society, civility and civilisation, found in travel literature collapsed into the discourse on nature. According to Gissis, 'Humans became classified and visually represented along the same lines as flora'.[97]

One well-known example that reflected this trend was Carolus Linnaeus's book *Systema Naturae* published in 1735, in which the renowned Swedish botanist and zoologist presented a new scientific method for classifying flora and fauna. In his taxonomy, Linnaeus divided animals and plants into a hierarchical system according to their external characteristics which he believed stemmed from climatic differences. This analysis later led him to attempt to classify humans in a similar way. First, he categorised humans into four types according to the four continents he was familiar with and following this he described each group according to its complexion.[98]

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[95] Grove, *Green Imperialism: Colonial Expansion, Tropical Island Edens and the Origins of Environmentalism, 1600-1860*, 162.
[96] Ibid.
[97] Snait Gissis, "Visualizing "Race" in the Eighteenth Century," *Historical Studies in the Natural Sciences* 41, no. 1 (Winter 2001): 41,53.
[98] Carl von Linne, *Systema Naturae Sive Regna Tria Naturae Systematice Proposita Per Classes, Ordines, Genera, Et Species* (Leiden: Apud T. Haak, 1735).

By utilising climate theory, eighteenth century writers were also able to anchor their prejudiced beliefs in external elements with the support of contemporary scientific explanations. Many assumed, for example, that 'lethargy' was a result of prolonged exposure to the sun, that excessive heat served as fertile ground for the emergence of despotic regimes and that wild undomesticated environments were evidence of the presence of barbarian people. Book XIV 'Of Laws in Relation to the Nature of Climate' in Montesquieu's *The Spirit of Laws,* published in 1748, is one of the most cited examples used to illustrate the perceived influence of climate on human societies and their political institutions during this period. Montesquieu wrote:

> people are […] more vigorous in cold climates. [...] This superiority of strength must produce various effects; for instance, a greater boldness, that is, more courage; a greater sense of superiority, that is, less desire of revenge; a greater opinion of security, that is, more frankness, less suspicion, policy, and cunning […] In the tropics the heat of the climate may be so excessive as to deprive the body of all vigour and strength. Then the faintness is communicated to the mind; there is no curiosity, no enterprise, no generosity of sentiment; the inclinations are all passive; indolence constitutes the utmost happiness; scarcely any punishment is so severe as mental employment; and slavery is more supportable than the force and vigour of mind necessary for human conduct.[99]

The attribution of mental and cultural traits to climatic conditions, also known as 'climatic determinism' or 'moral climatology', can be seen in many natural historical and philosophical essays of the time and it is demonstrated in the work of renowned figures such as David Hume, Immanuel Kant, Georg Wilhelm Friedrich Hegel and others.[100] Explanations of human variation were often also intertwined with accounts on the origin of human races. Many eighteenth-century thinkers, for example, asserted

[99] Charles de Secondat Baron de Montesquieu, *The Spirit of Laws* (Kitchener: Batoche Books, 2001 [1748]), 246-49.

[100] David Hume, "Of National Characters," in *Essays, Moral, Political, and Literary* (Indianapolis: Liberty Classics, 1742 [1987]). Georg Wilhelm Friedrich Hegel and H. B. Nisbet, *Lectures on the Philosophy of World History, Introduction: Reason in History* (Cambridge: Cambridge University Press, 1975 [1822,1828]). Immanuel Kant, "Von Den Verschiedenen Racen Der Menschen [Reprinted as 'on the Different Races of Man'] " in *This Is Race: An Anthology Selected from the International Literature on the Races of Man*, ed. Earl W. Count (New York: Schuman, 1950).

that humans originated from a single source. This notion, known as monogenesis, was closely associated with the biblical story of creation. Simultaneously it encouraged the ideas of a universal morality and equality and therefore corresponded with the ideas of the Enlightenment. According to monogenetic thinkers, the physical traits of ethnic groups were solely the result of the external influence of environments and climates. These traits were flexible and could be transformed in a new geographical location.

Thus, the French naturalist and head of the *Jardin du Roi* in Paris, Georges-Louis Leclerc Comte de Buffon, believed, for example, that Africans would lose some of their distinguished attributes if they moved to colder climates while others asserted that Europeans who remained in the tropics for several generations would become darker, thereby, adapting to the warm climate of the tropics.[101] In 1749, Buffon published his book *Histoire naturelle*, which attempted to incorporate all natural phenomena into a general interpretation of the laws governing the universe. Within this compendium, Buffon stressed the fluid influence of climate and its transformative attributes:

> Everything goes to prove that the human type is not composed of species with essential differences between them, but that, on the contrary, there was originally only one species of man, which having multiplied and spread out over the whole surface of the earth, underwent different changes by the influence of climate, by the difference of nourishment, by the manner of living, by epidemic diseases […].[102]

As can be seen in Buffon's writings, human classification was not necessarily understood as fixed during the eighteenth century and the category of 'race' was used infrequently and quite loosely. Despite the rise of hereditarian theories during the nineteenth century, which increasingly viewed races as separate and fixed categories,

[101] Harrison, 11-13.
[102] In: Grove, *Green Imperialism: Colonial Expansion, Tropical Island Edens and the Origins of Environmentalism, 1600-1860*, 163.

questions concerning European acclimatisation in the tropics continued to occupy colonials. In 1835, the French verb *acclimater* first appeared in the dictionary of the *Académie Française*, which defined it as 'to accustom to the temperature and influence of a new climate'.[103] The dictionary also provided examples for the term's usage which included the adaptation of Spanish sheep to the northern European climate and the physical and mental difficulties that Europeans faced in the West Indies.[104]

To those who understood climate theory as the main explanation for human variability, Jews served as the ultimate proof for the possibility of acclimatosation. Jews were considered the purest race in Europe as they were known to avoid intermarriage and physically isolate themselves from non-Jews. Jewish communities had existed for centuries around the world and yet they still resembled the people among whom they lived. In 1787, Samuel Stanhope Smith published his *Essay on the Causes of the Variety of Complexion and Figure in the Human Species*. His reference to Jews serves as the epitome of this discourse.

> No example can carry with it greater authority on this subject than that of the Jews. Descended from one stock, prohibited by their most sacred institutes from inter-marrying with strangers, and yet widely dispersed into every region in the globe, this one people is marked with the peculiar characteristics of every climate.[105]

The notion of a uniquely Jewish ability to acclimatise to new environments did not, however, prevent other thinkers from taking a completely opposite approach to the nature of Jews. These thinkers asserted that the Jewish people were the only race immune to the influence of climate. For example, in his *Essay on the Physical, Moral, and Political Regeneration of the Jews*, published in 1788, Abbé Grégoire argued that

[103] Osborne, 137.
[104] Ibid., 136-37.
[105] Quoted in: Efron, *Defenders of the Race: Jewish Doctors and Race Science in Fin-De-Siecle Europe*, 42.

Jews possessed a number of unique characteristics which made them resistant to the influence of climate.

> Climate has scarcely any effect on them, because their manner of life counteracts and weakens it influence. Difference of period and country has, therefore, often strengthened their character, instead of altering its original traits. In vain has their genius been fettered; it has never changed; and perhaps there is more resemblance between the Jews of Ethiopia and those of England, than between the inhabitants of Picardy and those of Provence.[106]

Opposite and contradictory approaches towards Jews demonstrated the fluidity, abstractness and amorphousness of the concept of climate, which enabled manifold interpretations. Climate theory worked well, not in spite of its logical inconsistencies and ambiguities but rather because of them. It was pervasive precisely since it was variant, creating the possibility for different arguments and perspectives to be highlighted within different political, cultural and social contexts and depending upon the individual inclinations of different writers. The fluidity of climate theory inspired both feelings of attraction and alienation towards Jews and suited not only the inherent inconsistency of bigotry in general but also offered an explanation for the specific historical condition of Jews as an uprooted people. Jews signalled everything that Europeans did not wish to be. If the former were unable to adapt to different climates, then the latter could and vice versa.[107]

Haskalah and the Seeds of Climate Theory in Jewish Thought

The discourse on climate in relation to Jewish characteristics did not only prevaile among non-Jewish thinkers, but was also embraced by Jews who wished to emphasise

[106] Quoted in: ibid., 6.
[107] Waltraud Ernst and Bernard Harris, *Race, Science, and Medicine, 1700-1960* (London: Routledge, 1999), 7.

their own identity (in the literal meaning of the word, that is, sameness) as Europeans. During the second half of the eighteenth century, modernisation began to infuse traditional Jewish communities in western and central Europe. The intellectual movement which led this process, the *Haskalah,* pursued two main objectives. On the one hand, it wished to preserve the unique cultural and moral principles of Jewish tradition and heritage and, on the other hand, it aimed to adopt the ideas of the European Enlightenment. This process was also intertwined with the 'scientification' of Jews, which led them to adopt new forms of investigation while gradually neglecting their traditional ones.[108]

Many *maskilim* first focused on the translation of European (mostly German) scientific literature into Hebrew. According to historian Iris Idelson-Shein, the majority of these books did not achieve a large readership due to the translators' deficient use of biblical Hebrew in modern contexts. However, Idelson-Shein adds that this was not true of all *maskilic* publications. In 1788, the German-Jewish *maskil* Baruch Lindau published a natural science textbook for students under the title *Reshit Limudim* (Beginning of Studies), which soon became popular among Jewish readers of all ages and was accepted by both conservative and radical thinkers. The first volume of *Reshit Limudim* focused on geology, biology, geography and anthropology, while the second volume focused on astrology, physics and chemistry. In his introduction, Lindau alluded to Buffon's magnum opus, *Histoire Naturelle,* and to Anton Friedrich Büsching's *Neue Erdbeschreibung* (New Earth Description), a compendium of seven volumes published between the years 1754-1761, which included a human taxonomy

[108] Oren Sofer, *There Is No Place for Pilpul! Ha-Tzfira Journal and the Modernization of the Socio-Political Discourse* (Jerusalem: Mossad Bialik Press and The Center for Research on the History and Culture of Polish Jewry at the Hebrew University, 2007), 23-24.

based on geographical divisions. A similar taxonomy appeared in *Reshit Limudim*, which appears to have been the first modern Hebrew taxonomy of its kind.[109]

The penetration of natural philosophical ideas and, specifically, of climate theory into Jewish thought also influenced the social and political arguments of Jews during the age of the Enlightenment. In 1787 and 1788, the Royal Society of Arts and Sciences in the city of Metz established an essay competition with the question 'Are there means for making the Jews happier and more useful in France?'[110] Polish-French-Jewish thinker Zalkind Hourwitz replied to this question in his essay, *Apologie des Juifs* (Vindication of the Jews), published in March 1789. According to Hourwitz, the fact that Christians and Jews shared the same environment meant that there could be no major differences between them. 'It is recognised by all physicians', Hourwitz wrote, 'that the physical constitution of the Jews is absolutely identical to that of other people who inhabit the same climate'.[111] Hourwitz's assimilationist essay was one of the three winning essays in the competition.[112] At the time of its publication, only a few months before the revolution, 40,000 Jews were living in France. They were allowed to practice their religion but were restricted by the authorities with regard to many other rights and activities. Hourwitz's intellectual ideas were deeply interwoven with his active participation in the political struggle for Jewish emancipation and civil rights in France.[113]

Similar to Hourwitz, the Dutch Sephardic-Jewish scholar and merchant, Isaac de Pinto, was involved in political attempts to improve the conditions of Jews in

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[109] Idelson-Shein, 111-12, 14, 24.
[110] Abbé Grégoire who was mentioned earlier also participated in this competition and even won a price. Pierre Birnbaum, *"Est-Il Des Moyens De Rendre Les Juifs Plus Utiles Et Plus Heureux ?" : Le Concours De L'académie De Metz (1787)* (Paris: Seuil, 2017).
[111] Idelson-Shein, 47.
[112] Lynn Hunt, *The French Revolution and Human Rights: A Brief Documentary History* (Boston: Bedford Books of St. Martin's Press, 1996), 48-49.
[113] Jay R. Berkovitz, *The Shaping of Jewish Identity in Nineteenth-Century France* (Detroit: Wayne State University Press, 1989), 62.

Europe. Already, in 1748 he published an essay titled *Political Reflections Concerning the Condition of the Jewish Nation,* in which he emphasised the need to integrate Jews into the national economy by reducing their taxes and opening all trades to them. According to Adam Sutcliffe, the tension between eighteenth-century cultural exclusiveness and idealistic universalism is illustrated by the exchange of letters between De Pinto and François-Marie Arouet Voltaire, the French philosopher known for his extreme hostility to Judaism.[114] In correspondence between the two men from 1762, De Pinto emphasised the 'natural' ability of Jews to integrate into the societies in which they live and become a part of them – physically, as well as socially and politically.

> [Jews] have been scattered through so many nations, that they have, we may say, adopted in each country, after a certain time, the characters of the inhabitants; a Jew in London bears as little resemblance to a Jew in Constantinople, as this last resembles a Chinese Mandarin! […] The Jew is a chameleon who everywhere assumes the colours of the different climates he inhabits, of the different peoples he frequents, and of the different governments under which he lives.[115]

De Pintos' notion of acclimatisation, particularly in relation to the so-called adaptability of Jews, is expressed even more clearly in an earlier letter he wrote to the French traveller and thinker Charles Marie de la Condamine in 1746.

> Transplanted nations gradually assume the colours that characterize the countries in which they settle […]. They assume not only the habits of their new compatriots, but also the exterior composition of their bodies, as well as the interior disposition of their spirit. This is quite evident today in Holland, where the descendants of the [Jewish] Spanish, the Portuguese, and the French have become 'Holland-ised' so to speak, in their colour, temperament, and moods.[116]

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[114] Adam Sutcliffe, "Can a Jew Be a Philosophe? Isaac De Pinto, Voltaire, and Jewish Participation in the European Enlightenment," *Jewish Social Studies* 6, no. 3 (Spring-Summer 2000): 32.
[115] In: Idelson-Shein, 109.
[116] Quoted in: Jonathan Schorsch, *Jews and Blacks in the Early Modern World* (Cambridge: Cambridge University Press, 2004).

De Pinto not only wrote as a Jew who was familiar with Enlightenment literature and had internalised the notion of contemporary naturalists on climate, but also as a colonial agent who was directly exposed to European accounts of the 'exotic' natural conditions of the tropics and their indigenous populations. In 1748 he became one of the directors of the Dutch East India Company and, a year later, of the West India Company, in both of which his family were leading stock holders. Between 1602 and 1796 the Dutch East India Company sent nearly a million Europeans to East Asian lands to pursue trade and political domination. The company's operations also included the forced migration as well as the enslavement of thousands of Africans and Asians.[117] De Pinto's involvement in both political advocation for Jewish emancipation in Europe as well as his involvement in colonial practices is symbolic of the Jewish-colonial paradox. On the one hand Jews aspired to assimilate into European societies by using a rhetoric of egalitarianism and universalism and on the other they held on to a logic of particularism, difference and inequality.[118]

'Weak Transmutation': The Zionist Answer to European Race Theories

Commencing in the 1830s, criticism of the actual possibility of European acclimatisation in the so-called torrid zone began rising. This criticism was influenced by high rates of European mortality in the colonies in previous decades which had weakened the colonisers' confidence in their ability to acclimatise. The fact that European death rate did not seem to wane over time, even among those who were born

[117] Kerry Ward, *Networks of Empire: Forced Migration in the Dutch East India Company* (Cambridge: Cambridge University Press, 2009).
[118] Katz, Leff, and Mandel, 6.

in the colonies or had lived there for longer periods, was presented by some at the mid-nineteenth century as evidence that acclimatisation was, in fact, not possible.[119]

Moreover, scepticism about acclimatisation was mutually constitutive with emerging ideas of racial differences between distinct ethnic groups based on their perceived innate characteristics. Following the work of Michael Barton on the evolution of race notions, Mark Harrison reminds us that the term 'race' before the nineteenth century usually signified a historical lineage. Whereas, after 1800 race came to be understood as 'an inherent physical quality that was unalterable and definitive of certain people'.[120] The new meanings attributed to the idea of race further challenged contemporary beliefs regarding European acclimatisation in the tropics while simultaneously enhancing and legitimising their control of people who were perceived as not only different but also as inferior.

Ideas concerning race served Europeans in their attempts to justify colonialism and argue for their superiority over non-Europeans, both in the metropoles as well as in the colonies. In this context, the work of Hannah Arendt on the link between European imperialism and antisemitism as the main reasons for the rise of totalitarianism in the twentieth century has led scholars to continue developing the conceptual and practical links between the rise of racial thought in Europe and its colonies.[121]

In the late eighteenth century, vigorous attempts to achieve Jewish emancipation finally came to fruition in western and central Europe. Following the French revolution in 1789, Jews were granted equal rights, first in France in 1790 and

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[119] Arnold, 9-11.
[120] Harrison, 11-15.
[121] Hannah Arendt, *The Origins of Totalitarianism*, 3rd ed. ed. (London: Allen & Unwin, 1967). Benjamin Madley, "From Africa to Auschwitz: How German South West Africa Incubated Ideas and Methods Adopted and Developed by the Nazis in Eastern Europe," *European History Quarterly* 35, no. 3 (2005). Jürgen Zimmerer, "Colonialism and the Holocaust: Towards and Archiology of Genocide " in *Genocide and Settler Society: Frontier Violence and Stolen Indigenous Children in Australian History*, ed. Dirk A. Moses (New York: Berghahn Books, 2004).

later in the territories conquered during the Napoleonic wars. These events marked the first significant signs of Jewish mobilisation, a process which had already begun with the gradual neglect of Jewish tradition in favour of Enlightenment thought initiated by the *Haskala* several decades earlier.

As a result of this reformative legislation, Western and Central European Jewry experienced radical socio-economic and geographic improvements in their lives during the nineteenth century. Descendants of the first emancipated generation often grew up in middle class families and pursued higher education in European universities. The German-Jewish middle class, in particular, viewed the academy and the laboratory as preferable arenas in which to pursue social mobility.[122]

However, Jewish emancipation did not annihilate anti-Semitism. On the contrary, one of the undesirable outcomes of this political achievement was the development of biological race sciences which were supposed to prove once and for all the so-called inherent differences between Jews and Gentiles. As mentioned earlier, during the nineteenth century hereditarian accounts gradually replaced climatic accounts in explaining human characteristics, and by the turn of the twentieth century, Jews (especially in Germany) were increasingly recognised as a biological category whose external characteristics were fixed and unchangeable.[123]

Nevertheless, the prominence of these hereditarian ideas did not escape the scientific education of emancipated Jews. Indeed, by the 1880s Jewish doctors and social scientists began to examine their own race by utilising innovative research methods. On one hand, the Jewish interest in biological race theories reflected their successful integration into Western scientific circles. On the other, it highlighted the

[122] Shapira, 6-7; Gideon Shimoni, *The Zionist Ideology* (Hanover, N.H.; London: Brandeis University Press, 1995), 13.
[123] Hirsch, 79-80.

limitations of integration and usually served as a response to the ongoing accusations directed at Jews as an inferior race.

Jewish scientists' growing concern with race can also be understood as a reaction to the pogroms against the Jewish population in the Russian Empire during the 1880s. The assassination of Tsar Alexander II in 1881 and the political and social instability that followed, led to a series of violent events against Jews in the Pale Settlement of the Russian Empire. As a result, two and a half million Jews immigrated from Russia to various destinations in the west. Historians agree that the meeting of integrated Western and Central European Jews with traditional Eastern European Jews was a complex and, at times, painful social encounter, which made many re-evaluate the Jewish problem and its solutions and served as a catalyst for the emergence of Zionist ideology.[124]

Race was also utilised to stress the definition of Jews as a *Volk* and a nation rather than a religion. In fact, the notion of Jewish racial decay and the rise of Jewish nationalism were deeply intertwined. For Zionists, racial notions were not only a means of strengthening Jewish national identity, but also a tool to clarify the urgency of the nationalist cause. According to them, Jews were a nation and a race essentially different from other races and nations with whom they had integrated and assimilated over the past decades. Thus, a Jewish homeland would contribute to their racial re-isolation and would prevent their perceived degeneration.[125]

In their research, Western and Central European Jewish race scientists were interested in exploring the purity of the Jewish race, its unique racial characteristics, its susceptibility to certain illnesses, and the biological relation between modern Jews and

[124] Efron, *Defenders of the Race: Jewish Doctors and Race Science in Fin-De-Siecle Europe*, 9; Steven E. Aschheim, *Brothers and Strangers: The East European Jew in German and German Jewish Consciousness, 1800-1923* (Madison; London: University of Wisconsin Press, 1982), 32.
[125] Hart, *Social Science and the Politics of Modern Jewish Identity*, 21.

biblical Jews. This process can also be understood as what Nancy Leys Stepan and Sander Gilman describe as a 'transvaluation of the terms,' a process in which minorities who were categorised as racially inferior during fin-de-siècle appropriated the idioms of science and re-valuated the meanings of these idioms for their own purposes.[126] This absorption of biological paradigms usually led Jewish scientists to caution against what they perceived as a Jewish racial decay caused by assimilation, intermarriage and conversion.

Yet, most Jewish scientists, including those who believed Jews were a pure race, tended to reject categoric hereditarian accounts in favour of environmental, historical and cultural accounts. In other words, as Harrison demonstrates in a different context, climate theory did not simply disappear in the second half of the nineteenth century. Rather, it transformed into soft hereditarianism or what Harrison terms a 'weak transmutation,' a view that still accepted the effects of climate but drew these out over many generations thereby transforming them into 'a remote rather than an immediate influence on human development'.[127]

One of the most important scholarly works linked to this notion was the *Theory of Inheritance of Acquired Characteristics,* published by the French naturalist Jean-Baptiste Lamarck in 1801. In his book, Lamarck argued that organisms were able to adjust to new environments and produce biological and behavioural characteristics accordingly, while some of these characteristics would become hereditary over time. Lamarck was essentially a botanist of the school of Buffon, but when he was appointed Chair of Zoology in the newly established *Muséum d'Histoire Naturelle* in 1793, he

[126] Leys Stepan Nancy and L. Gilman Sander, "Appropriating the Idioms of Science: The Rejection of Scientific Racism," in *The "Racial" Economy of Science : Toward a Democratic Future*, ed. Sandra G. Harding (Bloomington: Indiana University Press, 1993).
[127] Harrison, 106. The notion of weak transmutation developed in India at the beginning of the nineteenth century.

was obliged to transfer his attention to the study of anatomy. As a result of this combination of disciplines, he eventually concluded that living forms should not be examined retrogressively, but rather progressively. In other words, the evolution of an organ during the lifetime of an organism or its development of new habits could be passed on to the next generation if mating occurred between two individual organisms which had experienced the same change.[128] In the age of revolution, modernisation, and progress, this view was widely accepted and favoured.

Lamarckian (and later neo-Lamarckian) theory was based on both the notion of plasticity and the notion of heredity and therefore made it appeal both to those who wished to prove the human ability to adjust and prosper in new environments as well as to those who aimed to stress that climate had once had a decisive effect upon races and that, consequently, certain racial characteristics fitted specific geographies. The rise of nationalism during the nineteenth century eventually also served as a deciding factor in favour of this belief and bolstered the idea of an organic link between nations and their primal environments – a concept which had immediate implications for Jews, who were not perceived as belonging to any particular geography.

By locating Jewish degeneration in social and environmental conditions rather than in heredity, Jewish doctors and social scientists presented the task of transporting themselves to a new environment as tantamount to physical transformation. Jewish scientists such as Elias Auerbach, Arthur Ruppin, and Redcliffe Nathan Salaman explained that the Jewish *Urtypus* (primal type) was created in Palestine in ancient times and thus its 'return' to the 'biblical homeland' would correspond with its ancient

[128] Pietro Corsi, "Jean-Baptiste Lamarck: From Myth to History," in *Transformations of Lamarckism : From Subtle Fluids to Molecular Biology*, ed. Snait Gissis and Eva Jablonka (Cambridge, Mass.; London: MIT Press, 2011), 12-13.

nature. Although the environmental accounts provided by these scientists were not always consistent, their explanations usually relied on neo-Lamarckian theory. [129]

However, this rhetoric was not only typical in the writing of race scientists. In fact, it was much more prevalent in the writings of Zionist leaders and thinkers (among the later many were historians and philologists). Russian-Jewish poet and author, Zeev Vladimir Jabotinsky, who later in his life became a militant Zionist and the leader of Revisionist Zionism, explained in his essay, *Zionism and the Land of Israel*, published in 1905, why Palestine was the only logical destination for Jewish settlement.

> The slow and constant pressure of the natural environment – the landscape, the climate, the flora, and the winds of the homeland – is what determines the structure of the nation's soul. […] what we have been trying to preserve in the Diaspora must have been created previous to our dispersion […]. Before we arrived at the Land of Israel, we were not yet a nation and we did not exist as a people. It was on the soil of the Land of Israel that the Hebrew nation was created. […] When conceptualising monotheism, we breathed the winds of this land. When we fought for our independence we were surrounded by its air, which nurtured our bodies. […] the nation of Israel and the Land of Israel – are one. […] A different climate, a different flora, and other mountains will necessarily distort the body and the soul, which were created by the climate, the fauna, and the mountains of the Land of Israel.[130]

The link between climate and nationhood, as reflected in the writings of Jabotinsky, echoed neo-Lamarckian perceptions which identified climates and environments as primal and remote influences in the development of human groups. It is important to note that Jabotinsky's essay was published in response to the British East Africa scheme. In 1903, a few weeks following the Kishinev Pogroms, the British colonial secretary Joseph Chamberlain, who was aware of contemporary Zionist attempts to find a territory for Jewish refugees, proposed the ZO a specific territory

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[129] Elias Auerbach, *Palästina Als Judenland* (Berlin, Leipzig: Aktionskomitee der Zionistischen Organisation, in Kommission Beim Juedischen Verlag, 1912). Arthur Ruppin, "The Selection of the Fittest," in *Three Decades of Palestine: Speeches and Papers on the Upbuilding of the Jewish National Home* (Jerusalem: Schocken, 1936). Todd Endelman, "Anglo-Jewish Scientists and the Science of Race " *Jewish Social Studies* 11, no. 1 (Autumn 2004): 72. Hirsh, 88

[130] Vladimir Zeev Jabotinsky, *Ktavim Tziyoniyim Rishonim* (Jerusalem: A. Jabotinsky), 120-21.

within the British Protectorate of East Africa. In the following years the East Africa Scheme became the subject of a fierce discussion within the Zionist movement. At the heart of this debate was a fundamental question concerning the essence of the Zionist project, its suitable territory and its future destiny. Supporters and opponents of the East Africa Scheme utilised a variety of arguments to advocate their cause. As we can see in Jabotinsky's text, within these arguments, climate played a significant role. Jabotinsky was decisive in his wish to portray the Zionist choice of Palestine as a homeland as driven by rationality. He claimed that those who aimed to present this decision as driven by fantastic religious notions should be aware 'that the relations between Zionism and Zion are, for us, not only a strong instinct […] but a justified conclusion of great importance that is based on pure positivist reasons.'[131] To support his argument, Jabotinsky also referred to the work of the renowned nineteenth-century historian, Henry Thomas Buckle, who asserted in the introduction to his book, *History of Civilisation in England,* published in 1857, that there was a strong relation between the characteristics of civilisations and the environmental conditions in which they were created.[132]

Jabotinsky's text also reflected the ideas of German Romanticism. In the first volume of Wilhelm Heinrich Riehl's monumental compendium from 1854 on the natural history of the German people (*Land und Leute*), the writer ridiculed the national notion presented by the French Enlightenment, which was understood to be a product of written constitutions and abstract natural rights. Instead, he proposed that national character emerged organically from the topography and culture of a specific territory.[133] Johan Gottfried Herder, whose view of history and interest in German antiquity

[131] Ibid., 111.
[132] Henry Thomas Buckle, *History of Civilisation in England* (London: John W. Parker & Son, 1857).
[133] Thomas M. Lekan, *Imagining the Nation in Nature : Landscape Preservation and German Identity, 1885-1945* (Cambridge, Mass.; London: Harvard University Press, 2004), 6.

provided important ideas for the Romantic movement, similarly argued that the structure and logic of different languages reflected the organic history of their nations, their racial characteristics and their natural environments. For this reason, he asserted that Jews 'continue to be an Asian race in Europe, alien to our part of the world, bound to the ancient laws that were given to them under different skies'.[134]

Nineteenth-century historical, geographical and philological scholarly work played an important role in maintaining the conceptual link between nations and their unique natural ambiences. In his book, *Histoire de langues sémitiques,* the renowned French philologist Ernst Renan initially aimed to compare Indo-European and Semitic languages in a linguistic context. However, his study drifted into a theoretical discussion on the role of Semitic languages in the 'history of the human spirit'. Renan understood languages as archives of human development that reflected the construction of nations' cultural and social features. In his research, he created a taxonomy of the different languages that had emerged from the primal Semitic language and developed distinctively in various historical contexts. His discussions on Semitic philology also touched on questions of geography and race, thus rendering Jews and the Orient inseparable. Renan asserted that the natural and climatic conditions of the desert were the prime reasons for the formation of Semitic moral characteristics. Perhaps the most important characteristic resulting from ancient Jewish life in the desert, according to Renan, was the lack of imagination to which he ascribed the lack of Jewish interest in mysticism and the emergence of the monotheist faith ('*Le desert est monotheiste*').[135]

[134] Johann Gottfried Herder, *Johann Gottfried Von Herder's Sämmtliche Werke: Zur Philosophie Und Geschichte* (Stuttgart und Tübingen: r J.G. Cotta'schen Buchhandlung, 1827 [-1830]), 1784-91.
[135] Guy Stroumsa, *The Making of the Abrahamic Religions in Late Antiquity* (Oxford: Oxford University Press, 2015), 11.

Gil Anidjar reminds us that during the nineteenth century the concept of 'Semitism' contributed to the racialisation of philology and the study of religion.[136] Within this scholarship, Renan was one of the most read and disputed scholars among Jewish intellectual circles of the time.[137] In 1904 Jewish historian Josef Klausner published an essay titled *Ernst Renan and Spiritual Anti-Semitism* in which he aimed to reply to some of Renan's arguments on the Jewish race. Nonetheless, the role of the desert in initiating monotheism was actually not a matter of controversy for him. On the contrary, Klausner wrote:

> if we accept the common assumption among contemporary scholars concerning the Indian origin of the Aryan race and the Arab origin of the Semitic race, then we shall easily find an answer to the question of the inception of the Hebrew language. There is no type of natural environment richer and more verdant than the Indian one, and no type of natural environment poorer and more desolated than the Arab one. […] Indian nature is luxuriant, fresh, alive and variant. Arab nature is terrifying in its glory, in its unison, and within it only one mighty force can reveal itself. […] Its simplicity and earnestness elevated the spirits [of the Semites] and directed their senses - not outwards towards the external nature – but inward towards the human soul.[138]

Klausner's view not only corresponded with Renan's theory, but most likely also responded to the work of scholars such as Henry Buckle and others who wished to explain polytheism and Greek mythology as outcomes of the unique natural and climatic conditions in the Peloponnese. It was also within this context that Jewish historian Simon Brenfeld compared the Greek and Palestinian environments and climates in 1887 to explain the distinct worldviews of the two genius nations.[139] Brenfeld claimed that the pleasant climate in Greece enabled the people of this

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[136] Gil Anidjar, *Semites: Race, Religion, Literature* (Stanford, Calif.: Stanford University Press, 2008).
[137] Jehuda Reinharz and Yaacov Shavit, *Darwin and Some of His Kind: Evolution, Race, Environment and Culture - Jews Read Darwin, Spencer, Buckle and Renan* (Tel Aviv: Ha-kibbutz Ha-meuhad, 2009).
[138] Joseph Klausner, *Yahadut Ve-Enoshiyut* (Warsaw: Yavne, 1905), 206-07.
[139] Jacob Shavit, "'Thunat Ha-Aretz' Ba-Sifrut Ha-Yehudit Shel Ha-Mea Ha-19 Ve-Ha-20: Gilgula Ha-Moderni Shel 'Torat Ha-Aklimim' Ve-Shimusheha," in *Eretz Yisrael Ba-Hagut Ha-Yehudit Ha-Hadasha*, ed. Aviezer Ravitzky (Jerusalem: Yad Ben Zvi, 1998), 394-95.

geography to flourish, conceive enlightened ideas, celebrate the pleasures of life and view themselves almost as gods. On the other hand, according to Brenfeld, the Jews in Canaan suffered from a dry climate. When there was no rain they felt weak and dependent upon God's will.[140]

Historical accounts during the nineteenth century placed great emphasis upon identifying the origins of nations, as well as on the evidence that supported the primal existence of nations even if this evidence was highly selective and romanticised as can be seen in the desert argument above. The development of a 'national memory' marked a sacred point of beginning in the past that served as a source of legitimacy and inspiration for the present. Historian Prasenjit Duara writes that 'history was the principal mode whereby non-nations were converted into nations.'[141]

As Yael Zerubavel demonstrates the desert was a loaded term which held various connotations in Judeo-Christian tradition. For Zionists, it embodied the notion of antiquity and nativity and served as a source of inspiration for the reviving Hebrew identity and culture. The desert was the place where the Israelites had received the Torah and where their collective identity crystallised.[142] Thus, the Zionist utilisation of the Hebrew Bible as an indispensable part of Jewish history and the harnessing of its mythological episodes for the narration of Jewish national past was not necessarily understood as a religious act. By utilising the 'desert argument', Klausner and Brenfeld were able to emphasise the unique national, ethnic and spiritual roles of the Jewish people in world history and simultaneously to imply that such Jewish merit was only

[140] Simon Brenfeld, *Kore Ha-Dorot: Hashkafa Be-Hitpathut Ruah Yisrael Ve-Ha-Yahadut Me-Dor Le-Dor* (Warsaw: Meir Yehiel Halter Print, 1887), 8-9.
[141] Prasenjit Duara, *Rescuing History from the Nation: Questioning Narratives of Modern China* (Chicago: University of Chicago Press, 1995), 27.
[142] This view did not prevent the simultaneous negative depiction of Bedouins, the native dwellers of the desert as lazy, impulsive and immoral. Yael Zerubavel, *Desert in the Promised Land* (Standford, California: Standford University Press, 2019), 36-40.

possible in a specific geographical location. According to Klausner, monotheistic faith was not part of a divine revelation given to the Israelites by God in the Hebrew Bible, but merely a historical notion, which could be 'rationally' explained by material facts. He wrote, 'The historical essence [of the nation], in contrast to the metaphysical one […] is a result of race, climate and history itself.'[143]Furthermore, to stress the uniqueness of Judaism in comparison with other Semitic nations, Klausner added that although Arabs and Jews shared similar racial attributes, the former were not able to prosper like the latter because they did not develop in the most fertile and temperate part of the Middle East, that is, in Palestine.[144]

Between 1853 and 1876, historian Heinrich Graetz published the first comprehensive history of the Jewish people from a Jewish perspective. The eleven volumes of his magnum opus *Geschichte der Juden* (History of the Jews) covered Jewish history from biblical times to the nineteenth century. In his introduction to the first volume, Graetz described in detail the country's climate, morphology, fauna and flora. Similarly, to Klausner and Brenfeld, Graetz asserted that it was as a result of the natural conditions in Palestine that the People of Israel came to be 'the chosen people'. He wrote that the country's

> ever blue pure skies and sun of justice illuminate the people who inhabited it […]. The glory of the Land of Israel is present in the spiritual life, the mental characteristics and the splendour of the people […] who would later become the chosen people.[145]

While reflecting romantic and neo-Lamarckian notions on the so-called organic link between the Jewish people and the Land of Israel, such arguments also corresponded with a much older Jewish rabbinical literary tradition as reflected in Judah Halevi and David Kimhi's (RaDak) texts mentioned earlier, thus combining between

[143] Klausner, 200.
[144] Ibid., 208.
[145] Heinrich (Zvi) Graetz, *Divrei Yemei Yisrael* (Tel Aviv: Yizraʿel, 1955 [1916]), 3.

new ideas which were prevalent in scholarly fields such as race sciences, geography, history and linguistics on the origin of people and nations while simultaneously manifesting common religious and popular perceptions on the definition of the 'chosen people' and its historical and natural relation to the Holy Land.

It is important to emphasise that these arguments were usually more common among Eastern European Jewish thinkers. Whereas nation states in western Europe gradually emancipated their Jewish subjects during the nineteenth century, the laws for the Jewish people in the Russian empire were getting stricter. Jews were only allowed to inhabit certain provinces and were, therefore, forced into close geographical and cultural proximity. In the same way, they were restricted to certain occupations and were often prohibited from acquiring higher education. Thus, the majority of Eastern European Jews maintained a rigorous religious lifestyle, in which even small but influential secular circles were connected to Jewish rituals and customs.[146]

The spirit of the *Haskala* penetrated the Russian Empire during the late eighteenth century through Galicia and was primarily influenced by the ideas of Moses Mendelssohn and the German *Haskala* which preceded it. As stated earlier, members of this movement wished both to preserve Jewish tradition and adopt modern European intellectual ideas. However, while Central European *Haskala* reflected and concurred with the principles of the ambient Enlightenment movement, Eastern European *Haskala* related to the intellectual currents of its geographical surroundings only much later at the end of the nineteenth century. In other words, Jewish processes of secularisation in eastern Europe usually aspired less to become part of the general non-

[146] Shimoni, 22-25.

Jewish society, and instead attempted to revive and redefine its own cultural characteristics.[147]

Thinkers such as Klausner, Jabotinsky, Graetz, Brenfeld and others grew up in religious surroundings and received a traditional Jewish education, only to become increasingly exposed to, and influenced by, Western (often romantic) ideas during their adult lives. As a result of this background, they possessed a strong spiritual and emotional sentiment towards the place they identified as the Land of Israel while simultaneously wishing to portray themselves as secular, modern and 'enlightened' thinkers. The employment of climate as a material argument which also consisted of obscure implications, created a bridge between their spiritual and worldly perceptions and aspirations.

Conversely, Western and Central European Jews, who will play a greater role in the coming chapters, were usually less exposed to Jewish beliefs and practices in the late nineteenth century. They, too, were interested in securing a national solution for the 'Jewish problem' in Europe. Yet, they were willing to negotiate a variety of geographical destinations for Jewish colonisation and had different considerations from their coreligionists in the east.

Naturally, the division between Eastern and Western European Jews is not all-encompassing and contains numerous exceptions. Nevertheless, by presenting the range of Jewish perspectives on climate, we can witness the diverse geographical, cultural and political circumstances and tendencies that prevailed among European Jewry during the eighteenth and nineteenth centuries while demonstrating the dissimilar modernisation and 'scientification' processes they underwent in relation to their Gentile surroundings. In addition, the analysis of climate discourses among European Jewry

[147] Ibid.

also serves as a backdrop for the next chapters of this thesis, which focus on the role climate played in the Zionist enterprise.

As we have seen throughout this chapter, Jewish and Zionist accounts of climate and their impact on the Jewish people were routinely intertwined with shifting Western scientific paradigms which were often related to the European encounter with various ecosystems and people. At the same time the Jewish utilisation of climate theory also reflected the evolution of Jewish social and political positions concerning their own identity and history.

Chapter 2. Knowing Climate: Zionist Climatology and Meteorology

Every Colonial Enterprise, wherever it may be, relies tremendously on the climatic potential of the target country, and all colonialists must therefore notice the recordings of weather observations.[148]
Rudolf Feige-

As we have seen in the previous chapter, climate in modern European thought was often associated with the development of notions concerning the evolution of nations, languages and races. However, climate was not only an abstract, amorphous and fluid concept. It was also a concrete, physically sensed and empirically-proven condition which was subject to scientific investigation of its own. Thus, while the first chapter of this thesis focused on the role of climate in modern European intellectual thought, the present chapter addresses the science of climate investigation itself, its general disciplinary evolution during the nineteenth and twentieth centuries and its specific significance and development within the context of the Zionist project.

In the following pages, I focus on the evolution of Zionist climate research in Palestine as well as in the other destinations considered for Jewish colonisation at the beginning of the twentieth century. Through the prism of climate investigation, I explore the political, social and cultural ideas and conventions which constructed and guided the work of the practitioners within this scientific field.

It is worth mentioning that this chapter addresses the Zionist history of both climatology and meteorology. According to Fredrich Nebecker, before the nineteenth century the activities of natural philosophers, weather observers and forecasters were intertwined, and the term 'meteorology' encompassed all three of them. Yet, from the mid-eighteenth-century onwards these theoretical and practical activities were further

[148] Manuscript by Rudolf Feige, unknown date, GSJHA, G.F.0341-4/2.

developed and became more distinct. Many of those who followed the empirical tradition made average weather conditions their main interest as they developed the descriptive science of 'climatology' which was based on weather statistics. Meteorology, on the other hand, focused mainly on ephemeral weather conditions and their forecasting. However, since meteorological instruments and methods of investigation were essential for climatological accounts and because climatological knowledge assisted meteorological predictions, they remained tangled. [149]

The first section of this chapter focuses on the rise of climate sciences during the nineteenth century and their close relations to colonial economic and political interests. In this section, I describe the general theoretical and practical attributes of colonial climate sciences in the era of high imperialism in order to place Zionist climate investigations in a larger context. The second section analyses Zionist climate research in two locations considered by the ZO for Jewish colonisation between 1902 and 1905 – El Arish in the Sinai Peninsula and Guas Ngishu in the British East Africa Protectorate. This section mainly focuses on the ways in which climatological findings were presented in the scientific reports of the two commissions and examines the ways in which different representations of knowledge on climate not only mirrored but were also constructed by various political, social and cultural beliefs.

The third section addresses the overall characteristics of climate research in Palestine at the beginning of the century and scrutinises the arguably colonial features of this research field. Furthermore, it examines the ways in which colonial knowledge on climate was transported to Palestine and absorbed by ZO experts while simultaneously focusing on individual colonial experts who laid the foundations for climate research in this country. In this section, I argue that the global and transnational

[149] Nebeker, 1.

characteristics of climate research during the nineteenth and twentieth centuries, as well as its strong dependency on novel technologies, made climatology a desirable and prestigious scientific field of study – a fact that contrasted with the apparent difficulties experienced by contemporary experts in drawing significant conclusions from it. Moreover, I claim that the importance attributed to climate research before 1918 was in presenting the ZO as an entity that possessed the required knowledge to pursue colonisation more than it actually had functional implications.

The fourth and final section of this chapter describes climate research in Palestine during the 1920s and 1930s. It was only during this period – following World War I and the employment of meteorological instruments in airplanes, alongside the establishment of the British Mandate in Palestine and the consolidation of the *Yishuv* institutions – that climate research became an 'infrastructural' science utilised for medical, agricultural and architectural research. Finally, I demonstrate how aviation, which was dependent on meteorology, not only served as a catalyst for the development of climate sciences but also how it introduced new expertise, ideas and values into its practice.

The Rise of Climate Sciences

The recording of weather observations, the explanation of weather phenomena, and the prediction of winds and rains are ancient practices known to have been conducted during the times of the Babylonians and the Greeks. The invention of new instruments, such as the thermometer and the barometer in the seventeenth century, gave rise to the provision of exact measurements of atmospheric pressure, humidity and wind direction,

subsequently leading to the replacement of qualitative methods of describing climate with quantitative ones.[150]

However, successful quantification required that the numbers recorded in different times and places express the same meaning. Thus, what truly elevated the status of climate investigation were nineteenth-century attempts to standardise instruments, research methods and types of measurements. Simultaneously, during the era of high imperialism information on climate became widespread and thus more prevalent than ever before. The proliferation of climate research during this period was mostly a result of imperial technological, communicational and infrastructural endeavours such as the invention of the telegraph and the railway. These developments increased the mobility of the data produced on climate to a global scale. For example, following Alexander von Humboldt's cartographic innovation concerning isotherms[151] in the early nineteenth century, regional and eventually global climatological maps of various sorts were produced, thereby, connecting for the first time disparate places which shared similar temperatures or rainfall.

[150] Ibid., 1, 3-4. Thomas Kuhn defined the movement towards precision as a 'second scientific revolution', in which the classical mathematical sciences – mechanics, optics, astronomy – extended their reach into the so called 'Baconian sciences' of the seventeenth century – heat, electricity, magnetism, chemistry. John Heilbron later revised Kuhn's thesis to argue that it was not mathematicians who turned to natural philosophy but the reverse. Natural philosophers began to assimilate parts of so-called mixed mathematics into their own relatively new efforts at the quantification of heat, magnetism, electricity, and similar fields. Norton M. Wise, *The Values of Precision* (Princeton, N.J.; Chichester: Princeton University Press, 1995), 3.

[151] Isotherms are lines on a map connecting points which have the same temperature at a given time or on average over a given period.



Figure 2. Alexander von Humboldt System der Isotherm Kurven, 1849.

By the 1870s, most nations had established official weather services, and international cooperation in meteorology was well underway. Yet, as mentioned earlier, climate research was very much tied with colonial enterprises. According to historians Deborah Coen and Martin Mahony, by the late nineteenth century climate research in the Austro-Hungarian and British Empires was regarded as *the* ultimate global science – both in terms of its subject matter and its practices. In addition, although climatology and meteorology were grounded on standards and data formats that were biased towards northern climates, they were understood as reflecting the diversity of the empires with 'all types of climates' as signs of both heterogeneity and unity.[152]

Climate observation at this period often investigated oceanic weather and it was closely associated with the activity of mercantile and naval ships. In India and its neighbouring seas, early efforts to understand weather and climate were also related to the wish to predict and understand the monsoonal climate. Thus, the emergence of climate sciences during this period did not only aim to determine global climate patterns or anticipate seemingly inconsistent colonial climates. It was also an attempt to make

[152] Coen. Mahony.

sense of an emerging global economy which had been shaped by European imperialism, and to understand how the new economies of places such as Australia and India fitted into new global patterns of trade and profit. According to Martin Mahony and Georgina Endfield, 'new understandings of a global climate system were being co-produced with new understandings of a global economy'.[153] In addition, climate sciences were also important for settler societies who were struggling to make sense of the weather in their new territories. For example, in Australia, meteorology was among the first sciences to be institutionalised and its practitioners were understood to be serving as 'important environmental interpreters for colonists and governments.' [154]

The colonial research of climate in foreign geographies usually manifested itself in two main strategies. The first was the commencement of short-term research expeditions and the second was the establishment of permanent meteorological stations. Choosing between these two options depended first and foremost on the colonial strategies and ambitions at issue as well as on the degree of colonial interest in a given territory. In addition, the choice of strategy depended on the ability of the metropole to transfer experts to foreign regions and to provide them with scientific equipment for long durations. In the imperial context, research expeditions were usually sent first to a given territory and only after a decision to colonise it was made would a permanent meteorological station be established. On the other hand, nation states or settler colonies that had already possessed and explored a given territory did not require the employment of research expeditions and, thus, immediately began researching climate with their own meteorological stations.

[153] Mahony and Endfield, 4.
[154] Ibid., 3.

As I demonstrate in the following sections, Zionist climate research in the first half of the twentieth century reflected the metamorphosis of Jewish colonisation strategies from imperial ones to settler colonial ones. Early Zionist attempts to examine climate both in Palestine as well as in other destinations were led by research expeditions. This was partly an outcome of Zionist absorption of colonial sciences and partly a result of the British direct involvement in Zionist expeditions. It was only from 1906, after the East Africa Scheme was rejected by the ZO, and to a greater extent following the consolidation of the Zionist project in Palestine during the 1920s and 1930s, that Zionist meteorological stations began to be rapidly established throughout the county.

One important attribute of research expeditions at the turn of the twentieth century was the diverse and international backgrounds of experts who participated in them. According to historian Deborah Neill, the transfer of knowledge and expertise between different colonial enterprises on a global scale was the norm in the period between 1871 and 1914. Although German, British and French experts supported the expansion of their states and were prone to compete with each other on both professional and national levels, they nevertheless shared a similar education and training, a feeling of belonging to the same European cultural heritage, and a mutual belief in their 'civilising mission' regarding non-western regions.[155]

As we shall see, the Zionist movement frequently hired 'foreign' experts from different European nationalities as experts in its first expeditions. One of the reasons for this recruitment was the fact that very few Jews were experts in the natural sciences before World War I. Even those who were were usually not an exception to this

[155] Deborah Joy Neill, *Networks in Tropical Medicine: Internationalism, Colonialism, and the Rise of a Medical Specialty, 1890-1930* (Stanford, Calif.: Stanford University Press, 2012), 6-7.

international network of experts and knowledge. Jewish experts had often acquired their professional experience in other colonial enterprises before joining the ZO and, in some cases, they retained other colonial affiliations even after becoming Zionists. The German-Jewish botanist and Zionist leader Otto Warburg, for example, serves as a prime example of this trend. Born in Hamburg in 1859, Warburg studied botany at the University of Strasburg, and following his graduation he embarked upon a three-year scientific excursion to study tropical plants in Asia and Australia. In 1897 he became an active member of the German Colonial Economic Committee (*Kolonialwirtschaftskommitee*), which focused on promoting economic development in the German colonies and soon afterwards he founded the committee's scholarly journal on colonial agriculture, entitled 'The Tropic Planter' (*Der Tropenflanzer*), which he also edited. [156]

Yet Warburg's prominent position in German colonial scientific enterprises did not prevent him from becoming a zealous Zionist at the same time. Warburg joined the Zionist movement in 1898, and from 1903 onwards he held several important executive positions in its organisation, including as director of the Committee for the Exploration of Palestine (CEP) and president of the ZO (1911-1920).[157] Warburg's involvement, instigation and management of almost all the Zionist expeditions and investigations that took place between 1903 and 1914 and his unique emphasis on climate investigation demonstrate how the transfer of knowledge and experts between different colonial

[156] Derek Jonathan Penslar, "Zionism, Colonialism and Technocracy: Otto Warburg and the Commission for the Exploration of Palestine, 1903-7," *Journal of Contemporary History* 25, no. 1 (Jan. 1990): 146-47; Frank Leimkugel, *Botanischer Zionismus: Otto Warburg (1859-1938) Und Die Anfänge Institutionalisierter Naturwissenschaften in 'Erez Israel'* (Berlin: Veröffentlichungen aus dem Botanischen Garten und Botanischen Museum Berlin-Dahlem, 2005), 3, 29, 31.
[157] Penslar, *Zionism and Technocracy: The Engineering of Jewish Settlement in Palestine, 1870-1918*, 61.

enterprises enhanced the Zionists' general assimilation into colonial scientific discourses.

Climate Research in Undesired Geographies

In 1897, the ZO was established by Theodor Herzl. One of the central goals of this organisation during its early years was to find a geographical solution for the pressing condition of thousands of persecuted East European Jews. All Zionists agreed that the solution to the 'Jewish problem' was the establishment of a Jewish homeland, but they were divided on the question of where this homeland should be, how the territory for the desired homeland should be obtained and what kind of Jewish characteristics it would have.

Between 1897 and 1904, Herzl made numerous diplomatic efforts to obtain a charter from the Ottoman Sultan to establish a Jewish settlement in Palestine. This territory was believed to be the historical homeland of the Jewish people. As we have seen in the previous chapter, throughout the centuries Jews had retained strong spiritual and emotional sentiments towards the Land of Israel and, therefore, it was considered to be the most suitable destination for a Jewish settlement. Yet, following continuous difficulties and obstacles in obtaining the charter, Herzl eventually turned to examine other potential destinations suggested to him by officials in the British Empire and which at times seemed easier to obtain.

Two of the most important destinations proposed by the British for Jewish colonisation were El Arish in the northern Sinai Peninsula (1902) and Guas Ngishu in what is today the Republic of Kenya (1903). The latter was also known as the 'Uganda Scheme' or the 'East Africa Scheme' and it is this geographical area that constitutes the focus of this section. Following the British propositions, two Zionist commissions were

sent to explore the aforementioned regions. The biographical backgrounds of their members as well as the research they conducted during the expeditions demonstrates the Zionists' absorption of the colonial scientific trends which were prevalent at the turn of the century.

Zionist plans to acquire a territory in proximity to Palestine which would serve as a vantage point for its future colonisation began with the Zionist proposal to establish a Jewish settlement in Cyprus and in the Sinai Peninsula. Both of these territories were controlled by the British empire at the beginning of the twentieth century. However, due to religious tensions already prevalent in Cyprus, Colonial Secretary, Joseph Chamberlain was afraid of settling Jewish refugees in this country. On the other hand, he was willing to allow the establishment of a Jewish settlement elsewhere if Herzl could show him "a spot in the English possession where there were no white people as yet".[158] Following this statement the ZO suggested examining the natural and social conditions in El Arish in the Sinai Peninsula.

The El Arish expedition was sent to its destination on February 11, 1903. The commission included Jewish and non-Jewish experts, the majority of whom had gained professional experience in other colonial enterprises. The head of the commission, Leopold Kessler, was a German-Jewish mining engineer who had previously worked in Rhodesia and South Africa. Other members of the commission included Albert Edward Williamson Goldsmith, the former director general of the Jewish Colonisation Association (JCA) in Argentina; Emile Laurent, a Belgian professor at the Agricultural Institute in Gembloux, who had already participated in two scientific expeditions to the Congo; Thomas Henry Aylmer Humphreys, a British civil engineer and chief inspector

[158] Şükrü S. GÜREL, "Zionist Plans and Cyprus (1896-1948)," *The Turkish Yearbook of International Relations* 19 (1979): 85.

for the Egyptian Survey Department; Oskar Marmorek, a Austrian-Jewish architect and member of the Zionist Action Committee; Hillel Yafeh, a Russian-Jewish physician who had worked in Palestine since the 1890s; and Selig Soskin, a Russian-Jewish agronomist who, like Warburg, simultaneously maintained high-level positions in both the German and the Zionist colonial enterprises.

It is no coincidence that most of the experts in this commission were either agronomists or engineers. The former understood which crops would be most suitable and most profitable in the specific climate and soil of the given territory and the latter were familiar with contemporary ways to 'improve' these conditions for specific colonial needs. Indeed, as Deborah Coen points out, the increasing interest in climate research during this period was an ironic trend at a time when the global economy was becoming more dependent on technologies (such as irrigation systems) that could overcome natural constraints.[159]

Nonetheless, the commission's members were indeed mostly concerned about the agricultural prospects of El Arish. Although they did not possess a rainfall gauge, local Bedouins had informed them that rain was not frequent in this area. Instead, the area was said to be afflicted by disastrous floods once or twice a year. In addition, the members of the El Arish commission searched for wells and ground water and presented their underground depths in metres within the report. Furthermore, although the designated area researched by the commission was restricted to El Arish, the expedition expanded the region of its investigation to Pelusium in the eastern extremes of the Nile Delta, to Kantara on the western side of the Suez Canal (governorate of Ismailia) and to other sites along the canal. In the report conclusions, the commission suggested adding these fertile areas to the territory offered by the British government

[159] Coen, 840.

as well as constructing a pipe system to transport fresh water from the Nile to additional eastern destinations. In El Arish itself, the commission advised the use of building dams that would capture the annual floods and serve as water reservoirs for the dry season. Finally, the commission recommended building meteorological stations and agricultural experimental stations in the area to improve and further develop knowledge of the natural local conditions.[160]

Nevertheless, at a meeting in Cairo, which took place shortly after the commission had completed its investigation and which was attended, among others, by the ZO president Theodor Herzl and British civil engineer William Willcocks, who had undertaken the planning of the Aswan Dam only one year earlier (1902), the parties were unable to come to an agreement concerning potential cooperation on the utilisation of the Nile water. In his memoir, member of the expedition Hillel Yafeh wrote that it was Willcocks' rejection of the proposal to include the future Jewish colony in the water distribution of the river, that caused the negotiations to eventually fail.[161]

As a result of the failing negotiations between the ZO and the British government on the terms of establishing a Jewish colony in El Arish, another British proposition was made in 1903 which focused on a specific territory within the British Protectorate of East Africa. In December 1901 the Uganda Railway linking Mombasa to Lake Victoria was completed. Historian Gur Alroey highlights the ambitious characteristics of this imperialist project, which was meant to strengthen Britain's hold on Africa, specifically on the sources of the Nile. The railway consisted of 920 kilometres of railroad, 43 stations, 1,200 bridges and an investment of over £5 million. However, it did not take too long to realise that this project was not as profitable as

[160] Hillel Yafeh and Soskin Selig, Log Book of the Commission Appointed to Report on the Practicability of Establishing Settlements on the Land under Egyptian Administration East of the Suez Canal and Gulf, 1903, ISA, 1950 /19-פ.
[161] Hillel Yafeh, *Pirkei Sikhronot* (Tel Aviv: Unknown, 1935), 27.

expected due to its infrequent usage by local populations and because of the small number of Europeans who visited or resided in this region. Alroey claims that in order to cover the mounting losses of this expensive project the British decided to offer this region to other white Europeans.[162]

Historian Adam Rovner suggests that settling white settlers in the British protectorate was also meant to reinforce British power in the region as the Germans had begun to increase their presence and proximity in an area to the south of the British Protectorate.[163] As we shall see in the following pages, in referring to Jewish Europeans as white people Rovner and other historians draw upon contemporary primary sources especially within the colonial context. Indeed, identifying Jews as part of the 'white' race was by no means an obvious statement at the turn of the twentieth century. Historian Sander Gilman points out that during the late nineteenth century the general consensus in the ethnological literature was that Jews were 'black' or at least 'swarthy'.[164]

Nevertheless, literary scholar Eitan Bar-Yosef argues that by colonising non-European territories, Zionists were able to finally view themselves as Western and white people.[165] According to Tara Zahara as part of Herzl's diplomatic attempts to obtain a charter for Jewish colonisation from one of the Great Powers of the time, Zionists occasionally 'advertised' themselves as settlers who could contribute to other colonial projects. The British Zionist leader Israel Zangwill, for example, speculated that 'if Britain could attract all the Jews of the world to her colonies she would just

[162] Gur Alroey, "Journey to New Palestine: The Zionist Expedition to East Africa and the Aftermath of the Uganda Debate," *Jewish Culture and History* 10, no. 1 (May, 2012): 29.
[163] Adam Rovner, *In the Shadow of Zion: Promised Lands before Israel* (New York: NYU Press, 2014), 53.
[164] Gilman, 171.
[165] Eitan Bar-Yosef, *A Villa in the Jungle: Africa in Israeli Culture* (Tel Aviv: Van Leer Jerusalem Institute and ha-kibbuts ha-meuhad, 2013), 26-35.

double their white population […] we could create a colony that would be a source of strength, not only to Israel but to the British Empire […]'.[166]

Thus, as demonstrated in the previous chapter, while Jews were increasingly regarded as a non-European race in nineteenth and twentieth century science, their fair complexion as well as their liminal position between east and west, and perhaps even their alleged cosmopolitanism manifested in their so called ability to acclimatise in different environments, occasionally positioned them in the global political sphere as a white people.

Simultaneously, the notorious Kishinev pogrom in 1903 – a reminder for Jewish inferiority in the European realm – made the British offer to settle East Africa even more relevant to Zionist leaders. At the Sixth Zionist Congress in August 1903, Herzl presented the British proposal as a temporary refuge for Russian Jews in immediate danger. By a vote of 295-178 the Congress decided to send a research expedition to examine the proposed territory.

The commission set off from Berlin to Mombasa on December 24, 1904. Similar to the biographical background of the El Arish commission, the Zionist expedition to Guas Ngishu included 'foreign' experts. The head of this commission, Major Alfred St Hill Gibbons, was a British Boer war veteran and a well-known explorer. Another member of the commission, Alfred Kaiser, was a Swiss orientalist and an adviser for the Northwest Cameroon Company. Before joining the Zionist expedition to Guas Ngishu Kaiser's personal research had focused on measuring the precipitation in the Sinai Peninsula with the aim to prove the veracity of the biblical fertility of this region. The third member of the Guas Ngishu expedition commission, Nachum Willbush, was a Zionist engineer and the son of a Russian-Jewish farmer who

[166] Quoted in: Zahra, 175.

had no experience in colonial excursions and was appointed to the group at the last moment to represent the ZO's interests in the final report.

In the following pages, I analyse the report provided by the Guas Ngishu expedition. As I demonstrate, the commission's methods of collecting data on climate and its ways of presenting and interpreting the data mirrored common colonial scientific practices. In addition, the data presented in the report also reflected the discrepancy between the use of advanced and relatively accurate measuring instruments and the insufficient knowledge of colonial experts in climate sciences along with their lack of suitable methodologies to address the data they produced on climate. This discrepancy was not unique to Zionist research. Rather, it echoed a general disciplinary deficiency in the study of climatology and meteorology which prevailed until the end of World War I.

Given the relatively large area that needed to be researched within a short timeframe, Gibbons decided to divide the group so that each member would investigate a different part of the region on his own. This division was also the cause of the subsequent publication of three different reports, and a comparison between them tellingly reveals how climate investigation was practised, how climatological findings were displayed, and what significance different types of data display had on the ways in which climate was understood. All three reports emphasised the importance of the country's natural conditions and rendered a distinct account of its climatic conditions. At the same time, the general content and display of the data in each report, as well as each member's interpretations and final conclusions regarding the climatic conditions, were utterly different and in some respects even contradictory.

The first part of Gibbons' report reflected the Victorian experience of Africa often associated with colonial adventure literature which tended to depict hunters and

explorers facing dangerous situations in the wilderness of the so-called 'Dark Continent'.[167] In the second part, he addressed the natural conditions in Guas Ngishu, referring mainly to its climate, soil and water. Gibbons presented his findings on climate in a table which included four columns: date, minimum and maximum temperature (in Fahrenheit), and altitude.[168] Following these results, Gibbons concluded that the natural conditions of the plateau, and specifically its climate, were suitable for the colonisation of Jewish Europeans. Gibbons wrote 'at the hottest period […] there is but little difference between the temperature on the plateau and that of Europe during a fine summer.'[169]

Kaiser's report, on the other hand, was characterised by a rigid scientific style and referred to a larger range of natural elements. He, too, presented a table of the climatic conditions that included four columns: time of observation (date and hour), place of observation, sea level and temperature (in Celsius). Following the presentation of the data in the report, Kaiser asserted that the temperature differences between day and night on the plateau were too extreme for humans, animals and plants and that 'immigration on any considerable scale cannot be advised.'[170]

Finally, Willbush's report was written in a simple yet practical style that emphasised the need for potential engineering projects in Guas Ngishu. It opened with a table of the climatic conditions that also included four columns: date, important events of the day (including indication of place), temperature (in Fahrenheit) and remarks. All the remarks in Willbush's table were short descriptions of the climatic conditions (for

[167] Eitan Bar-Yosef, "Spying out the Land: The Zionist Expedition to East Africa, 1905," in *'The Jew' in Late-Victorian and Edwardian Culture : Between the East End and East Africa*, ed. Eitan Bar-Yosef and Nadia Valman (Basingstoke ; New York: Palgrave Macmillan, 2009), 190-92.
[168] Major A. St. Hill Gibbons, Alfred Kaiser, and Nahum Willbush, *Report on the Work of the Commission Sent out by the Zionist Organization to Examine the Territory Offered by H.M. Government to the Organization for the Purpose of a Jewish Settelnment in British East Africa* (May 1905), 11.
[169] Ibid., 12.
[170] Ibid., 43.

example ‘hot and sultry’).[171] Similarly to Kaiser, Willbush concluded that due to the country’s poor natural conditions, the land would be ‘unsuitable for Jewish or any other European settlement.’[172]

Numerical tables were popular forms of standardisation during the late nineteenth century. According to Nebeker, this form of data display was meant, among other things, to allow people without any scientific education to be able to read them.[173] However, besides being a satisfactory way to store information, the tabulation of data on climate did not necessarily assist in producing accurate or absolute knowledge about the natural conditions of places. The reports of the East Africa expedition demonstrate the inconsistency in the methods of investigation and the lack of standardisation in tabularisation among the commission members which led to extremely different interpretations of the same climatic conditions.

As demonstrated, each of the three tables depicted slightly different elements and presented them in a different order. All three reports included the date of the observation, but only Kaiser mentioned the specific times at which the measurements were collected. While Kaiser indicated both the place of the observation and its altitude, the other two only referred to one of these elements – Willbush to places and Gibbons to altitudes. All three reports recorded the temperature – two in Fahrenheit and one in Celsius – yet this was the only climatic element that was measured by the commission. Humidity, rain, air pressure and other commonly measured climatic elements of the time were absent from the report. In addition, while Gibbons displayed the minimum and maximum temperatures, he did not dwell on this distinction; whereas Kaiser, who

[171] Ibid., 57.
[172] Ibid., 69.
[173] Nebeker, 15-16.

did discuss the extreme temperature differences between day and night in Guas Ngishu, did not provide similar categories within his chart.[174]

Historian Kristine Harper explains that although climatology and meteorology were relatively developed fields of research at the turn of the twentieth century, they were only introduced as official academic disciplines following World War I.[175] This meant that prior to 1918 experts who researched climate were usually not qualified climatologists. However, while climatological research during this period was often addressed by natural scientists, colonial expeditions demonstrate that climate investigation was sometimes also performed by experts who lacked any competence in this particular field. The study of climate by experts and laypeople who were not climatologists was enabled by the field's strong dependency on instruments as well as by the high socio-scientific importance which was attributed to the precise quantitative data produced by these instruments. In other words, thermometers, barometers and rain gauges could be operated by almost anyone who was provided with basic training on how to use them.

Another obstacle for the Zionist commission to Guas Ngishu was the recurrent tension and criticism which constituted the dynamic among the committee members. In the concluding paragraphs of Willbush's report, he voiced his disapproval of Gibbons' findings and his strong objection to British colonial approaches to both climate and indigenous knowledge in non-European geographies. Willbush wrote:

> If the territory offered is really of the beautiful countries of the world, […] then following the law of the survival of the fittest, it ought to belong to any strongest tribe that might have adapted itself to the country. […] If a country is uninhabited there are probably natural reasons which make it unsuitable for human habitation, for humanity is actuated by reasons entirely different of those of the English colonial enthusiasm. It does not pine after beautiful climate and happy hunting grounds as the later seek, but its aspirations are founded on the

[174] Instead he presented a separate chart which included some climatic observations conducted at night time.
[175] Harper, 11. Nebeker, 45.

> possibility of eking out an existence. It would be judging very superficially to say that ignorant negroes who settled in great masses of more than a hundred per square mile (40 per square kilometre) in the unhealthy Victoria Nyanza coast, would reserve the beautiful and health highland territory for a state of the future for white Europeans. If we consider not only the climatic question, but all questions of existence, we shall easily come to understand why the populations of the unhealthy coasts die of epidemics, yet fail to emigrate to the highland which is only about twenty to forty miles distant.[176]

Willbush's rejection of the East Africa Plan is often understood as reflecting a common contemporary political stance within the ZO which did not assent to considering any other destination for Jewish settlement besides Palestine.[177] Warburg, who oversaw the appointment of the commission members, was, in fact, also among the opponents of the British offer. Warburg wrote that 'the idea of sending Jewish workers to tropical plantations is out of question […] even if the soil and the climate are suitable as the literature says.'[178] Consequently, his choice of a Russian-Jewish engineer for the commission – who at the time of the expedition had already invested funds in a factory in Palestine, who was inexperienced in colonial expeditions, who was entirely unfamiliar with Africa and who was the only commission member who had been asked to volunteer for the task – may have influenced the final conclusion of Willbush's report.[179]

Moreover, Willbush's mocking attitude towards British colonial considerations of climate perhaps also stemmed from what he perceived to be the disproportionally large role given to climate in colonial science. Ultimately, however, his report revealed his ineptitude in using colonial language as well as his lack of experience in colonial

[176] Gibbons, Kaiser, and Willbush, 72.
[177] Rovner, 57. Alroey. Indeed, Willbush was not a great supporter of the East Africa scheme. However, neither did he reject it. One pragmatic approach of the Palestine advocators was to support the East Africa plan by presenting it as part of a 'reversed' colonial plan. This plan meant establishing colonies as a temporary solution and only later founding a Jewish metropole in Palestine. Willbush mentioned this plan in his memoir and it is possible that he considered this option while exploring Guas Ngishu. Nahum Willbush, *Ha-Masa Le-Uganda* (Jerusalem: Ha-sifriya Ha-tzionit, 1963), 11.
[178] Letter from Warburg to Weizmann, November 14th. 1911, CZA, A12/71.
[179] Willbush, 26. Alroey, 36.

scientific expeditions (for which he was overtly criticised by Gibbons), and the significant role of scientific data in establishing the power relations that existed between those who possessed knowledge and those who were intended to be subjugated to it.

Furthermore, Willbush's approach to colonial science can be understood as embodying the liminal condition of fin-de-siècle European Jewry who were caught between the anti-colonial principle of liberating Jews from a long history of persecution and oppression on one hand, and their absorption of colonial ideas and practices as part of their attempt to obtain a non-European territory on the other. As Katz, Leff and Mandel remind us, before colonising Palestine Jews operating in the European colonial sphere were often neither exactly masters nor victims. Alternatively, they 'circulated between physical spaces of metropole and colony and enjoyed the status somewhere between equal citizens and oppressed subjects.'[180] Thus, while criticising British colonialism, Willbush also alluded to the potential Jewish settlers in Guas Ngishu as 'white Europeans'.[181]

Nevertheless, questions concerning the climate in Guas Ngishu were not only raised by the commission members. Between 1903 and 1906 the East Africa Scheme was the subject of a fierce debate within the Zionist movement. At the heart of this debate was a fundamental question concerning the essence of the Zionist project, its suitable territory and its future destiny. Supporters and opponents of the East Africa Scheme utilised a variety of arguments to advocate their cause. As we have seen earlier in Jabotinsky's text, within these arguments, climate played a significant role.

Supporters of the East Africa Plan wrote in a statement from 1906 that 'the Zionist Executive's report on East Africa is entirely an act of deceit. What England was

[180] Katz, Leff, and Mandel, 11.
[181] Gibbons, Kaiser, and Willbush, 72.

offering, […] has superb climatic qualities and is a place where millions of people can be settled'.[182] Similarly, the British commissioner of East Africa himself, Sir Charles Eliot, noted the designated area 'is a grassy plain, well-watered and possessing a temperate climate.'[183] According to Eliot it was especially suitable for Eastern European Jews. Eliot wrote that 'in August, I myself found it disagreeably cold but this objection would doubtless not be felt by Jews from eastern Europe'.[184]

Renowned Russian-Jewish author and publicist Mikha Yosef Berdichevsky, similarly advocated the East Africa Scheme yet he presented a rather distorted view of the capacity of this area to serve as the homeland for all Jews. Influenced by Nietzsche's ideas on the regenerative aspects of destruction while also alluding to Darwin's theory of the survival of the fittest, Berdichevsky wrote that 'thousands of people will lose their lives in the new climate and the hard conditions [of Guas Ngishu], but those who will survive will be strengthened. It is preferable to have few heroes than many weak.'[185]

Berdichevsky's support of the East Africa Scheme, however, was not representative of the general approach of Eastern European Jews who usually opposed alternative territories to Palestine. While Western and Central European Jews were generally willing to consider various destinations for a future homeland, for the Eastern European Jews – who as we have seen in the previous chapter, manifested a very different experience of Jewish identity – Palestine was not simply one place that could be replaced by any other.

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[182] Alroey, 24.
[183] Ibid., 33.
[184] Ibid.
[185] Mikha Joseph Berdichevsky, *Kitvei Mikha Yosef Berdichevsky* (Tel Aviv: ha-kibbuts ha-meuhad, 1996), 87-89.

Thus, the East Africa Scheme presented one of the most disputed episodes during the early years of the Zionist movement as it highlighted the existing tensions between two fundamentally different Zionist approaches. Climate was utilised as an argument for and against the Jewish colonisation of Guas Ngishu but this was not simply because temperature, air pressure, humidity and wind directions were understood as essential elements for colonisation. One piece of evidence for the inessential role of climate in choosing a territory for the Jewish people was the fact that the climate in Palestine was not necessarily more favourable than that of Guas Ngishu. Thus, in its final rejection of the scheme, Zionists drew on a longstanding tradition of Jewish longing for 'Zion' rather than considering the scientific findings they had initiated. Nevertheless, the Zionist elevation of scientific research and its important role during the turn of the century was meant to present the ZO as a liable organisation that made rational political decisions on the basis of empirical data.

As Mitchell Hart reminds us, between 1880 and 1930 Jewish scientists began following the trend of a growing trust in numbers and their ability to reveal patterns and reflect reality. Numerical data and statistics were used during this period to cover a broad area of disciplines. In addition, the emergence of Jewish numerical data was a task traditionally associated in Europe with state and municipal administrations. Thus, similar to Hart's argument on the role of social sciences, I argue here that the scientific investigation of climate and the environment by the ZO, aided this institution in fashioning itself as a Jewish 'government' in potential. [186]

[186] Hart, social, 3-6, 17

Climate Investigation in Palestine

Due to the weakening power of Ottoman rule which begun in the mid-nineteenth century, a period of reformation was initiated in the Empire, which included the 'capitulation system'. The capitulations were a series of bilateral contracts between the Ottoman and European powers that granted the latter rights and privileges, especially in the spheres of trade and goods. This development marked an increase in Western interventions in Palestine. Bolstered by the improvements in global transportation, this period was also followed by a significant increase in the number of travellers, explorers, and pilgrims who visited the region.

The first to conduct modern climate research in Palestine in 1846 was the Scottish physician Edgar McGowan. From the 1860s most climate investigations in Palestine were conducted by the British Palestine Exploration Fund (PEF) and the Scottish Meteorological Society under the supervision of physician Thomas Chaplin, director of the British hospital for Jews in Jerusalem.[187] Following the activity of the British and the Scottish, other nations began establishing meteorological stations in Palestine during the late nineteenth century. In 1896 Otto Kersten, a German chemist, geographer and the General Consul of the German Reich in Jerusalem founded the German Palestine Association (*Deutsches Palästina Verein* [GPA]) and established several meteorological stations in the country.[188] The official purpose of the PEF, the GPA and other national associations was usually to rediscover the biblical history of

[187] Yaron Perry and Efraim Lev, *Modern Medicine in the Holy Land: Pioneering British Medical Services in Late Ottoman Palestine*, International Library of Colonial History (London; New York: Tauris Academic Studies, 2007), 68,73.
[188] Blanckenhorn, 107-08.

the Holy Land; yet they also had military, economic and political interests that stretched far beyond simple historical and religious interests.[189]

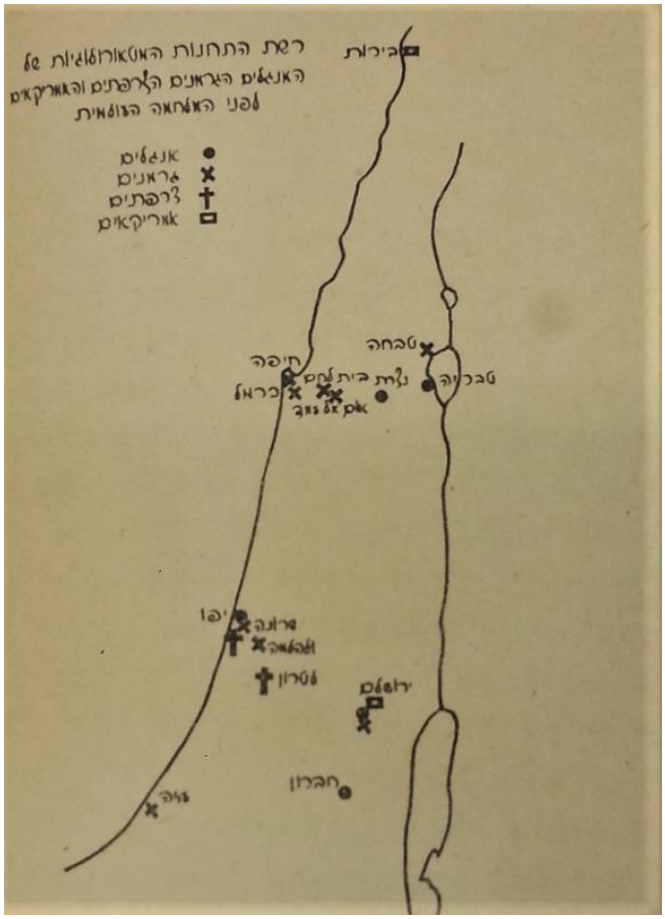


Figure 3. Map depicting the international meteorological stations in Palestine before World War I by Jewish meteorologist Dov Ashbel, 1940.

The first Jewish meteorological station in Palestine was established in 1897 in the agricultural school of Mikve Israel. According to Jewish meteorologist Dov Ashbel, this station examined precipitation, temperature, humidity and winds. Nevertheless, the ZO, which was not officially linked to the school's activity, preferred to send research

[189] Clemens Wachter, *Die Professoren Und Dozenten Der Friedrich-Alexander-Universität Erlangen 1743-1960 (Teil 3).* (Erlangen: Universitätsbund Erlangen-Nürnberg, 2009), 19. According to other sources, Blanckenhorn's first surveys in Palestine were undertaken in 1894 at the invitation of Theodor Herzl. Jacob Norris, *Land of Progress: Palestine in the Age of Colonial Development, 1905-1948* (Oxford: Oxford University Press, 2013), 60.

expeditions to investigate the natural conditions of Palestine before deciding on establishing an official meteorological station. In 1903 the Sixth Zionist Congress established the CEP. Headed by Warburg, the committee's main goals were to investigate Palestine and its surroundings, make information on the country known to the wider public, research local diseases and eventually to also establish stations for agricultural experimentation.[190]

In 1904 the committee's first official expedition travelled to Palestine with the objective of exploring the metallurgical possibilities of the Dead Sea, the Judean Desert and Transjordan. Its inspections also included the collection of climatic data and its subsequent publication in scientific journals. This expedition was headed by the German geologist Max Ludwig Paul Blanckenhorn, who was accompanied by the young and – at that time – less experienced Zionist agronomist Aaron Aaronsohn.[191]

Blanckenhorn had already participated in German and Ottoman scientific excursions to the region before being recruited for the job by the ZO. In 1897, he began to work for the Prussian Geological Regional Office (*Preußischen Geologischer Landesanstalt*) and shortly afterwards was elected as head of the GPA. Thus, similar to other contemporary Zionist expeditions, the expedition to Palestine involved non-Jewish colonial experts who were simultaneously affiliated with other colonial enterprises. Moreover, following Blanckenhorn's expedition to Palestine, the relationship between the CEP and the GPA grew stronger. An article published in 1909 by Blanckenhorn revealed that most of the GPA meteorological stations in the country were also funded by the ZO, but they adhered to the scientific model of the GPA on

[190] Tahon, 30.
[191] Aaron Aaronsohn, *Tzemah Ma'rav Ha-Yarden* (Tel Aviv: Keren Aaronsohn Zikhron Ya'akov, 1940).

Blanckenhorn's advice.[192] The significance of this collaboration was that CEP members were able to imbibe climatological knowledge from a more experienced colonial entity.

Nevertheless, the collaboration between the CEP and the GPA was also a result of practical considerations. In an article from 1910, Blanckenhorn reported that the German operators of the old meteorological stations in the country were not always reliable sources of information because many of them returned to Europe after completing a short duty in Palestine, some went on annual leave or became ill, and in some cases, even died. Blanckenhorn argued that this variety of circumstances affected the quality of the scientific data produced in the meteorological stations which were producing inconsistent and often false information. To solve this problem, he suggested establishing new meteorological stations that would be based in existing towns and villages and would rely on local operators. These operators were to be found in Templer settlements, such as Wilhelma, Sarona and Waldheim; in Jewish settlements, such as Zikhron Yaakov and Melhamia [Menahemia]; and in Arab villages and towns, such as Nazareth, Bethlehem, Ma'an and Jericho.[193] Thus, as historian Norton Wise points out, the process of scientific standardisation not only depend on an extensive set of agreements regarding materials, instruments, methods and values but also on the accomplishment of an extended network of practitioners sharing similar knowledge and aspirations.[194]

However, according to Blanckenhorn, the Arab stations were harder to operate than the others due to what he called 'the lack of interest [in climate research] among the Arabs.'[195] Indeed, local Arabs were typically less involved in the scientific

[192] Max Blanckenhorn, "Studien Über Das Klima Des Jordantals," *Zeitschrift des Deutschen Palästina-Vereins* 32, no. 1/2 (1909): 40.
[193] Max Blanckenhorn, "Zum Klima Von Palästina " ibid.33, no. 2/3 (1910): 109.
[194] Wise, 9.
[195] Blanckenhorn, 109.

investigation of climate in Palestine. This may simply have been the result of their existing familiarity with the natural characteristics of the country. In addition, it could be claimed that the local Arabs were not necessarily well disposed towards the kind of knowledge for which European science strove for. Therefore, Blanckenhorn's statement on local Palestinians' interest in climate also reflected the common and widely spread colonial stance that often ignored indigenous knowledge, while echoing a vision of colonial science as an enterprise whose universalisation had to be accepted by all.

A Practical Science is Born

In the late nineteenth century, astronomer George Airy opined that 'the observing is out of all proportion to the thinking in meteorology'.[196] Physicist Arthur Schuster suggested at a meeting of the British Association for the Advancement of Science that meteorologists should stop observing for five years and instead work on ascertaining what the observations meant.[197] Similarly, the Russian-Jewish engineer and businessman Pinhas Rutenberg wrote about climate research in Palestine that 'the precipitation measurements we have today demonstrate the lack of consistency and standards in survey methods and therefore we cannot determine the seasonality of the weather events.'[198] According to Nebecker, at the turn of the twentieth century climatic data was collected by a larger number of experts. However, climatic regularities became valuable and practical for scientists in other fields (such as botany, medicine and architecture) only following World War I.

[196] In: Nebeker.
[197] In: ibid.
[198] Pinhas Rutenberg, "Meshek Ha-Maim Be-Eretz Yisrael. 1, Emek Ha-Yarden, Hatsa'at-Tokhnit Mukdemet," (Jerusalem: Sivan, 1920), 6.

The increasing establishment of Jewish meteorological stations in Palestine and the growing interest in meteorological data went hand in hand with the intensification of Jewish immigration and the consolidation of the economic and political objectives of the Zionist project in Paletine during the 1920s and even more so in the 1930s. As we shall see in the following chapters, this transformation was evident in the development of agricultural enterprises that emphasised the acclimatisation of new crops as well as the growing concerns of physicians in regard to the health conditions of Jewish settlers in the country.

Jewish meteorologist Dov Ashbel reported that it was only following the end of World War I that every new Jewish settlement began establishing its own meteorological station. Moreover, starting from the 1930s all meteorological stations were connected and supervised by the Meteorological Department of the newly founded Hebrew University of Jerusalem directed by Ashbel himself. According to Ashbel, the presence of meteorological stations in Jewish settlements became so prevalent during these years that by the late 1930s a map of the existing meteorological stations was able to delineate the areas of Jewish settlement within the country. That is, in contrast to the lack of meteorological stations in Arab villages. [199]

Thus, the growing attention given to meteorological data during this period was not only the result of internal developments in the Jewish *Yishuv*. It was also the outcome of wider developments in the study of meteorology following World War I. In general, the first half of the twentieth century witnessed a marked increase in the number of people pursuing scientific educations. This growth was also reflected in the number of meteorologists following World War I, which rapidly surged as a result of the increase in the size and number of universities in general and due to the

[199] Ashbel, 15-17.

establishment of meteorology and climatology as academic disciplines for the first time.[200]

Another important cause for the rise of meteorology following World War I was related to the conduct of modern warfare and especially the effect of weather on airplanes. The transformation of the sky into a new battle arena during the war boosted the study of meteorology to a new level. Although the weather had always been considered important in the conduct of war, it was not until the twentieth century that meteorological staff became a standard feature in military organisations. Meteorologist Ernest Gold, one of the founders of the British military meteorological service, wrote in 1945 that before World War I 'the army had little use for meteorology: the attitude of the general staff [was] that "the British Army fights its battles with guns and bayonets and not with meteorology."'[201] Yet, the introduction of chemical weapons and aircrafts as major components of the first global war rapidly effected a change in the utilisation of meteorological data. Robert A. Millikan, commander of the Meteorological and Areological Service of the Signal Corps during the war, also wrote that 'the biggest element in the effectiveness of a modern army is its artillery and […] the effectiveness of the artillery is dependent entirely upon […] winds corrections.'[202] By the end of the war all major European powers had introduced meteorological services within their militaries and the amount and frequency of reported meteorological information was unprecedented.

Ashbel reported that during World War I British military units as well as the German and the Turkish enemy armies performed scientific climate research in Palestine for aviation purposes. According to Ashbel, the most important aspect to their

[200] Nebeker, 45.
[201] In: ibid., 83-84.
[202] In: ibid.

examinations was the behaviour of the winds from ground level to six kilometres above the ground.[203] Still amid the war, in November 1917 the British government announced its support for the establishment of a Jewish homeland in Palestine by issuing the Balfour Declaration. Following Palestine's conquest by the allied forces, it was placed under the military rule of the Occupied Enemy Territories Administration and in the summer of 1920 a civil British administration replaced the military one. This administrative shift also led to some fiscal and military adjustments. Until 1921 the British army had 7,670 troops in the Palestine, including three foot battalions and three horse regiments at an annual cost of £3 million. In order to reduce military expenses and manpower after 1921, most of the imperial troops were replaced by armoured cars and airplanes.[204]

Thus, meteorological developments in Palestine were also a product of the British military strategy in this land. The most important contribution to climate research in Palestine made by the British concerned its decision to establish the Department for Civil Aviation (DCA) in 1934. This decision was accompanied by another important resolution to build an international airport in Lydda, which would include the first meteorological service in the country. During its early days the meteorological service of the DCA consisted mainly of British colonial officers but it did not take long until this service began cooperating with local Jewish experts and institutions. Indeed, by the end of the 1930s the DCA's meteorological service was headed by the German-Jewish meteorologist Rudolf Feige.[205]

Feige's biography epitomises not only the cooperation between Jewish experts and the British administration in Palestine but also the interrelation between

[203] Ashbel, 13.
[204] David E. Omissi, *Air Power and Colonial Control: The Royal Air Force 1919-1939* (Manchester: Manchester University Press, 1990), 44-45.
[205] Files of the Meteorological Department at the Hebrew University, 1938, CAHUJI, 120/239.

meteorology and aviation as well as the importance of World War I in advancing both fields. Moreover, it was due to Feige's familiarity with aviation technologies that he was able to migrate to Palestine in the first place and become head of the meteorological service.

Born in Breslau in 1889, Feige studied physics and mathematics in his hometown university. During World War I he volunteered in the Zeppelin Unit of the Kaiser's army, where he served as a meteorologist and a physicist. Following the end of the war Feige was elected head of the Breslau-Krieten region meteorological service which owned two airplanes for scientific use.[206] Nevertheless, following the Versailles Agreement in 1919 flying became strictly limited on German territory and German official and private institutions were forbidden to continue developing aviation technologies. As a result of these restrictions, German flying enthusiasts turned their attention to gliding, an activity that soon became a patriotic and even a rebellious sport in opposition to the Allies. Feige, too, demonstrated great interest in gliding and frequently utilised gliders for meteorological research.[207]

Following the rise to power of National Socialism in 1933, Feige was arrested by the authorities and imprisoned for one year. Ensuing his release from prison, he decided to migrate to Palestine. However, during the 1930s and 40s Jewish immigration to Palestine was often limited by the British authorities and Feige was forced to find an alternative way to arrive in this land. In 1935, a few months before the beginning of the second *Makabiyah* Games (often referred to as the Jewish Olympics), Feige assembled a group of twelve Jewish aviation experts and together they applied to compete in the

[206] Feige's Curriculum Vitae and other personal documents, GSJHA, G.F.0341-3/ 1.
[207] Yossi Malki, *Moderniyut, Leumiyut Ve-Hevra: Reshit Ha-Teufa Ha-Ivrit Be-Palestina/ Eretz Yisrael* (PhD Dissertation: Tel Aviv University, 2007), 6, 21. GSJHA, G.F.0341-3/ 1. Peter Fritzsche, *A Nation of Fliers: German Aviation and the Popular Imagination* (Cambridge; Mass: Harvard University Press, 1992).

games using gliders. This was the first (and last) time gliding served as a competitive category in the *Makabiyah*. The gliding group included engineers, pilots, technicians and meteorologists; all of whom would become central figures in British as well as in Zionist aviation and meteorological activities in subsequent years in Palestine.[208]



Figure 4. Preparing the gliders for the Makabiyah in Palestine, 1935.

After settling in the country, Feige and his German colleagues joined the 'Flying Camel' (*Ha-gamal Ha-meofef)*, a Jewish gliding club which was founded in 1933, and together with other local gliding clubs, stimulated great enthusiasm among the Zionist youth. Similar to the restrictions imposed by the Allies on German gliders, Jewish gliders in Palestine were at first not permitted to develop aviation technologies under Mandate rule in Palestine. Thus, equipped with meteorological and technological knowledge from Germany, the *Flying Camel* and other Zionist gliding clubs invested in this activity while also collecting meteorological data in this way. Academics at the Hebrew University such as Dov Ashbel and others, also joined the flying efforts and taught courses in engineering, meteorology and aeronautics to the club members. In 1935 Jewish gliding clubs in Palestine were united under the umbrella organisation of

[208] Information on the participation of Feige and his gliding team in the *Makabyah* GSJHA, G.F.0341-1.

'The Aero Club of Palestine', which in the course of the next decades would become the Air Force of the *Hagana* and subsequently of the Israel Defence Forces. [209]

Yet, in addition to the importance of gliders in the context of nation-building, Feige continued to similarly advocate for the advantages of gliders in the study of meteorology. In a short essay he published in 1935, Feige explained why this activity was suitable for climate research in general and in particular in Palestine. He wrote that while most countries utilise airplanes to measure temperatures and humidity, the glider, which according to him had not been used enough for systematic climate research, is much more accurate for the estimation of wind direction as this light aircraft depends entirely on the vertical movement of the air and can help predict the creation of clouds and rain. In addition, according to Feige, gliders were especially appropriate for use in Palestine since their measurements and predications were even more accurate in flat and 'uninhabited' countries.[210]

Feige's description of Palestine as an uninhabited land may reflect the transparency of the local Arab society in his eyes. This approach – which represented a general attitude within the *Yishuv* during the Mandate period and was by no means unique to Feige – combined with the flourishing of meteorological stations in Jewish settlements following 1918 mentioned earlier might explain why during the 1929 uprising, Palestinian Arabs destroyed Jewish meteorological stations in Beer Sheva, Jericho and Beit Shean, thus, unintentionally emphasising the symbolic link between the Zionist enterprise and the colonial science of climate investigation.[211]

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[209] Unknown, "Das Juedische Flugwesen in Eretz Israel," *Hamasad* 4, no. 12 (1939): 184. Malki, 6-7, 15-16, 26, 30. Testimonies on the beginnings of aviation in Palestine: by Michael Uri, March 30th, 1958, HHA, 33.00012 and by and Yosef Keren, unknown date, HHA, 122.00029.
[210] Das Segelflugzeug als meteorologisches Forschungsmittel. March, 1935, GSJHA G.F. 341-16/15.
[211] Ashbel, 14-16.

Accordingly, the introduction of gliders into the meteorological scene rearticulated the increasing segregation that existed between Jews and Arabs in Palestine during the 1920s and 1930s and situated it 'beyond the ground'. Through the establishment of meteorological stations and the development of military aviation (which depended on meteorological research), the air also became politicised, thus, allowing colonialism to manifest itself in multiple spatial arenas.

While before World War I the practical conclusions that could be drawn from climate investigation were still limited, and climatology and meteorology often served as colonial sciences which mainly demonstrated power, following the war climate research increasingly became an applied field of investigation. As we shall see in the following chapters, during this period climate research began to be systematically implemented and integrated into the study of medicine, agriculture and planning in Palestine and many Jewish experts in these fields began presenting the climatic measurements collected by the Hebrew University and the DCA in their scientific publications.

The shift in the practical status of climate research in Palestine was first and foremost a result of British developmental, infrastructural and institutional investments in the land, and its cooperation with and support of the *Yishuv's* institutions. In addition, the shift was also a result of the transfer of knowledge, ideas and practices from interwar Germany to Palestine after 1933 which, simultaneously with the intensification of the Arab-Jewish conflict, charged meteorology with additional political connotations.

Part II: Confronting Climate in Palestine

The second part of this thesis discusses the ways in which Jewish settlers dealt with the climatic conditions in Palestine after settling in this country. This part addresses Jewish approaches to climate in Palestine within the three fields of expertise that were most concerned with the effects of climate on the success of the Zionist project in Palestine: planting, health, and planning. While this part addresses climatic investigation during both the late Ottoman and the British rule, its emphasis is upon the Mandate period (1921-1948) during which Jewish leaders and experts were increasingly concerned with the potential hazardous effects of the local climate.

Chapter 3. Agriculture, Botany and Climate

In this chapter, I present the ways in which local climate in Palestine was understood and managed by British and Zionist agricultural and forest experts. Agriculture was viewed as the most promising economic force in Palestine during the first half of the twentieth century due to the country's scarce natural resources. Agriculture would not only enable a self-sustaining Jewish settlement but, owing to Palestine's position on the world's main trade routes, the British and Zionists also aspired to transform the country into a major competitor in the global fruit and vegetable market.

In addition to serving as an economic asset, agriculture also possessed a cultural significance. In late nineteenth-century Europe agriculture was often perceived as a romantic refuge from urban society. In a similar vein, Zionists often highlighted the ills of Western industrial society. As noted earlier, according to Zionist ideology, the 'return' of Jews to Palestine was not only seen as the geographic transportation of a persecuted people to their 'historical' homeland. It was also perceived as an opportunity to transform an allegedly weak, pallid and effeminate populace living off charity and urban handicrafts in Europe into a strong, tanned and masculine populace of farmers and labourers who would become rooted in the land of their ancestors.

Correspondingly, as Yael Zerubavel points out, trees possessed important symbolic value in Hebrew culture and became an icon of national revival symbolising Zionist success in 'striking roots' into the ancient homeland. The Jewish National Fund (JNF) described the planting of trees as promoting the redemption of the country [*Geulat Ha'aretz]*, while Jewish children were often named after trees.[212]

[212] Yael Zerubavel, "The Forest as a National Icon: Literature, Politics, and the Archeology of Memory," *Israel Studies* 1, no. 1 (Spring, 1996): 60.

The planting of trees and forests was also viewed as a way of improving the air quality, increasing rainfall and lowering average temperatures. This notion, which has been ingrained in Western traditions since antiquity, asserted that deforestation was responsible for the evolution of warm climates while forestation created cool climates. During the nineteenth century, this scientific discourse had vast global and imperial implications as it influenced the management and control of large territories.[213] In Palestine, however, the link between climate and forests received an additional local interpretation. Improving climate through afforestation was related to the Edenic image of the country in the Judeo-Christian tradition which, according to the British and Zionists, needed to be restored. The discrepancy between the imagined biblical land ('the land of milk and honey') and its disappointing present-day reality became a central subject of scientific examination and an incentive for afforestation. Afforestation and its relationship to climate in Palestine is also the subject of the first section of this chapter.

The second section of this chapter focuses on the transfer of forestry and agricultural ideas and practices as well as the transportation of seeds and plants between different colonial or 'modernising' contexts and their reception in Palestine. Many Jewish agricultural and forest experts had acquired their professional training in Europe and were later influenced by the policies of the British Agriculture and Forest Department in Palestine. Another major source of inspiration for these experts was the knowledge on acclimatisation accumulated during recent decades in former settler colonies such as the United States and Australia. In this section, I argue that the inclination to study the methods of acclimatisation in settler states was not only a result of the similar climatic conditions in these countries but also a result of a shared social

[213] Barton, 2.

and cultural experience as well as a similar economic and political approach to the settled territory and its indigenous populations.

Zionists believed that the successful acclimatisation of crops required knowledge and experience but, more importantly, they thought, it required the use of advanced technologies which made it less vulnerable to local natural constraints. Thus, the third and last section of this chapter presents the irrigation solutions which were introduced to Palestine during the first half of the twentieth century as a response to its climatic challenges. This section also stresses the role of irrigation in enhancing the materially and conceptually imbalanced power relations between Jews and Arabs in Palestine reflected in their access to and utilisation of water.

Solving Desiccation

Since the late seventeenth century, natural philosophers in Europe had been debating what they called the desiccation theory or climate change. These debates became more central during the second half of the nineteenth century. The more reliable meteorological data became and the more frequently statistics were used to analyse it, the greater speculations concerning desiccation theories became. Most contemporary scholars agreed upon the reality of changes in global climate, yet they were undecided about a few fundamental issues. While some believed that desiccation was part of a long-term geological progression, others thought it was a process which could be dated to more recent historical times. Another related debate concerned the causes of climate change, which were perceived to be either natural (autogenic) or a result of human interference (anthropogenic). Many claimed, for example, that deforestation instigated

by humans had contributed to recent climate change by producing frequent droughts and more extreme temperatures.[214]

In addition, the scientific discourse on climate change was also part of a general demonstration of global and imperial power-knowledge. Historian James Rodger Fleming suggests that climate change should also be understood in contemporary spatial terms. According to him, to conceive intelligibly of climate change one must adopt not only a historical perspective, but also a global one. [215] Similarly, historians Christoph Bonneuil and Jean-Baptiste Fressoz have argued that 'European colonial expansion played a key role in the emergence of reflection on anthropic climate change'.[216]

As mentioned earlier, the era of high imperialism at the late nineteenth century undeniably introduced a form of globalism into the climate sciences when networks of meteorological observers were established around the world, meteorological instruments and measurements were standardised, imperial communication technologies enabled the rapid transformation of data on climate from different corners of the globe and statistics became the preferred method of analysis. Moreover, as the European powers expanded, new questions were raised about how climates on similar latitudes could be so different, most notably on opposite sides of the Atlantic.[217] Indeed,

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[214] David Moon, "The Environmental History of the Russian Steppes: Vasilii Dockuchaev and the Harvest Failure of 1891," *Transactions of the Royal Historical Society* no. 15 (2005): 252-53. According to Richard Grove, the origins of the debate began in the 1860s following the publication of Darwin's controversial theories in *On the Origin of Species by Means of Natural Selection* which influenced and transformed many fields of thought, and, among other things, stimulated an unprecedented wave of environmental concerns. Grove, *Ecology, Climate and Empire: Colonialism and Global Environmental History, 1400-1940*, 21.

[215] James Rodger Fleming, Historical Perspectives on Climate Change, (New York ; Oxford: Oxford University Press, 1998). 5-6.

[216] Christophe Bonneuil and Jean-Baptiste Fressoz, *The Shock of the Anthropocene: The Earth, History and Us* (Verso: London 2015), 176.

[217] G. T. Cushman, "Humboldtian Science, Creole Meteorology, and the Discovery of Human-Caused Climate Change in South America," *Osiris* 26, no. 1 (2011). Fleming. William B. Meyer, *Americans and Their Weather* (Oxford: Oxford University Press, 2000).

these methodological developments, which were discussed in the previous chapter, enabled scientists to consider climate change as a global phenomenon that had broader implications and significance than merely those of a narrow local issue.

Throughout the first decades of the twentieth century, arguments supporting climate change were often based on 'climate reconstruction', a form of historicising climate which depended on ancient literal accounts of climate. Greek and Roman texts were occasionally interpolated alongside archaeological findings and geological analyses to prove that climate change had occurred in Greece, Cyrenaica and parts of Europe. In 1917, American geographer Ellsworth Huntington, a vehement environmental determinist and one of the most prominent advocators of climate change at the beginning of the century, published an article entitled 'Climatic Changes and Agricultural Exhaustion as Elements in the Fall of Rome' in which he tied the decline of the Roman Empire to changes in the climatic conditions of the Mediterranean region.[218]

Nevertheless, considering the number of scholarly accounts dedicated to it, the Old Testament appears to have served as the most important textual evidence in proving climate change both in Palestine and in Egypt. Huntington wrote in 1911 that 'in no other country could [climate] theories be so well tested, for [Palestine's] known history extends back to remote antiquity.'[219] Later in the same article Huntington added that during his expedition to Palestine he was 'surprised also to discover how closely historical progress or decline appear to have synchronised with the changes in climate'.[220]

[218] Ellsworth Huntington, "Climatic Change and Agricultural Exhaustion as Elements in the Fall of Rome," *Quarterly Journal of Economics* 31, no. 2 (February, 1917).
[219] *Palestine and Its Transformation* (Boston and New York: Houghton Mifflin Company, 1911), vii.
[220] Ibid., 6.

The scientific discourse on climate change in Palestine was relatively abundant during the first decades of the twentieth century and it was intertwined with Western colonial interests in the country. In an article titled 'Is the Earth Drying Up?' published in 1914, the British geologist and explorer John Walter Gregory aimed to confirm climate change by comparing Palestine's contemporary physical conditions to its glorious biblical representations:

> Palestine is described in the Bible as a land flowing with milk and honey; it was fertile in vine and olive; many incidents suggest that it was well wooded; and, according to the Old Testament statistics, it had a dense population. Now it is a barren, arid land, with a scanty vegetation, swept by parching winds from the eastern deserts, and occupied by some 700,000 people, who are mostly Arabs and mostly paupers.[221]

As we have seen in the previous chapter, until the end of World War I, climate investigation was usually carried out by experts who were not formally trained as climatologists. Climatology and meteorology, as academic fields of study, were only introduced as independent academic departments following the war.[222] Accordingly, scholars advocating climate change theories during the first two decades of the twentieth century were usually not climate experts. Moreover, in many cases they were not even natural scientists. Among the prominent international scholars who debated the question of climate change in Palestine were the British classicist and lexicographer Sir William Smith; the Scottish theologian George Adam Smith; and the British Reverend and Professor of Assyriology Archibald Henry Sayce. The arguments put forth by these scholars were usually based on archaeological findings and literal biblical descriptions of the Land of Israel, especially those which referred to a material

[221] J.W. Gregory, "Is the Earth Drying Up?," *The Geographical Journal* 43, no. 2 (Feb. 1914): 152.
[222] Harper, 11. Nebeker, 45.

dimension of ancient woods and forests, water levels in lakes and seas, and demographic diminution.[223]

> According to the Book of Numbers (i.3 and 46), the Israelites in the wilderness included 603,550 men capable of bearing arms; the censusing of the reign of David records the number of available warriors as 1,300,000 (2 Sam. xxiv. 9) […]. It would certainly be difficult to maintain in modern Palestine the population indicated by these records.[224]

At the same time, anthropogenic arguments on climate change also stressed the continuation of weather phenomenon in this land as proof of humanly instigated degeneration. Rather than providing evidence for the fertility of the local environment in past times, these scholars relied on biblical accounts of weather patterns in the Land of Israel. For example, geographer and archaeologist Major-General Sir Charles William Wilson wrote in this context:

> The country is still subject to those sudden storms so frequently alluded to in the Bible; and in fact, there does not appear to have been any great change of climate since the times of the Kings of Judah and Israel.[225]

German scientist Heinrich Hilderscheid, who conducted a comprehensive study on annual rainfall trends and seasonality indices within the Bible, argued along similar lines:

> Just like today, there were two seasons in ancient Palestine: summer and winter, while autumn and spring were only rarely referred to in the holy scriptures […] 'You made summer and winter and gave them to the earth' (Ps. 74,17).[226]

Hilderscheid also pointed out that as in modern times, summer rains during the biblical period were extremely uncommon and unwanted. On the rare occasions that they did occur, they signified God's punishment as they usually destroyed the peasants' crops.

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[223] Gregory, 152-54.
[224] Ibid., 153.
[225] Wilson, 328-29.
[226] Heinrich Hilderscheid, "Die Niederschlagsverhältnisse Palästinas in Alter Und Neuer Zeit " *Zeitschrift des Deutschen Palästina-Vereins* 25 (1902): 83.

Another example provided by Hildescheid to support his argument was related to the wind directions in the country. According to him, already in biblical times rain clouds came from the sea coast and moved inland (west winds), whereas winds from the south and the east indicated dry weather (*ḥamsins*).[227]

Meteorologist Rudolf Feige, one of the few Jewish experts to comment on this scientific debate, utilised the Old Testament to argue against desiccation theory:

> [The climate in Palestine] was already described some thousand years ago in the most beautiful way in the Bible, so elaborate and detailed, so much in agreement with our modern knowledge of the climate of Palestine that one can only wonder how men like Huntington and others still try to prove that our climate here has changed during historical times.[228]

According to the opponents of desiccation theory, Palestine had never lost its fruitful potential. Thus, the only reason for the possible worsening of its conditions could be attributed to local Arab and Ottoman neglect ('*Unkultur*' as Hilderscheid described it*)*.[229] In other words, even among those who did not believe in desiccation theory, the notion of the 'land of milk of honey' did not fade. To them the only explanation for the so-called desolate condition of the land was as a result of human intervention.

The discourse upon environmental neglect was similarly part of a global colonial discourse in which colonial administrators and experts blamed indigenous people for mismanaging the natural resources in their countries, which had resulted in environmental decline. Specifically, the British and the French tended to lay the blame upon the Muslim invaders in North Africa and the Middle East. These imperial powers evoked what Diana Davis terms as 'environmental imaginary'; a form of orientalism that viewed the Middle East and North Africa as strange and 'defective' environments

[227] Ibid., 85-86.
[228] Manuscript by Feige, unknown date, GSJHMA, G.F.0341-22/ 1.
[18] Unknown, "Das Klima Palästinas," *Die Welt* 32 (07.08.1903): 8.

that were on the verge of disaster. Generally, the local Arabs and Berbers were understood to be responsible for this situation as they were accused of instigating deforestation and overgrazing, while Westerners were able to portray themselves as those who had come to 'protect', 'improve', 'restore' and 'normalise' these regions.[230]

Numerous European sources similarly reflected this view on Palestine. American land conservationist Walter Clay Lowdermilk wrote that 'backward native populations and political and social decay are the usual result when land is impoverished by erosion and neglect. Palestine is a classic example for such transformation'.[231] Jewish Agronomist Aaron Aaronsohn similarly wrote in 1909:

> Prof. Hilgard has shown that the decadence and the relative sterility of the countries of Asia Minor and northern Africa, formerly renowned for their fertility, have been caused by the wars which have devastated these countries, the misgovernment which followed these wars, and the ignorant and wandering population resulting from such wars and such government.[232]

One of the most frequently utilised colonial methods for solving desiccation and 'improving' local climate was forestation. The link between forests and climate change, which prevails to this day, can already be found in the writings of Greek naturalist Theophrastus and it remained relevant throughout most of the next millennia. During the eighteenth and nineteenth centuries this axiom was further developed by German, French and British scientific societies and colonial institutions such as the British Association for the Advancement of Sciences, the Royal Geographical Society, the Royal Botanical Gardens in Kew and other prominent colonial scientific institutions.[233]

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[230] Diana K. Davis and Edmund Burke, III, *Environmental Imaginaries of the Middle East and North Africa* (Athens, Ohio: Ohio University Press; London, 2011), 2-6.
[231] Walter Clay Lowdermilk, *Palestine Land of Promise* (London: Victor Gollancz Ltd, 1944), 24.
[232] 'Palestine as an Agricultural Country', Manuscript by Aaronsohn, 1909-1910, BAA, _35_1_2. 4.
[233] Grove, *Ecology, Climate and Empire: Colonialism and Global Environmental History, 1400-1940*, 5-17.

By 1850, tropical deforestation was conceived of as a global problem and in the following decades the British, who pioneered the research on climate and forestry, transformed one-fourth of the lands of their entire empire into protected forests. Fifty separate forest services in the empire protected not only trees but also soil, water and the climates of entire continents and regions. Desiccation theory was typically prevalent in the imperial periphery and was mostly established in the headquarters of the Indian Forest Service. From there knowledge was transported to the metropole as well as to other colonies through the activities of individual experts and institutions.[234]

However, it was not only new knowledge on climate that developed the science of forestation but also colonial forestry that gave rise to new knowledge on climate. Environmental historian Brett Bennett claims that nineteenth century forest experiments with new trees in Australia and South Africa led experts to develop new comparative approaches in climate studies.[235] In addition, according to nineteenth century New Zealand government scientist, James Hector, the principal aim of collating standardised meteorological observations was to compare the New Zealand climate with that of other countries in order to introduce new trees and plants to it.[236]

In Palestine, the British were occupied with foresting from the moment they stepped foot on the ground. Between 1921-1948, the British government planted 20 million trees on an area of 10,207 acres while supplying another 15 million trees to local municipalities.[237] The so-called environmental decline referred to by the British

[234] Barton, 1-2, 7. Grove, *Ecology, Climate and Empire: Colonialism and Global Environmental History, 1400-1940*, 19.
[235] Greg Barton and B. M. Bennett, "Edward Harold Fulcher Swain's Vision of Forest Modernity," *Intellectual History Review* 21, no. 2 (2011).
[236] P. Holland and J. Williams, "Pioneer Settlers Recognizing and Responding to the Climatic Challenges of Southern New Zealand," in *Climate, Science, and Colonization: Histories from Australia and New Zealand* ed. J. Beattie, E. O'Gorman, and M. Henry (Basingstoke, England: Palgrave Macmillan, 2014), 87.
[237] Gideon Biger and Nili Liphschitz, "Australian Trees in the Land of Israel 1865–1950," *The Journal of Israeli History* 16, no. 3 (2008): 240-41. During the same period the Zionists planted about 5 million trees on 5,189 acres.

was also addressed in the Afforestation Ordinance as early as 1920, that is, even before the official Mandate for Palestine was received. High Commissioner Herbert Samuel wrote a report to the League of Nations in 1921 stating that 'such are the first beginnings of a process which should add largely to the productiveness of Palestine, increase its rainfall and bring fresh charm to its scenery'.[238]

When describing the cultural impetus behind Britain's afforestation schemes in Palestine, historian David Shorr writes that the British believed that:

> The cooler and moister climate produced by the forests would change the very nature of the countryside, rendering the landscape more pleasing to the European eye. The new conditions would be favourable to the raising of sheep and cattle, on the English model, instead of the destructive goats of the Mediterranean basin. Thus, would the Holy Land be changed – or returned – to one in which Europeans (whether Zionist settlers or British administrators) could live with no great discomfort.[239]

British afforestation also fulfilled an important political and territorial role. Forests were large land areas which were controlled and monitored by the government and in which grazing, woodcutting, and, at times, even loitering were prohibited in ways which crucially affected the local agrarian social structure. As Barton notes, 'this was most likely to happen, not under a democracy where a majority of users – peasants, craftsmen, and traders – could block reform, but under an authoritarian regime where colonial overlords could, for better or worse, impose their control'.[240]

Similarly, from 1911, Zionist institutions realised that owing to Ottoman land policies and later British tree protection policies forests could serve as practical instruments with which to gain power over land. Following the appointment of botanist

[238] Herbert Samuel, "An Interim Report on the Civil Administration of Palestine, During the Period 1st July, 1920 - 30th June, 1921 ", ed. Office of Public Sector Information (London: HMSO, 1921).The afforestation ordinance was updated in 1926, 1939 and 1947.
[239] David Shorr, "Forest Law in Mandate Palestine," in *Managing the Unknown: Essays on Environmental Ignorance*, ed. Frank Uekotter and Uwe Luebken (New York, NY: Berghahn Books, 2014), 75.
[240] Barton, 7.

Otto Warburg as president of the ZO, the JNF which was under the ZO's direct supervision, moved from solely purchasing lands that were suitable for agricultural settlements to also purchasing stony lands that were unsuitable for agriculture but could be used for planting trees. It was in this way that trees became effective agents in the expansion of the Jewish frontier in Palestine.[241]

During the 1920s and 1930s, the borders of this frontier mainly concerned the central and northern parts of Palestine, which were also the most fertile areas in the land, however, in the 1940s Zionists were beginning to think beyond these borders. One of their most ambitious campaigns during the 1940s concerned research upon the climatic and soil conditions of the arid Negev region in the southern part of Palestine. The Negev was presented as a geographical area that required blooming and redemption – a vision that was realised through afforestation mainly from the 1950s onwards.[242]

Ethnographer Irus Braverman points out that although the word 'forest' derives from the Latin word *fori* which means outside and is linked to the idea of wilderness, throughout the centuries the definition of 'forest' has changed and transformed into what historian James Scott has described as bureaucratically measured and calculated entities meant first and foremost for production and profit.[243] Thus, another common impetus for planting forests in metropoles and colonies was the importance of the timber industry. Nevertheless, Barton claims that despite the general importance of a timber supply, desiccation theories which explained how forest lands affected rainfall,

[241] Gideon Biger and Nili Liphschitz, *Green Dress for a Country: Afforestation in Eretz Israel: The First Hundred Years 1850-1950* (Jerusalem: Ariel, 2000), 49-50.
[242] Zerubavel, *Desert in the Promised Land*. Eyal Weizman, *The Conflict Shoreline : Colonization as Climate Change in the Negev Desert*, First edition. ed. (Göttingen and Brooklyn: Steidl, in association with Cabinet Books,, 2015).
[243] Irus Braverman, *Planted Flags: Trees, Land, and Law in Israel/Palestine* (Cambridge: Cambridge University Press, 2009), 31-32.

soil preservation and water flow received much more attention in British forestry circles during the turn of the twentieth century.[244]

Shorr similarly argues that in Palestine the British were less interested in forests for timber products and were much more concerned with the effects of forests on agricultural soil, hydrology and climate.[245] Correspondingly, Zionist forestry during the first half of the twentieth century was usually not an economic enterprise. Rather, planting trees and forests was more often associated with notions of climate. Jewish agronomist Itzhak Elazari-Volkani wrote, for example, that

> the primary use of forest trees […] in this land has never been economic. Trees enabled shadow, they purified the air, embellished the landscape and balanced the humidity. However, when timber was required for building, it was always brought from northern countries. This was true already during the times of Solomon […].[246]

Acclimatisation

The first person to suggest afforestation in Palestine was the Jewish agronomist Josef Niego, director of the earliest agricultural school in Palestine, Mikve Israel, who had aquired his agronomical education in Montpellier and was familiar with French and British notions of dessication. In a meeting of the new settlements' representatives in Jaffa in 1894, he claimed that forests were meant, among other things, to improve local climate. Following Niego's suggestion, the first large forest was planted in Hadera, located on the northern coastal plain, between 1895-1899. The eucalyptus tree, which

[244] Barton, 9.
[245] Shorr, 77.
[246] Itzhak Elazari-Volkani, *Midot* (Tel Aviv: Ha-aretz Ve-ha-avoda, 1942), 152.

was depicted as a miraculous drier of swamps and was popular in many countries at the turn of the century, was chosen to be the principal tree within the Hadera forest. [247]

At the turn of the century, it was believed that the natural aromas of the eucalyptus tree would improve and refreshed the air and its rapid growth would dry swamps and, therefore, help fight malaria.[248] In a letter written by Aaronsohn in 1912 he reported that when visiting the agricultural stations in Atlit, American-Jewish philanthrope Nathan Straus offered to purchase land on the Carmel mountain and afforest it in order to cure malaria in the area.[249]

Before British and Zionist afforestation schemes were applied, tall trees in Palestine were a very rare sight. At that time the flora mostly consisted of *maquis* and *garrigue*, shrubs or small oaks and terebinth. However, because the British and Zionists were most often not familiar with the 'original' flora of the country, they planted trees that had never existed in Palestine before, thus, radically intervening in local natural processes.[250]

The eminent position of the eucalyptus tree was replaced in the 1920s by the pine tree which, as Braverman claims, has served ever since as an emblem of the Zionist project in Palestine/Israel. Zionist foresters liked the pine for several reasons. Pines grew relatively quickly and prepared the soil for other plant societies. Furthermore, pines created a distinctly European landscape, thereby, concealing the geographic dislocation of European Jews and reminding them of home.[251] However, neither the

[247] Biger and Liphschitz, *Green Dress for a Country: Afforestation in Eretz Israel: The First Hundred Years 1850-1950*, 44.
[248] Barton and Bennett, 269. Chang and King, 288.
[249] Letter from Aaronsohn to Dr. Friedwald, April 7th, 1912, BAA, _1912_14_2_9.
[250] Shorr, 78.
[251] Irus Braverman, "Planting the Promised Landscape: Zionism, Nature, and Resistance in Israel/Palestine," *Natural Resources Journal* 49, no. 2 (Spring, 2009): 342.

eucalyptus nor the pine were particularly well received by the local Arabs, who named them *shajarat al-Yahud* (the Jews' trees).[252]

Throughout human history, settlers have transferred seeds and plants from their homelands to their new destinations, thus, changing the ecology and landscape of their new homes in conjunction with their presence. In Australia, the oak and the elm were originally introduced by Europeans to enhance the timber industry. Similarly, in New Zealand and California pines and cypresses (as well as some varieties of eucalyptus from Australia) were planted to enhance the timber industry as well as to provide more shade.[253] According to one source from 1956, of every 600 plant species in America, only 100 were endemic while 400 species had originally come from Europe and Asia.[254]

Historian William Cronon writes about the settler colonial landscape of New England that it was shaped by a variety of circumstances that did not necessarily correspond with the ecology of the region itself. He adds that preconceptions regarding what the new country would offer often determined the filters with regard to what kind of information relating to the natural environment was stressed and what information was omitted. Furthermore, as mentioned earlier, Cronon asserts that settlers' descriptions of the natural environment usually contained comparisons with their old homelands.[255]

As the knowledge and traditions of the Jewish settlers in Palestine were tied to European countries, the first plants and animals that were introduced to this country were those from Western countries. For Jewish European settlers in Palestine, the forest was a touching reminder of homeland landscapes. This approach is evident in the

[252] Ibid., 342-44. Sufian, 41. Today it is recognised that a monoculture of pine prevents biodiversity and increases fires which spread more easily in non-diverse environments.
[253] Biger and Liphschitz, "Australian Trees in the Land of Israel 1865–1950," 236.
[254] Israel Gindel, *Imutz Tzmahim* (Tel Aviv: Am Oved, 1956), 36-37.
[255] Cronon, *Changes in the Land: Indians, Colonists and the Ecology of New England*, 19-20.

writing of many contemporaries. For example, the poet Leah Goldberg captured this state of comparison in a newspaper column in 1945. She wrote:

> Young pine groves, who would not enjoy them? In this land they are a great wish for the future […] but sometimes the heart is actually drawn to old trees. Those who have planted deep roots in the ground, their branches are convoluted, and their trunk tells of a permanent residency in this land. Trees that are not part of a project but are just present.[256]

In addition to the reminder of European flora in the newly constructed landscape, the acclimatisation of plants and seeds was associated with another imagined Jewish past – the biblical one. The first director of the JNF acclimatisation station in Rehovot, botanist Israel Gindel, preferred using the Hebrew term *Imutz* [adoption] over the foreign term 'acclimatisation' [*aklimatisazia/ Iklum]*, since, according to him, it was this term that was utilised in the Old Testament to describe the very same practice. In his book *Adoption of Plants* [*Imutz Tzmahim*], Gindel devoted an entire chapter to the longstanding history of acclimatisation in Palestine. He began his account with cedar trees which, according to the biblical story, were imported to Palestine from Lebanon to build the Jewish temple in Jerusalem.[257]

Furthermore, the number and origins of acclimatised plants during the 1940s and 1950s were often presented as a metaphor for discussing the diasporic characteristics of the Jewish society in Palestine. Yosef Weitz, director of the Land and Afforestation Department of the JNF, wrote in this context: 'Indeed, our country, which was blessed by people who immigrated from distinct geographies and climates, was similarly blessed by a diverse variety of plants'.[258]

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[256] Leah Goldberg, "Me-I'nyan Le-I'nyan: Beit Daniel Be-Zikhron Ya'acov," *Al Ha-mishmar* March 26th, 1945, 2.
[257] Israel Gindel, *Imutz Zmaḥim* (Tel Aviv: Am Oved, 1956), 33, 38-40.
[258] Ibid., 15.

Attempts to acclimatise seeds on a large scale required scientific research, a qualified staff, nursery trails and controlled plantation sites. Prior to World War I, much of the research on acclimatisation was based on the work of the agricultural school Mikve Israel and the Jewish Agricultural Experiment Station in Atlit, which was established in 1910 by agronomist Aaron Aaronsohn to study weather-resistant crops and dry farming techniques. Other local independent plantations were founded during the second decade of the twentieth century in Jerusalem, Beer Sheva, Beit Jamal, Gaza and Haifa.[259] Although the JNF had been active in acclimatisation attempts for several decades, it was only in 1941 when this institution established an official acclimatisation station in Rehovot. Gindel noted that from this year onwards the station had attempted to adapt approximately 1,600 exotic species of trees and bushes, of which 300 were successfully acclimatised – among them 120 different species of eucalyptus. [260]

In these experimental stations, trained workers examined temperature, rainfall, air pressure and other climatic elements and suggested the botanical species which best suited the natural conditions of the country and were most likely to yield a profit. The importance of acclimatisation in agriculture was mainly economic. In a report published by the British Agriculture and Fisheries Department in 1922, the head of the department E.R. Sawer, explained the importance of agriculture in Palestine. According to him 'without visible coal, oil, timber, or minerals of commercial value, Palestine must depend economically and fiscally upon its rural industries'.[261] He claimed that local agriculture ought to be based upon both traditional as well as new crops, thus, advocating in this specific report the restoration of the date culture and sugar production

[259] Bigger, 218-19
[260] Israel Gindel, *Ha-Ekaliptus Be-Yisrael* (Rehovot: Tahana Leheker Ha-haklaut, 1951), 3.
[261] E.R. Sawer, "A Review of the Agricultural Situation in Palestine," (Department of Agriculture and Fisheries, 1922), 1.

in Jericho along with the introduction of profitable crops that could compete in a global market, such as rubber, cotton, and tobacco.[262]

Throughout the centuries the transportation of useful and profitable plants between metropoles and their colonial holdings, as well as the enormous financial possibilities enabled by global and imperial commerce, had created a large body of knowledge on the environmental and climatic conditions required to improve crops. This knowledge also supported and enhanced botanical and agricultural enterprises in Palestine. In addition, British resources enabled the easy transportation of seeds from the empire's many distant geographies to Palestine. The use of seeds from different parts of the world also suited this geography because of the diverse climatic regions which characterised Palestine itself.

As previously mentioned, Palestine's climate is influenced by the country's location between the arid zone of the Sahara and the Arabian deserts, and the humidity of the Levant and eastern Mediterranean. These climatic conditions are highly variable within the country and alter according to altitude, latitude and the proximity to the Mediterranean. A contemporary Jewish agronomist explained the agricultural implications of this climatic diversity in the following way:

> The dissimilar development of distinct species [in Palestine] is more evident during summer because it is at this time when the variances in temperature in different regions of the country is the greatest. While some fruits, such as the dry dates, ripen nicely in the Jordan Valley they do not ripen in the coast region. Other species bloom in the hinterland during the summer and become ripe during the fall. In the coast region they bloom during the fall and do not always ripen. On the other hand, some trees are damaged by the heat in the hinterland during the summer while on the coast they remain in good shape.[263]

[262] Ibid., 7-8.
[263] Hanan Oppenheimer, *Cultivation of Sub-Tropical and Tropical Fruit Trees* (The Jewish Agency: Sifriyat Ha-sade, 1942), 14.

As we have seen, climatological accounts of Palestine not only presented it as a crossroads of diverse climatic regions but usually also compared these regions to other geographies which were perhaps more familiar to the European readership. The reason for this common comparison was not only a result of the so-called climatic resemblance between Palestine and other places. It also reflected the Zionist aspiration to absorb the technological examples which had been set by other Western administrations in arid regions. This tendency was so strong that Jewish botanists and agronomists often transported seeds (as well as the knowledge on how to cultivate them) from Western countries even though these seeds often originated from Asia, South and Central America, and even the Middle East.[264]

Moreover, Brett Bennett writes that while earlier forms of settlement and agricultural policy in the British Dominions had been motivated in part by ideas of climatic similarity between Britain and her new possessions, by the early twentieth century ideas of climatic equivalence were emerging between the colonies and dominions themselves. In 1924, a scientist in the Department of Forestry in Cape Town was sent to Australia to examine the origins of an imported eucalyptus species growing in South Africa. According to Bennett, the scientist returned with a map that demonstrated the latitudes of each country which was intended to help the Cape foresters visualise more clearly how the two countries' climates potentially overlapped and, thus, identify botanical 'climatically matched' species.[265]

Similarly, during the Mandate period, Zionist scholarly attention shifted from absorbing the 'general' Western agricultural and botanical knowledge that had often

[264] Elazari-Volkani, 156. Ironically, geographer William B. Meyer argues that early British colonists of North America saw in the southern Atlantic coast a region that shared similar characteristics with the Mediterranean, and which could, therefore, correct Britain's trade imbalances in popular products such as wine, olives and rice. Meyer, 5.
[265] Barton and Bennett, 276.

been developed in warm climates (usually in the Mediterranean) to specifically absorbing knowledge which had been developed in settler states, specifically in California and Queensland. One Jewish agronomist even described California as 'an example and a role model' for Palestine.[266]

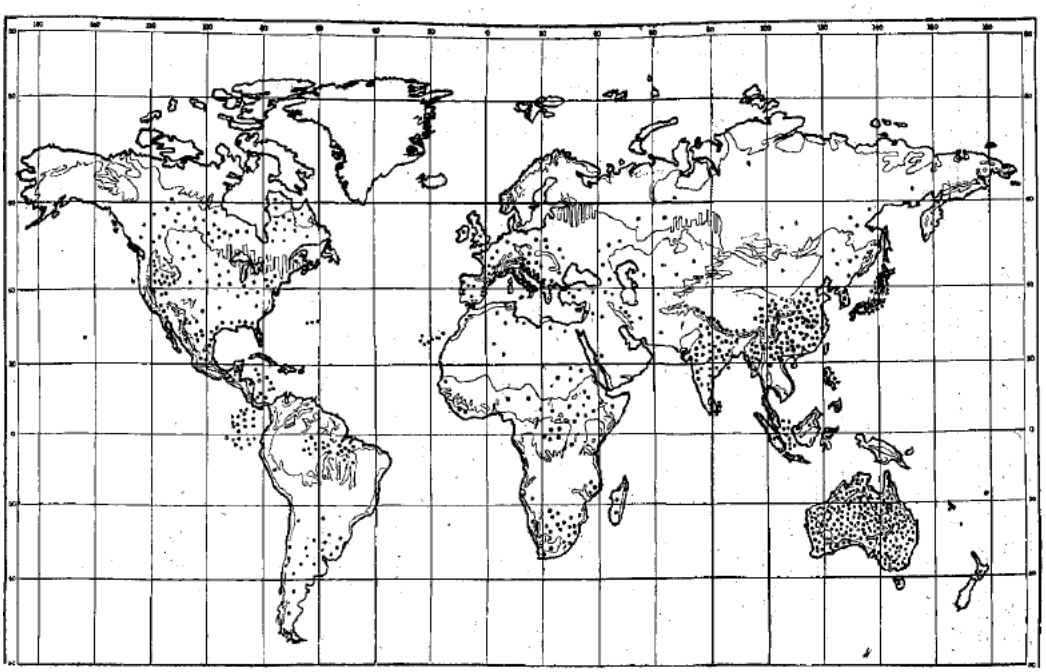


Figure 5. The origins of plants in Israel by Israel Gingel, 1956.

Furthermore, Hebrew agricultural publications frequently referred to scientific literature on the acclimatisation of plants and seeds in former settler colonies. In 1928, agronomist, teacher and Zionist activist Rachel Yanait Ben Zvi requested the United States Forest Service in San Francisco to send her information on planting in arid zones.[267] Likewise, the bibliography of *Cultivation of Sub-Tropical and Tropical Fruit Trees* published in 1942 by botanist Hanan Oppenheimer mentioned the following titles:

H.K. Lewcock, *Pineapple Culture in Queensland,* Queensland Agr. J. 54.

[266] Elazari-Volkani, 182.
[267] Letter from Rachel Yanait Ben Zvi to the United States Forest Service in San Francisco, ISA, -פ 60/2078.

J.A. Mitchell, *The Climate of Florida*, University of Fla. Bull. 200, 1928.
G. Ginestous, *Resume de la Climatologie Tunesienne*, Tunis, 1922.
H.V. Smith, *The Climate of Arizona*, Univ. of Arit. Bull 130, 1930.
Gr. Taylor, *Sea to Sahara, Settlement Zones in Eastern Algeria*, Georgr. Rev. 1939.[268]

The content of foreign scientific journals as well as the agricultural and technological solutions they offered for overcoming climatic challenges were correspondingly cited in Hebrew agricultural publications. One popular theme in these journals was the destructive impact of the dry and dusty eastern desert winds (*ḥamsin*) on fruit plantations. These articles employed the knowledge of experts who often compared the local winds to the dry winds of southern California or the Sirocco in North Africa and who argued that European tree species were less resilient to this type of weather. One of the main solutions for this problem was the planting of trees which would serve as windbreakers.[269] This method had proved successful in the 'Great Plains Shelterbelt', a windbreaks project in the Great Plains states in the United States that began in 1934. The project was initiated in response to the severe dust storms that occurred in the Dust Bowl, which had resulted in significant soil erosion and drought. The United States Forest Service believed that planting trees on the boundaries of farms would reduce wind velocity and lessen the evaporation of moisture from the soil. By 1942, 220 million trees had been planted in the Great Plains, stretching out over 29,900 km from Canada to the Brazos River in Texas. The director of the Land and Afforestation Department of the JNF, Yosef Weitz, alluded to the American project when discussing a similar project in the arid regions of Palestine.[270]

[268] Gindel, *Imutz Zmaḥim*.
[269] Unknown, "Hashpa'at Ha-Ruhot Ha-Meyabshot Al Atzei Ha-Hadar," *Ha-sade* 4, no. 12 (1932): 5. Asaf Grasovski, "Hashpa'at Ha-Hamsinim Al Poryut Etzei Ha-Pri," ibid.15 (1936).
[270] Weitz Josef, *Forest Policy in Israel* (Jerusalem: Jewish National Fund Publication, 1950), 11-12.

However, the transfer of seeds and knowledge between former settler colonies and Palestine did not flow in only one direction. In 1910, the United States Department of Agriculture published a bulletin composed by Aaron Aaronsohn. In his analysis of the agricultural possibilities in Palestine, Aaronsohn described local Palestinian practices of cultivation while pointing out their backwardness and inefficiency. Yet, at the same time he blamed Jewish settlements for planting crops that did not suit the climate and soil of the country, thereby, annihilating many of the local species which, according to him, had developed over centuries in the unique conditions of this region.[271] The crops Aaronsohn recommended planting were mostly of local character. Among them were chickpeas, sesame, dates, olives, figs, wheat, barley and lentils, which were dependent upon seasonal rainfall patterns and, therefore, did not require artificial irrigation.[272]

The introduction to this bulletin was written by the acting chief of the United States Bureau of Plant Industry, G.R. Powell, who stated that the economic and agricultural importance of the Orient was beginning to be appreciated in the United States and that American explorers in Palestine have 'learned in the Orient that there is every reason to hope that the vast arid and semi-arid regions of America can be rendered productive, although from the point of view of the European agronomist they would appear as worthless deserts'.[273]

Similarly, agronomist Elazari-Volkani devoted an entire chapter in his book *Midot* to comparing Palestine with California. In this context he not only referred to the environmental similarities between both geographies but also to their social and economic structures. Among other things, he wrote that both settler societies aimed to

[271] Aaron Aaronsohn, *Agricultural and Botanical Explorations in Palestine* (U.S. Department of Agriculture, Bureau of Plant Industry, Bulletin N180, 1910), 33.
[272] Ibid., 17-30.
[273] Ibid., 7.

establish a plantation economy that would rely on settler labour, rather than on imported, cheap, and 'coloured' labour.[274] Correspondingly, American land conservationist Walter Clay Lowdermilk wrote in 1944 that 'colonization in America was like the colonization of Palestine – there were hardships and dangers in both cases.'[275] English literary scholar and art historian William John Thomas Mitchell explains the inclination to draw comparisons between these two geographies as related to the view held by both settler societies of their frontiers as a promised land:

> Since the beginning, Americans have been turning toward their own Western frontier as a wilderness to be traversed in search of a promised land, a Zion. The 'Great American Desert' was an idle fixe imposed on the reality of the fertile Western plains for several generations, as if Americans needed a desert to wander in, a diasporic ordeal to purify them for the promised Canaan of California.[276]

Indeed, the Old Testament and the garden of Eden were often interpolated in the writings of settlers in Palestine as well as in regard to the American West. Journalist and author William Ellisworth Smythe, for example, described the cultivated American West in his book *The Conquest of Arid America* from 1905 as 'the Garden of Eden itself'.[277] Yet, in California as well as in Palestine a so-called Edenic reality depended on the introduction of advanced irrigation technologies. Hence, Smythe wrote 'when he [Uncle Sam] waves his hand towards the desert and says, '*Let there be water!'* we know that the stream will obey his command'.[278]

[274] Elazari-Volkani.
[275] Lowdermilk, 20.
[276] William John Thomas Mitchell, "Holy Landscape: Israel, Palestine, and the American Wilderness," *Critical Inquiry* 26, no. 2 (Winter 2000): 201, 04.
[277] William E. Smythe, *The Conquest of Arid America*, New and revised edition. ed. ([S.l.]: Macmillan, 1905), 42.
[278] Ibid., xxv.

Irrigation

Environmentalist Alon Tal writes that no natural resource was as important to Zionism as water.[279] During the Paris Peace Conference in 1919, in which the borders of the defeated nations of World War I were redefined by the Allies, Zionist leaders made their own suggestion for the future borders of Palestine. For them water was a critical strategic resource and, hence, control over the region's rivers was understood as essential for the survival of the *Yishuv*. The Zionist proposal included a northern frontier starting on the Mediterranean Sea near the city of Sidon. The aspired border was to run northeast to the slopes of the Lebanon mountains including much of the Litani basin and the entire Jordan River to its most northern source.[280] The Litani and the Jordan alone could supply water for the irrigation of 741,316 acres of land. [281]

Aaronsohn, who was involved in the development of the Zionist proposal for the Peace conference, wrote on January 27, 1919:

> In Palestine, like in any other country of arid and semi-arid character, animal and plant life and, therefore, the whole economic life directly depends on the available water supply. It is therefore of vital importance not only to secure all water resources already feeding the country, but also to ensure the possession of whatever can conserve and increase these water – and eventually power – sources. The main water resources of Palestine come from the north […]. The boundaries of Palestine in the north and in the north east is thus dictated by the extension of the Hermon range and its water basins.[282]

Despite the Zionist efforts to convince the Allies with their proposal, it was eventually rejected by the French and Lebanese. Following continuous negotiations in

[279] Alon Tal, *Pollution in a Promised Land : An Environmental History of Israel* (Berkeley, Calif.; London: University of California Press, 2002), 199.
[280] Three springs makeup the northern headwaters of the Jordan River: The Hasbani, the Banias and the Dan.
[281] Report 'Water Resources of Palestine, I. Jordan Valley: Preliminary Project by P. Rutenberg', Jerusalem, June 1920, V.
[282] Aaron T. Wolf, *Hydropolitics Along the Jordan River: Scarce Water and Its Impact on the Arab-Israeli Conflict* (Tokyo: United Nations University Press, 1995), 21.

June 1920 it was agreed that the northern border of British Palestine would begin in Ras al-Naqura on the Mediterranean coast between Tyre and Acre and run to the Jordan River north of the Banias and Dan headwaters, continuing south to the northern shore of Lake Huleh, running east of the Jordan River through Lake Tiberias to meet the Sykes-Picot line at the Yarmuk. The Litani River was entirely outside the borders of this plan and the headwaters of two of the three tributaries of the Jordan (Hasbani and Banias) also laid beyond the frontier. These final border agreements deeply disappointed the Zionist leadership.[283]

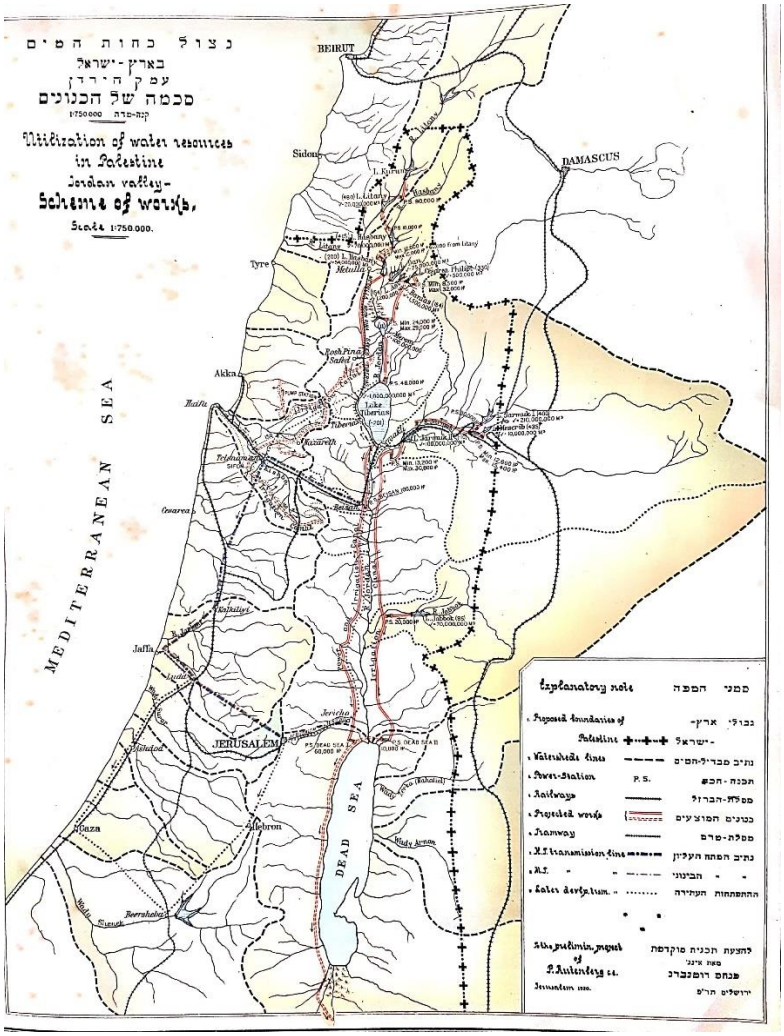


Figure 6. The Zionist plan for utilising the water resources in Palestine, 1920.

[283] Alwyn R. Rouyer, "Zionism and Water: Influences on Israel's Future Water Policy During the Pre-State Period " *Arab Studies Quarterly* 18, no. 4 (Fall 1996): 36-38. Jacob Yaari-Poleskin, *Pinhhas Rutenberg : Ha-Ish U-Po'alo* (Tel Aviv: Ha-Tekufa, 1939), 201-03.

Soon after the establishment of the British Mandate in Palestine, tensions began to mount between Jews and Arabs resulting in violence. Following the 1921 Jaffa riots the British government published the Churchill White Paper (named after Winston Churchill, who served as Colonial Secretary) in 1922. The implications of this paper were far reaching. Although the British still supported the principle of a Jewish national home in Palestine, in order to maintain the status quo, they decided to limit future Jewish immigration to the 'economic absorptive capacity' of the country. This new provision in addition to several years of below normal precipitation made the acquisition and development of water resources an even more important variable in the Zionist view. According to Zionist views, the legitimacy of the Zionists' claim to a national home could only be sustained by extensive land holdings and a demographic presence approximating that of the Arabs. However, if the country was to assimilate much smaller numbers of settlers, much of the land had to be turned into agriculture and for this purpose large-scale irrigation was required. From this point on, the imperative of agricultural development was sustained not only by the Zionist ideology of transforming Jews into productive people but also by a political necessity.[284]

In general, water sources in Palestine were divided into two main categories – upper ground water and underground water. Traditional Palestinian agriculture used upper ground water in a rotational irrigation scheme which was called *fassil*. The *fassil* method was accompanied by a flooding technique that utilised gravity to irrigate lower spots, often resulting in the creation of pools or manmade swamps. In this scheme, water distribution alternated from one area to another every twenty to thirty days. This method perfectly suited the agricultural practices that were based on seasonal crops

[284] Wolf.

within which irrigation was only periodically required every year. At the beginning of the Mandate period, Arab agriculture still generally focused on the production of dry cereals, which were dependent upon rainfall. [285]

Conversely, Jewish agriculture advocated investment in vegetables and fruits which required much greater amounts of water and far more intensive labour. The extraction of upper ground water was attempted by a few Jewish settlements during the 1920s along the Auja (Yarkon) and the Jordan Rivers. The most extensive and significant upper water development project in the country began in 1926 with the granting of a seventy-year concession by the British Mandatory Authority to the Zionist 'Palestine Electric Corporation' to develop a facility at the confluence of the Jordan and Yarmuk rivers for the generation of hydroelectric power. This concession also known as 'the Rutenberg Concession', named after the president of the corporation, suggested transforming the Lake of Tiberias 'into a great natural storage reservoir, providing a steady flow of water in dry seasons as well as in wet'.[286] In the scientific survey published in 1920, in preparation for the hydraulic project, Rutenberg described the climate conditions in the country and addressed local precipitation measurements at length. According to Rutenberg, one of the major problems in the country was not the insufficient amount of rainfall but rather its evaporation during the dry season which could reach 40,000,000 cubic metres during August in the Lake of Tiberias. Rutenberg suggested the planting of trees and forests to decrease the evaporation and increase the rainfall in the region.[287]

[285] Sufian, 136. Amos Nadan, *The Palestinian Peasant Economy under the Mandate : A Story of Colonial Bungling* (Cambridge, Mass.; London: Harvard University Press, 2006), 83.
[286] *Power for Palestine: The Rutenberg Concession*, (New York: Zionist Organization of America,, 1922), 2.
[287] Rutenberg, 6-8. Fredrik Meiton, *Electrical Palestine: Capital and Technology from Empire to Nation* (Oakland, California: University of California Press, 2019).

Yet, upper ground water solutions were not always easy to manage due to the geological and morphological characteristics of the country. In addition, many streams in the country depended on rainfall and, thus, the amount of water in them varied tremendously according to the rainy and dry seasons. The patterns of distinct rivers were also understudied during the first decades of the twentieth century and, therefore, experts were at first hesitant to initiate complex and expensive technological enterprises. Moreover, the fear was that during the dry season water in the artificial pools would easily evaporate.

The second and more common traditional and cheapest type of water extraction during this period was underground drilling which was usually realised through drilling wells. The mountains and hills in Palestine (especially along the Jordan river) serve as extensive aquifer systems. Rain that falls on these mountains does not evaporate or run off as surface water. Instead it permeates the water table and then flows, albeit extremely slowly, through the cracks of the underlying rock layers. Groundwater in the aquifer is considered to be a 'safe yield', that can be pumped without adverse effects on the water left in storage.[288]

In Arab plantations, traditional drilling was limited and, therefore, water extracted this way could only be used in the immediate surroundings of wells and could not be distributed easily within large fields. It was only following the intensification of foreign agricultural activities (mostly in Templer and Jewish colonies) that wells became an efficient means of irrigation. In the Templer colony of Sarona, a wind-powered pumping system was installed in 1879. In the 1880s, Edmond James de Rothschild helped the Jewish settlers of Rishon Letzion to perform deep drilling for water extraction, and a decade later two steam-powered pumps were installed at the

[288] Wolf, 9.

wells of the wineries of Rishon Letzion and Zikhron Yaakov. By 1897 internal combustion motors had been introduced into Palestine. Following these technological improvements, water in Jewish settlements could be pumped from a depth of 30 metres compared to the traditional Arabic systems that only reached 12 metres. The water flow also increased from 5-8 to 20-40 cubic metres per hour, a change that enabled the expansion of the plantation areas. These systems were much more expensive than the older ones and the investment capital for them usually came from parties outside the local economic system. Between 1900 and 1930, more than one hundred wells were drilled along the coast-line and the lower hills region where the soil was sandy and the aquifer was close to the ground surface. From the 1940s onwards, improved drilling technologies enabled the penetration of the stony ground along the mountain aquifer which stored even more water. [289]

At this point Jewish settlers had a profound advantage because they had greater resources as well as interests in investing in new technology. Technology was understood to be necessary for the success of the Zionist project in Palestine but it also had clear cultural manifestations and political implications. This notion was reflected in the writings of Jewish agronomist Selig Soskin who wrote in 1920:

> We ought not, when there is already electricity all over the world, to light up our old home, which is again to us so new, with a tallow candle. […] we dare not accept the farming methods of the backward natives of the country as our guiding line. […] We must make our own the experiences of the most progressive countries. We must learn and re-learn.[290]

To this end, irrigation technologies were the key to profitable agriculture. According to Soskin, irrigation could not only transform the arid regions in Palestine into flourishing ones, it could also double and even triple its annual levels of production.

[289] Karlinsky, 96-98.
[290] Soskin, 7.

He explained that countries with subtropical climates such as Palestine, if artificially irrigated, have an advantage over temperate countries as they are blessed with intense sunlight while their winters are not very cold. Soskin wrote that 'the extension of the process of vegetation by means of an artificial supply of water also during the dry season would make possible a second, and even a third and fourth, crop'.[291]

However, the Zionist ability to finance and execute advanced irrigation systems sometimes led experts to advise the planting of crops that were not necessarily suitable for the local natural conditions. From the Zionist vantage point, the rationale behind an 'improved' agricultural enterprise based on advanced technology was, first and foremost, to make food production profitable and, secondly, to make it less dependent upon local constraints. Hence, ironically the study of the local climate became a tool with which to negate both the climate and the local vegetation.

In *Cultivation of Sub-Tropical and Tropical Fruit Trees*, Oppenheimer discussed at length the foreign species that had been successfully acclimatised in Palestine as a result of extensive irrigation. Among these fruits were mango, avocado, carambola, papaya, persimmon, loquat, lychee, guava and pecan. The choice of acclimatising tropical fruits was mainly related to the cultural value attributed to them in comparison to local cereals and legumes and was not necessarily a result of the latter being unprofitable. Aaronsohn argued that besides the orange industry, during the first decade of the twentieth century Palestine annually exported barley worth between one to two million dollars to Britain for the brewing industry. He added that Palestine was one of the major suppliers of wheat to Italy 'for the macaroni industry' and that Palestinian tomatoes were in great demand in Marseille.[292]

[291] Ibid., 19.
[292] 'Palestine as an Agricultural Country', Manuscript by Aaronsohn, 1909-1910, BAA, _35_1_2.

The ability to cultivate foreign fruits and vegetables with the help of advanced irrigation systems continued to fascinate Zionist experts. In an article titled 'Palestine as a Fruit Producing Country' published in 1928, Otto Warburg claimed that since only small parts of the country could be irrigated at a reasonable cost, 'none but the most profitable crops must be raised on it'.[293] Warburg asserted that the best crop for this purpose would be bananas.

The most common banana species cultivated in Palestine from the 1920s onwards was the Cavendish banana which originated in the Canary Islands. This specific species was considered to be the most suitable for the local climate because it tolerated occasional cold weather and strong winds. Most banana plantations in Palestine were located in the Beit Shean Valley and the Jordan Valley, whose climates had tropical characteristics and where water could be easily extracted from the ground. Nonetheless, while the bananas acclimatised successfully in this region, the Jewish labourers were reported to be experiencing difficulties adjusting to its climate. A leaflet from the Agriculture and Forestry Department of the British government in 1927 states that Jewish settlers were not always interested in working or investing in banana plantations in the Jordan Valley.

> If only they would have changed their work hours and wore hats […] to protect themselves from the sun, the natural conditions [of the Jordan Valley] could be tolerable to them. Nevertheless, they must remember that they will not be able to expect a tropical yield crop without a tropical climate.[294]

The cultivation of bananas required an extensive amount of water. Another flourishing industry that required similar amounts of water was the citrus industry with special emphasis placed upon oranges, which had thrived on the coastline of Palestine

[293] Otto Warburg, *Palestine as a Fruit Producing Country: Banana Growing in Palestine* (Tel Aviv: Agricultural Experiment Station of the Palestine Zionist Executive, 1928), 1.
[294] George M. Odlum, "Gidul Ha-Bananot Be-Palestina," (Department of Agriculture and Forestry 1927), 10-11.

since the nineteenth century. Rainfall sufficed for the cultivation of this crop during the rainy months of an ordinary year, but in the five dry months between May and October most orchards in Palestine (except for the few that were located near rivers) were irrigated by wells. Thus, when investment in this fruit turned out to be profitable in Palestine, it was mostly as a result of Western irrigation technologies.[295]

Nearly all the oranges that had been grown in Palestine since 1890 were shipped to foreign markets, mainly to England and elsewhere in Europe. According to Nahum Karlinsky, the success of the orange market was related to changes in European consumption habits as well as to the healthful qualities that began to be attributed to fruits in general at that time. The growing market demand for the fruit, as well as the technological advancements which enabled its success, increased citrus exports from less than one million cases in 1921 to more than 15 million cases in 1939.[296]

In addition, Palestine's location on the world's main trade routes – on the coast of the Mediterranean, between Asia and Africa, next to the Suez Canal and the Haifa–Dera'a railway – was an essential feature that had to be considered when deciding on its agricultural crops. Agronomist Selig Soskin cited the importance of Egypt and Damascus as consumers of Palestinian products. Nonetheless, he added 'much more important […] for us will be the export to countries of the temperate zone'.[297]

The ability to confer considerable emphasis upon distant food markets was also possible thanks to the rapid expansion of steam boats and railroads in this region, which were able to transport goods quickly and easily. Another important development for this industry was the gradual introduction of refrigeration systems. As historian John

[295] Karlinsky, 92.
[296] Ibid., 13. 92.
[297] Soskin, 45.

Rees demonstrates mechanical refrigeration at the beginning of the twentieth century made more food available in wider geographical dimensions.[298]

Yet, at times the intensive irrigation required by the citrus industry threatened the general availability of local water. A 1922 report by the Department of Agriculture and Fisheries in Palestine stated that 'the further development of the orange will depend […] upon the extension of irrigation facilities'.[299] Moreover, a governmental memorandum from 1947 expressed 'fear of general lowering of the water table, following the extremely rapid development of orange cultivation, […]'. The report further warned that lowering of the water table has given cause for concern'.[300]

British apprehension over water use was not disconnected from its worry over the escalating national conflict. The amount of water necessary for the acclimatisation of profitable crops such as bananas and oranges required vast financial investments which usually came from parties outside the local economic system of the country and gave Jewish farmers a significant advantage over Arab farmers, thereby, contributing to the imbalanced political and economic power relations between Jews and Arabs. Local Arabs often expressed their concern at the rapid development of water sources undertaken by Jews and according to Rutenberg, Jewish hydrological research committees were sometimes attacked by local Arabs.[301] During the Mandate period water became a central part of Jewish settler identity and ideology and, in a way, it can be defined as a frontier in itself. One example of this inclination can be viewed in the popular Hebrew folk song *Maym Besason* [Water with Joy] which alluded to the

[298] Jonathan Rees, *Refrigeration Nation: A History of Ice, Appliances, and Enterprise in America* (Baltimore: John Hopkins University Press, 2013), 1-4.
[299] Sawer, 13.
[300] Nadan, 63-64.
[301] Rutenberg, V.

biblical phrase 'with joy shall ye draw water out of the wells of salvation'[302] composed in 1942.

Thus, the utilisation of technological irrigation systems to improve the living standard, productivity and economy of Palestine was not only seen as part of the 'mission' to civilise and modernise this geography. Jewish investment in the productivity of the country gradually also became a synonym for feelings of concern, love and loyalty and was often presented as proof of the Zionist claim to rights over this territory. In some ways, the hardships of coming to terms with the new climate shaped an emerging sense of a national identity.[303]

This tendency can also be identified in other settler societies. Garden and Berland argue that in the cases of American, Australian and New Zealand settlers, the confrontation with climate contributed to a growing nationalist literary tradition that portrayed pioneering hardship as fundamental to the development of a sense of national character.[304] One example for such notions in the Zionist context can be seen in the writings of the renowned biochemist and president of the ZO (1921-1931 and 1935-1946), Chaim Weizmann:

> It seems as if God has covered the soil of Palestine with rocks and marshes and sand, so that its beauty can only be brought out by those who love it and will devote their lives to healing its wounds.[305]

As we have seen, climate was a key element in understanding and developing Zionist agriculture and forestry in Palestine. As a result of its potential influence on the

[302] King James Version, Isaiah, 12:3
[303] Boaz Neumann, *Land and Desire in Early Zionism* (Hanover, N.H., London: Brandeis University Press, 2011).
[304] J. Berland, "Weathering the North: Climate, Colonialism, and the Mediated Body," in *Relocating Cultural Studies*, ed. V. Blundell, J. Shepherd, and I. Taylor (London: Routledge, 1993). D. Garden, "Extreme Weather and Enso: Their Social and Cultural Ramifications in New Zealand and Australia in the 1890s," in *Climate, Science, and Colonization: Histories from Australia and New Zealand*, ed. J. Beattie, E. O'Gorman, and M. Henry (Basingstoke, England: Palgrave Macmillan, 2014).
[305] Braverman, *Planted Flags: Trees, Land, and Law in Israel/Palestine*, 80.

success of food production in the land, climate was also intertwined with other fundamental aspects such as the national economy and global food markets. Attempts to manage local climate led to its comparisons with other, more familiar, geographies and simultaneously evoked its imagination in biblical times. Furthermore, efforts to negate and improve climate were associated with Zionist national ideology and eventually had an effect on the Arab-Jewish conflict.

Chapter 4. Medicine and Climate

In this chapter, I analyse Jewish medical approaches to climate in Palestine between 1921 and 1948.[306] The revolutionary discovery of germ theory in the late nineteenth century, which explained disease through bacteria and microbes instead of through climate and the environment, as well as the rise of hereditarianism in explaining the biological evolution of races, led to the decline of climate theories within medical accounts. Nonetheless, in this chapter I draw upon a historiography that emphasises the continuity of ideas relating to climate during the first half of the twentieth century, rather than their extinction within the evolution of scientific ideas and medical knowledge.[307]

In the first section, I focus on the transfer of tropical medicine to Palestine by the British colonial administration insofar as it was invoked to fight regional malaria. Tropical medicine concerned health issues that were associated with tropical and subtropical regions and it was usually based on 'Mansonian' medicine, typically defined as the research of vector-borne parasitic diseases. Zionist medical institutions and experts, who cooperated with British institutions for their own interests, embraced this development. Historians agree that tropical medicine cannot be separated from the colonial medical tradition.[308] Thus, the Zionist support of and contribution to this

[306] Earlier Zionist medical accounts concerning climate in Palestine were discussed in Chapter 2 from the perspective of Jewish physicians in Europe. Only a few Jewish physicians in Ottoman Palestine wrote about local climate in relation to settlers' health and usually their writings did not provide a systematic approach on this subject.

[307] John Farley, *Bilharzia: A History of Imperial Tropical Medicine* (Cambridge University Press, 1991). Dane Kennedy, "The Perils of the Midday Sun: Climatic Anxieties in the Colonial Tropics," in *Imperialism and the Natural World*, ed. John M. MacKenzie (Manchester and New York: Manchester University Press, 1990). Anna Crozier, "Sensationalising Africa: British Medical Impressions of Sub-Sahara Africa, 1890-1939," *Journal for Imperial and Commonwealth History* 35, no. 3 (2007). Livingstone, "Race, Space and Moral Climatology: Notes Towards a Genealogy." Johnson.

[308] Osborne. Worboys. Arnold; Johnson.

endeavour also suggests their adoption of a medical-colonial theory, language and practice which had far greater implications than fighting disease alone.

The following sections discuss medical climatology, a medical field that was meant to determine whether and how Jewish colonisation in Palestine would be possible.[309] In the second section, I present the issues that were of primary concern to this medical branch. In Palestine, medial climatology was more widespread among individual practitioners than among official institutions and, unlike other medical branches that relied heavily on scientific experimentations, medical climatology was also based on the frequent exchange of information between doctors and patients who expressed their difficulties in adjusting to the new climate.

In addition to describing the various effects of local climate on the settlers' physical and mental health, most physicians agreed about the need to proactively adjust to it. The third section, thus, presents physicians' attempts to raise public awareness of the means necessary for the preservation of health in Palestine while also emphasising the maintenance of public health as an individual responsibility. These means mainly focused on the principles of hygiene in warm climates and they often instructed the population on how to dress, what to eat and drink, and when to work and rest.

In the fourth section of this chapter, I examine the ways in which Jewish physicians – largely hailing from a Central European academic and cultural background – transported medical climatology to a place where their expertise allowed them to participate in a colonial development project, which doubled as a cultural project of settler nation-building. In this section, I trace the origins of medical climatology within the general context of Western medical history, as well as in the Jewish and Zionist

[309] Similar medical branches which were sometimes used as synonyms for what I call here 'medical climatology' were medical geography, physical medicine, climate physiology and medical biometeorology.

contexts specifically, discussing in tandem its transfer to Palestine and the cultural and political implications of its new destination.

Finally, I argue that the adoption of tropical medicine and medical climatology in Palestine not only reflected the challenges of Jewish European settlers in adjusting to their new natural environment, but also mirrored the Zionist transformation from an anti-colonial movement in Europe to that of a colonising one in Palestine. Following the work of historian Joseph M. Hodge, I show that the analysis of medical discourses – their creation, dissemination and institutionalisation – is important to understanding how Zionists viewed themselves and how they perceived the people and land that they encountered in Palestine. Ultimately, I argue that tropical medicine and medical climatology were instrumental in the gradual creation of a Western identity among European Jews in Palestine as well as in defining what was not Western.[310]

A Healthy Land Makes a Healthy People

As we saw in the first chapter, during the late nineteenth century some contemporary Zionist thinkers believed in the regenerative implications of the Palestinian climate on Jewish European bodies. However, beginning at the turn of the twentieth century the actual encounter of Jewish physicians with the climate in this geography transformed the Zionist romantic view of climate into an apprehensive one. Zionist attempts to improve the climate through afforestation, which I discussed in the previous chapter, provide one example of the apparent shift in the general approach to climate in Palestine during this period.

[310] Joseph Morgan Hodge, *Triumph of the Expert: Agrarian Doctrines of Development and the Legacies of British Colonialism* (Athens: Ohio University Press, 2007), 23. Johnson, 5-6,17-18. Alison Bashford, "Is White Australia Possible: Race, Colonialism, and Tropical Medicine," *Ethnic and Racial Studies* 23 (2000): 253.

Historian Sandra Sufian points out that unlike in other colonial contexts in which the indigenous population was the recipient of public health initiatives and the colonialists were concerned only with maintaining or protecting their own health, in the Zionist case it was initially the Jewish community who needed to be cured. Zionist rhetoric in Palestine emphasised the relation between healing both the Jewish body and the Jews' new habitat. According to this idea, when the Jews come to the Land of Israel, both will blossom at once – for the land needed the Jews to make it bloom with modern knowledge and technology and the Jews needed the land to become healthier and more productive.[311]

This notion of a double redemption is evident in many contemporary sources, among them a letter written by Herzl to the German Kaiser Wilhelm II on October 18th, 1898 concerning the future meeting of these two men in Palestine. Herzl wrote:

> our ancestors' land […] is crying for working hands. Among our brothers there are some poor and miserable proletariat. These people desperately plead for a country which they will be able to work. Great is our desire to transform these distresses – the distress of the country and that of the people – into a new welfare.[312]

One of the major diseases that Palestine 'needed' to be cured of at the beginning of the twentieth century was malaria. This disease was also one of the greatest concerns for the recently introduced medical branch of tropical medicine, which was based on germ theory and concerned with the health issues that were associated with tropical and subtropical regions (even though malaria was also familiar in temperate climates, including in Europe).

Among other things, tropical medicine unveiled the 'fallacy' of miasma theory. During the nineteenth century the majority of physicians and laypeople attributed

[311] Sufian, 23.
[312] Theodor Herzl, "Ha-Yoman 2, 1897-1901," in *Mivhar Kitvei Herzl* (Tel Aviv: M. Neuman, 1934-1948), Book 6, 124.

malaria to the inhalation of noxious vapours emitted from swamps. Indeed, the Latin meaning of the word malaria (*mal-aria*) is 'bad air'. However, in 1897 the British physician Sir Ronald Ross discovered the malarial parasite, thereby, proving that malaria was, in fact, transmitted by mosquitoes.

The importance of this discovery to the field of tropical medicine cannot be separated from its colonial history. Ross himself was born in Almora, India, the eldest son of a British Officer. He obtained his medical education in Britain but then returned to India to work in the Indian Medical Service for another twenty-five years during which he made the ground-breaking discovery of the malaria mosquito. After resigning from service in India, he joined the faculty of the Liverpool School of Tropical Medicine. In 1926, he became director-in-chief of the Ross Institute and Hospital for Tropical Diseases, which was established in honour of his work.[313]

From its inception, tropical medicine was linked with imperial expansions into new tropical regions. According to Ryan Johnson, tropical medicine was not only a theory and a practice but also a scientific language that influenced academics, governments and industrial interests. Alternatively, Johnson argues that Britain took advantage of its political and material dominance to develop ideas and practices in medicine and hygiene for the purposes of expanding and enhancing her rule in the tropical regions of the world. In addition, the importance of tropical medicine was also in rendering fears of tropical people, places and diseases at a time when the development of tropical colonies was increasingly linked to the future security and prosperity of the British Empire. [314]

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[313] E. R. Nye and Mary E. Gibson, *Ronald Ross: Malariologist and Polymath: A Biography* (Basingstoke: Macmillan, 1997).

[314] Johnson 2, 5. This idea is supported by the scholarship of academics such as: Worboys. David Arnold, *Imperial Medicine and Indigenous Societies* (Manchester University Press, 1988), 2. Farley, 4. Megan Vaughan, *Curing Their Ills : Colonial Power and African Illness* (Polity, 1991). Since Europe saddled warm countries with a significant degree of Otherness, the deeper cultural, social and political meaning

The prevention and treatment of malaria in Palestine was first and foremost intended to protect the health of British troops and colonial officers who suffered losses as a result of this disease during World War I. However, following the commencement of British rule in the country, the health of the local population also became an important consideration for ensuring the country's productivity and progress, as part of the British colonial mission. In the *Report of the High Commissioner on the Administration of Palestine from 1920-1925*, Herbert Samuel wrote that "malaria was the principal danger to the health of the people and the gravest obstacle to the development of the country".[315] However, fighting malaria was not only in the interest of the British Administration. In his report, Samuel mentioned several other major forces that were involved in achieving this goal. These included the International Health Board of the American Rockefeller Foundation,[316] the British Malaria Research Unit (MRU) (supported by the American Jewish Joint Distribution Committee), the JCA, and the Jewish agricultural colonies.[317]

Cooperation between these different agencies was epitomised in the work of Dr Israel Jacob Kligler, an American Jewish microbiologist who was formerly employed by the Rockefeller Foundation, who later served as the chief bacteriologist of the Hadassah Medical Organisation and who was finally appointed as director of the MRU in the 1920s. Kligler was not the only Jewish expert to transfer Western knowledge concerning Malaria to Palestine. To the contrary, many prominent Zionist

of 'tropical medicine' was that the tropics denoted a malleable concept, which could be stretched and applied to almost any non-Western locale.

[315] Samuel Herbert, *Report of the High Commisioner on the Administration of Palestine 1920-1925* (London: Printed and Published by his Majesty's Stationery Office, 1925), 10.

[316] The Rockefeller Foundation was generally involved in tropical medicine. Among other things, it donated the building for the London school of hygiene and tropical medicine in 1929. ISA: 320.10-מ.

[317] Herbert, 10-11.

malariologists received their training in leading schools for malariology and tropical medicine in Italy, France, the Netherlands, and Britain before arriving in Palestine.[318]

In addition, The MRU often conducted surveys for and with the Malaria Survey Section, a private agency funded by the Rockefeller Foundation, which collaborated with the Mandate government. According to Sufian, the joint reports of these institutions were regularly submitted to the British Health Department of Palestine. These reports examined the topographical and meteorological conditions of different geographical regions in Palestine. Yet, they also supplied important information on indigenous beliefs and practices and offered a demographic, economic, epidemiological, topographical and climatological mapping of the country.[319]

Despite continuous progress in the study of malaria, the tendency to view this disease as a result of climate continued to prevail within the Jewish community in Palestine during the first decades of the twentieth century. I argue, that this tendency was the result of two main reasons. The first relates to processes of knowledge production and the gradual diffusion of new ideas while adhering to old ones. Historiographical accounts of colonial tropical medicine often emphasise the continuity of ideas relating to climate during the first half of the twentieth century, rather than their extinction in the evolution of scientific ideas and medical knowledge.[320] Historian David Arnold gives expression to this continuity in asking:

> What [was] carried over from the old medicine of 'warm climates' into the new […] medicine? What attempts were made outside Europe (in India, Algeria or Brazil), to reconcile the older discourses of body humours and environmental miasma with the new language of microbes and germs? When were Hippocrates and Galen finally laid to rest? When were Pasteur and Manson installed as new Orthodoxy?[321]

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[318] Sufian, 208.
[319] Ibid., 138-41.
[320] Farley. Kennedy. Crozier. Livingstone, "Race, Space and Moral Climatology: Notes Towards a Genealogy." Johnson.
[321] Arnold, *Warm Climates and Western Medicine: The Emergence of Tropical Medicine, 1500-1900*, 4.

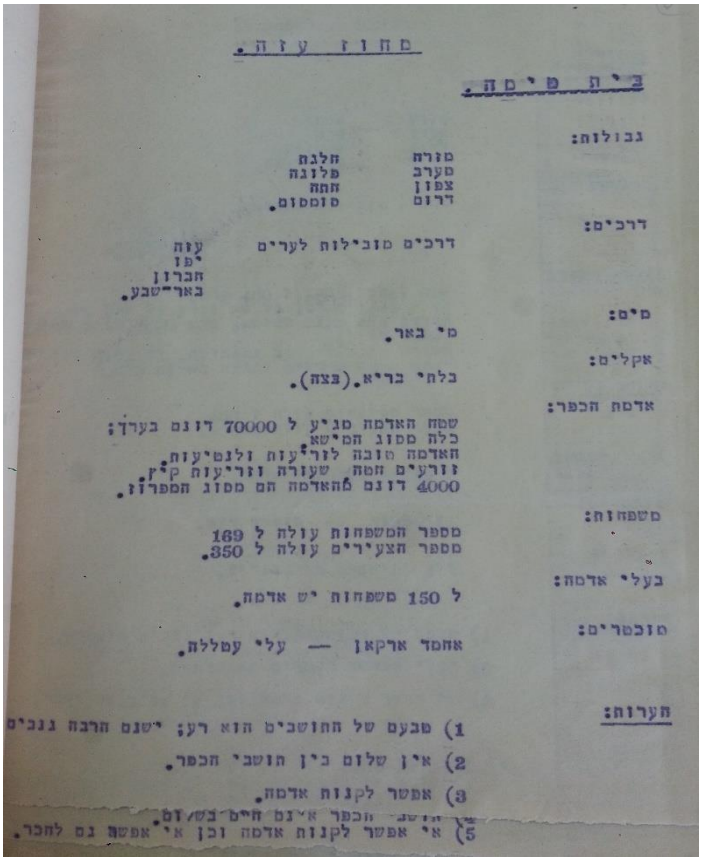
Nearly all the Jewish colonies before and during the Mandate period were located in areas infected with malaria, particularly Palestine's valleys and the coastal region. This was no coincidence. These lands were not only considered cheaper but their Arab landowners were also more likely to sell them, largely on account of the fact that they incorporated swampland contaminated with malaria.

During this period, numerous popular texts presented climate as the leading cause of malaria in Palestine. For example, an article published in the labour Zionist newspaper *He-ahdut* from July 1914 condemned the purchase of a swampland from the Arab village Tel-Shamam by Jewish institutions. The author of the article, purportedly quoting local Arabs, described the climate of this area as being 'so bad that even birds die when flying above it'.[322] He added that 'it would take years to improve the climate of Tel-Shamam'.[323] Owing to this view, he remarked that without climatic improvements settlers would continue dying from what he termed as 'the green fever'. His article ended with the morbid advice: 'get out and see the gravestones of Hadera and you will understand how many victims are needed to cure climate'.[324]

Perhaps as a response to such past mistakes, throughout the 1920s the Israel Land Development Company (*Ha-hevra Le-hakhsharat Ha-yishuv*) chose to investigate the natural and social conditions of Arab-owned land and produced reports about the areas in which it hoped to purchase plots. In addition to providing basic information on the plots – such as their size, borders, names of owners, number of inhabitants and type of crops – reports on the Gaza district villages from 1920-1921 also featured a discussion about climate. The quality of climate was therewith described

[322] B.S, "Gam Elle Goalim," *He-ahdut* 10.07.1914, 5.
[323] Ibid., 6.
[324] Ibid.

as being either ‘very salubrious’, ‘salubrious’, ‘not bad’, or ‘insalubrious (swamp)’.[325] Thus, as can be seen in the aforementioned examples, despite the fact that tropical medicine was well under its way at the 1920s, local environmental and climatic traits were still being identified as the cause for disease.



מחוז עזה.

בית סיסה.

גבולות:

מזרח תלגת
מערב פלוגת
צפון חמה
דרום מוסמוס.

דרכים:

דרכים מובילות לערים עזה יפו חברון באר־שבע.

מים:

מי באר.

אקלים:

בלחי בריא.(בצה).

אדמת הכפר:

שטח האדמה מגיע ל 70000 דונם בערך;
כלה מסוג המישא;
האדמה טובה לזריעה ולנטיעה.
זורעים חטה שעורה וזריעה פ"פ.
4000 דונם מהאדמה הם מסוג המפרזי.

משפחות:

מספר המשפחות עולה ל 169
מספר הצעירים עולה ל 350.

בעלי אדמה:

ל 150 משפחות יש אדמה.

מוכטרים:

אחמד ארקאן — עלי עמללה.

הערות:

1) טבעם של התושבים הוא רע; ישנם הרבה גנבים
2) אין שלום בין תושבי הכפר.
3) אפשר לקנות אדמה.
4) תושבי הכפר אינם חיים בשלום.
5) אי אפשר לקנות אדמה וכן אי אפשר גם להכר.

Figure 7. Report of the Israel Land Development Company on the natural and social conditions of Arab-owned lands in Gaza district villages, 1920-1921.

The second reason enabling the perpetuation of traditional ideas about climate as the initiator of disease was linked to the objective role of natural elements in forming the basic conditions for the breeding of Anopheles mosquitoes. These natural elements included topography, soil quality, rainfall, winds and temperature. Physicians who

[325] Reports on the Gaza district villages, 1920-1921, CZA, L18/6290.

worked in Palestine noted that alongside germ theory, climatic conditions did indeed play an important role in understanding the development of malaria. Thus, it was mentioned that a certain level of humidity was required for mosquitoes to be effective vectors of malaria. Furthermore, it was argued that mosquitoes were more likely to attack in warm and humid environments, especially after sunset when westerly winds faded, and the air was still.[326]

Another important environmental factor that induced the proliferation of mosquitoes was the chemical and geological structure of the ground, which determined whether rainwater would penetrate the ground or accumulate on its surface. In the latter case, if the water was not directed to rivers and creeks, it naturally transformed into swamps and became the habitat of mosquitoes. Other environmental elements influencing the proliferation of mosquitoes included the amount of water in a basin, its quality and distribution alongside with the characteristics of the flora and fauna in and around the basin. A report conducted by the British government on malaria control in Palestine between 1918 and 1941 remarked that the coastal plain

> is distinguished by an area of sand-dunes near the sea. These are particularly important because they block the mouths of the rivers, and so impede the winter torrents which should enter the Mediterranean. Thus, marshes and pools are common in this region, and have been the source of considerable malaria.[327]

Kligler similarly wrote that

> The configuration of the country, the character of the geologic formations, the volume and distribution of rainfall, the temperature and its seasonal variations— these are the physical facts which determine, to a greater or lesser degree, the distribution, prevalence, and intensity of the disease. Of equal

[326] D. Beckmann, "Eikh Lehishamer Mimalaria," in *Briut Ha-Oleh: Madrikh La-Oleh Ha-Hadash Be-Inyanei Higyena U-Vriut* (Jerusalem: Kupat Holim Amamit Ve-mahleket Ha-aliya Shel Ha-sokhnut Ha-yehudit, 1939), 13-14. Seide, 37.
[327] Malaria Report by the British government in Palestine, 1918-1941, TNA, CO 733/448/26.

> importance are the habits, customs, and economic conditions of the inhabitants.[328]

According to Kligler, poor nutrition increased the risk for malaria infection. He wrote that rural Arabs maintained a poor and uneven diet and therefore they were usually more prone to become ill. When food was available in sufficient quantities, though, the 'native population', according to Kligler, adopted a diet well suited to the 'climatic conditions of the country'.[329] In relation to the Jewish population in Palestine, Kligler noted that although they maintained a more stable diet, their efforts to retain European food habits weakened their immune system. In his account of malaria in Palestine, Kligler also related to the 'backward' local farming methods and irrigation systems as well as to the poorly ventilated living spaces of Arabs and Oriental Jews.[330]

Notwithstanding its updated appearance and its innovative methods and techniques, tropical medicine preserved many of the old climatic premises. These included notions regarding the role of climate in generating diseases and preserved longstanding metropolitan approaches towards non-temperate climates. In addition, the implementation of tropical medicine for the purpose of fighting malaria in Palestine was not an exclusively British endeavour. On the contrary, it involved the cooperation and support of Zionist institutions and individual experts who, throughout this process, adopted a colonial gaze towards the medical conditions of both the country and its indigenous population.

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[328] Jacob Israel Kligler, *The Epidemiology and Control of Malaria in Palestine* (Chicago: University of Chicago Press, 1930), I.
[329] Ibid., 15.
[330] Ibid., 12-13.

Climate as a Medical Issue

Beginning in the 1930s, Jewish physicians began to conduct experiments that were designed to examine whether and how climate in Palestine would affect the physical and mental natures of Jewish European settlers. This medical research, which I refer to as medical climatology, was meant to determine whether and how Jewish colonisation in Palestine would be possible. German-Jewish physician Theodor Zlocisti expressed his uncertainty concerning this issue in his book *Klimatologie und Pathologie Palästinas* (Climatology and Pathology in Palestine) when he wrote:

> we know that the body can adjust to extreme climatic situations for short periods of time, but the question is whether the body can also adjust and transform itself accordingly during long periods.[331]

Zlocisti argued, for example, that the sweat glands become more active in tropical and subtropical zones and that this fact might provide Jewish settlers with the ability to acclimatise to the warm climate of Palestine.[332] Yet, Zlocisti's investigation included not only anatomical observations of the glands' number, size and performance in Palestine but also of the nervous system's aptitude to activate the glands in different temperatures. As a result of this investigation, he claimed that extreme sensitivity and fatigue were, among other things, symptoms of an individual's difficulties in acclimatising.[333]

Medical climatological accounts generally failed to demonstrate any significant physiological transformations in Jewish settlers' bodies after settling in Palestine. One physical element that was routinely examined in this context was blood pressure and its

[331] Zlocisti, 38.
[332] This emphasis on endocrine glands can also be seen in the work of some non-Jewish tropical medicine specialists in Europe, such as Aldo Castellini. Harrison.
[333] Zlocisti, 36-38.

potential drop in warm climates. As the physicians themselves admitted, low blood pressure was traditionally linked with the laziness and indolence of the inhabitants of warm countries.[334] However, a decrease in blood pressure among Jewish settlers in Palestine could not be shown in the experimental results.[335] In fact, even low blood pressure among the Palestinian Arabs could not be explained with reference to the local climate. In 1930 Jewish physician M. Rosenberg measured the blood pressure of one thousand Palestinian Arabs in the area of Acre. The results of this experiment revealed that the blood pressure among this population was indeed lower than average. Nevertheless, Rosenberg admitted that this result was more likely to be caused by a vegetarian diet or because it was a symptom of chronic malaria.[336]

According to Sufian, blood examinations, as well as other surveys and tests, bore witness to the entrenched separation and comparisons that existed between Arabs and Jews. Doctor Shapiro of the MRU had to pointedly remind doctors to keep their monthly case reports on the incidence of malaria between Arabs and Jews separate for reasons of administration, classification, treatment and drainage implementation. Sufian argues that separating the data also reflected the different methods used to determine the prevalence of disease among different ethnic groups. An Arab-Jewish division through scientific classification reflected the separatist practices in the settlement schemes. Classifying statistics along ethnic lines was, moreover, conducted so that Zionist agencies could finance and improve Jewish healthcare separately.[337]

Yet, besides publishing the quantitative results of medical experiments, physicians often also conveyed qualitative data based on their daily interactions with

[334] Seide, 25; Zlocisti, 40.
[335] Ibid, 39-40.
[336] Rosenberg. M, 'Über der art Tiefdruck (Hypotension) bei Araber Palästinas', *Arch.Schiff. Trop*, XXXIV, 323, 1930.
[337] Sufian, 226-28.

patients who expressed their difficulties in adjusting to the new climate. Doctor V. Cohen described several case studies of patients who fell ill during the summer months. During this season some patients reported having chronic diarrhea and others testified to experiencing severe weight loss, extreme fatigue, insomnia and lack of energy. In addition to their medical profiles, Cohen also mentioned the time period patients had spent in Palestine since their immigration. As a remedy for their ill health, he often suggested that patients transfer to other climatic regions within the country, usually recommending a move to Jerusalem where the weather is more temperate.

Jewish settlers' preoccupation with climate in Palestine greatly influenced scientific researchers, thereby, also directing physicians' inquiries with regard to climate, which were in the first place intended to address public concerns as well as research the lives of affected settlers. This is not surprising, as doctor-patient interactions have been one of the most common ways to produce medical knowledge for centuries. According to Warwick Anderson, it was mainly due to the emergence of germ theory at the turn of the twentieth century that this shared repertoire of health and disease was divided into lay and expert spheres. Accordingly, its focus shifted from patients' experiences to accelerated processes of professionalisation in medicine.[338]

One major concern for physicians and patients alike in Palestine was the *ḥamsin*. This climatic phenomenon, mentioned earlier, brought dry, hot and sandy desert winds, which were believed to cause various physical and mental pathologies.[339] Zlocisti, who dedicated more than twenty pages to describing this phenomenon and its implications

[338] Anderson, 5.

[339] Zlosicti wrote that Palestinian Arabs used the word *ESherkije* which means 'the eastern' to describe the wind that accompanied this weather. Nonetheless, Europeans eventually adopted the Egyptian term – *hamsin* –which referred to southern winds in this geography. The term *ḥamsin*, which also means 'fifty' in Arabic has received many interpretations throughout the years. Some claimed it was because *ḥamsins* last fifty days a year. Other argued that it was because this phenomenon is very common in the fifty days between Easter and Pentecost. Zlocisti, 20.

for settlers' health, wrote that 'it would not be an exaggeration to say that no one feels physically or mentally comfortable in *ḥamsin* days',[340] and that 'there is no way to get used to *ḥamsins*'.[341] Moreover, contradicting the concept of acclimatisation, he remarked that the more experience one had with *ḥamsins*, the more sensitive one's body became to them. According to Zlocisti, most people reported *ḥamsins* making them feel worse with every passing year. [342] He described the mental effects of *ḥamsins* as including:

> nervous and mental exhaustion, fatigue, irritations and nervousness. The multi-layered intermediate forms of this phenomenon show themselves in uncertainty, insecurity of memory, loss of eagerness, loss of energy, loss of the capability to concentrate, loss of courage, loss of enthusiasm for work and life.[343]

Zlocisti added that this weather very often led to explosions of rage and senseless fits followed by contrition, remorse, or alternatively defiance and intolerance in reaction to the most trivial of stimuli. According to him, people with mentally unstable characters and women in their forties were especially prone to these reactions.[344]

[340] Ibid., 45.
[341] Ibid., 51.
[342] Ibid.
[343] Ibid., 44.
[344] Ibid.



Figure 8. Advertisement for a medicine treating the effects of the summer heat in Palestine, 1939.

When writing about the negative effects of the *hamsin* on children and ill people, German-Jewish physician Fritz Kahn suggested that the meteorological services should warn the population of the *ḥamsin* in advance through the use of special alarms. Kahn complained that not only did such a technology not yet exist but, on the contrary, instead of avoiding activity on *ḥamsin* days, some schools maintained their regular curriculum, thus, endangering the health of the children in the country. To alleviate the hazards of the *ḥamsin,* Kahn suggested building underground air shelters 'against the air' and installing 'air conditioning' – a technology which he believed would be of particular value in hospitals and children's homes. [345]

[345] Fritz Kahn's manuscript *Naturgeschichte Palästinas*, 1930s, LBICJH, AR 7144/MF 746, II,4, 2:42

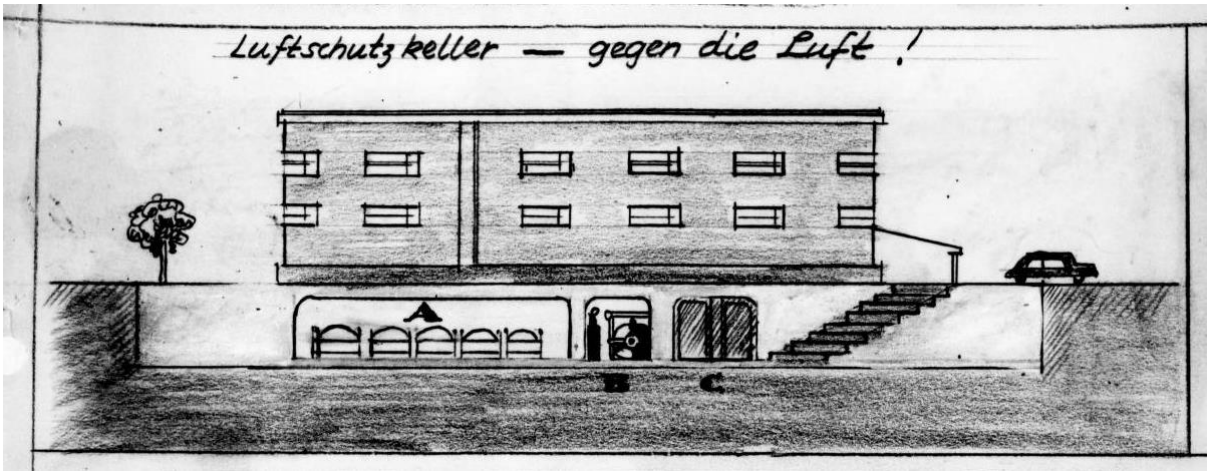


Figure 9. An illustration of air shelters 'against the air' by Fritz Kahn, 1936.

Mike Hulme writes that during the twentieth century climate was often referred to as an object which needed to be conquered. According to him, this aspiration was mostly achieved by improvements in tropical medicine and air-conditioning technologies which aimed to remove some of the direct physical fears that tropical and other warm climates presented to non-indigenous populations.[346] Indeed, Kahn was definitely not the first Zionist to suggest the use of air conditioning when he wrote about this technology during the 1930s in his manuscript *Naturgeschichte Palästinas* (The Natural History of Palestine). In fact, in 1902 Theodor Herzl had already suggested utilising air conditioning in his novel *Altneuland* when one of the characters in this book, a bacteriologist named Steineck, discusses a utopian machinery employed by Jewish settlers in Palestine to confront the local climate.

> This is a warm country. From here down along the Jordan […] the country is pretty well heated the year round. We have therefore developed the refrigerating industries. Understand? On the principle that the best stoves are to be found in cold countries […]. We, for our part, have provided ourselves with plenty of ice for the warm weather. In the heat of the summer, for instance, you will find blocks of ice even in the most modest homes. […] through science we have learned how to make ourselves more comfortable and healthier. Understand?[347]

[346] Hulme, "The Conquering of Climate: Discourses of Fear and Their Dissolution," 10.
[347] Theodor Herzl, *Altneuland = Old-New Land : Novel* (Haifa: Haifa Pub. Co, 1960 [1902]), 126.

Herzl's novel did not offer a practical plan for the foundation of the imagined Jewish state. Instead, he wished to inspire his readers by emphasising the liberating power of science, medicine and technology, which would transform Palestine into a fertile land and the Jews into a people such as all other nations. The utopian state as it was presented in *Altneuland* absorbed the accomplishments and achievements of modern European states, while alluding once again to a colonial rhetoric by implying that only where 'nothing' exists can modern innovations be implemented with such success.[348]

Historian Gail Cooper has pointed out that during the first decades of the twentieth century artificial climates were frequently mentioned in utopian novels and other fictional accounts of advanced societies.[349] However, Herzl's reference to 'refrigerating industries' indicated his familiarity with the most advanced technology of his time. This modern technology, which made artificial indoor environments independent of the weather outside, was first introduced in 1899 in the central stations of several cities in the United States including in New York, Boston, Baltimore, Los Angeles, St. Louise, Denver, and Kansas City. Later on, in the 1890s pipes from central stations were extended into nearby restaurants and other businesses. In 1902, the same year Herzl published his book, the New York Stock Exchange installed an air conditioning system in one of its new buildings and by 1904 the American Society of Heating and Ventilating Engineers was founded. However, this still did not mark a beginning of a new trend and it took a few more years until this technology became truly widespread. More prevalent during the first decades of the twentieth century was

[348] Clemens Peck, *Im Labor Der Utopie - Theodor Herzl Und Das "Altneuland"-Projekt* (Berlin: Jüdischer Verlag 2012), 384-85.
[349] Gail Cooper, *Air-Conditioning America : Engineers and the Controlled Environment, 1900-1960* (Baltimore; London: Johns Hopkins University Press, 1998), 1.

air cooling which used fans and ice. This solution was popular because it could be used on special occasions without having to install and pay the expanses of costly refrigerating engineering plans. Its downside was that it was often a very messy operation. Such a system was placed in Carnegie Hall in 1889.[350]

It was not a coincidence that air conditioning was invented in a former settler colony such as the United States. According to Cooper, one of the earliest visionaries of this technology was John Gorrie, a physician from Florida who as early as 1842 wrote that air conditioners are needed "to counteract the evils of high temperature and improve the condition of our cities"[351]. Gorrie was concerned with the health of Americans in the warm areas of the country but he appears to also have been bothered by the productiveness of Americans in these areas. In 1854 he wrote that "the cheap and abundant productions of artificial cold would enable many industrial arts to be carried on advantageously in warm climates, or continuously in temperate regions".[352]

Nonetheless, air conditioning was only one example of the utilisation of advanced technologies in utopian writings. This inclination can also be seen in Max Nordau's imaginative city *Elektropolis*, in which the Zionist leader, author and social critic described lifeless machines transformed from being objects of theoretical investigation into an integral part of modern life.[353] *Altneuland,* as well, suggested other technological innovations such as a gigantic irrigation project, an industrial landscape in the country side and electric trains. In the imaginative cities of the country, there was a widespread underground network of electricity, telephone and sewage water systems. Herzl understood technological developments and social advances as compatible concepts. As is evident in the quote presented earlier, his allusion to the refrigerating

[350] Ibid., 8-11.
[351] In: ibid., 8.
[352] In: ibid.
[353] Peck, 380-81.

industries also echoed a social message – air conditioning for the masses. Not less important was the fact that it referred to the nineteenth-century colonial discourse of environmental anxieties and suggested that – unlike the romantic approach of Jabotinsky and others presented towards climate in the first chapter – in Herzl's view, Jews had more in common with European colonialists encountering an unfamiliar environment than with a people 'returning' to its historical homeland.

Acclimatisation: Modes of Action

Most people in the first half of the twentieth century perceived the technology of air conditioning as a fantasy. For this reason, Jewish physicians agreed on the need to proactively adjust to the climate in Palestine. Jewish physician R. Kazenelson wrote in 1939 that becoming properly rooted in Palestine for the Jewish settler required adjusting themselves to the new climate and accordingly developing a new lifestyle. To clarify his point, Kazenelson added, 'when referring to adjustment, we clearly mean […] how to prevent diseases'.[354] Physician Joseph Davidson moreover explained that whereas most people are immune to diseases in their primal environments, this 'natural vaccination' is confounded when they move to new environments. In such cases, Davidson suggested, 'one should try to maintain their health, be cautious of diseases and exhaustion, especially if [in the process of immigration] changing to a physical occupation'.[355]

As demonstrated in the first chapter, Jewish physicians' beliefs in acclimatisation usually incorporated Lamarckian ideas that were often associated with notions of progress, reform through education, and freedom of choice. Anthropologist

[354] Unknown, *Beriut Ha-Oleh: Madrich La-Oleh He-Hadash Be-Inyanei Higyena U-Vriut* 19.
[355] Ibid., 4.

Dafna Hirsch explains that during the first decades of the twentieth century, 'hard' eugenic theories developed in juxtaposition with 'softer' approaches that emphasised improving external conditions to enable the advancement of nations. These approaches highlighted hygienic and public health reforms and largely depended on Lamarckian thought.[356]

Accordingly, knowledge about the effects of the natural environment and the potential diseases it may harbour, coupled with the awareness of and even personal responsibility for maintaining a healthy lifestyle, were understood to be essential to the success of Jewish acclimatisation in Palestine. Jewish physician Jacob Seide wrote that unlike other organisms, humans have the wisdom to adjust themselves to external conditions in order to achieve a harmonious relationship between their biological characteristics and their natural environment. He emphasised that to achieve this goal, 'humans need to acquire a deep knowledge of all the elements that could influence their lifestyle, their health and their cultural standards'.[357] As a result of this approach, many medical publications during the 1930s and 1940s were co-edited by physicians and meteorologists and included quantitative data on temperatures, precipitation, air pressure, humidity and the other climatic elements that prevailed in different parts of the country.

In addition, numerous medical books published during this period addressed a popular audience, thereby, intending to educate the masses into maintaining a better state of health in their new physical conditions. Notwithstanding the titles of these books which tended to allude to general public health, such as *Health of the Nation* [*Briut Ha-am*], *Health of the Immigrant* [*Briut Ha-oleh*] and *Public Health* [*Briut Ha-*

[356] Hirsch, 88-90.
[357] Seide, 7.

tzibur]), each of these books, in fact, addressed individuals rather than collectives, thereby, emphasising the responsibility of the individual in maintaining public health. This trend fits with Philip Sarasin's observation according to which the discourse on the individual body was intertwined at the end of the nineteenth century with the discourse on the collective body. [358]

The recommendations contained in these books were all relatively similar insofar as they focused on the principles of hygiene in warm climates. Seide explained in his guidebook, *Health of the Nation,* that he did not aim to provide general rules for hygiene but instead restricted his references to those concerning local environmental conditions.[359]

Popular medical guidebooks recommending special clothing and food in warm climates were also prevalent in the British colonies at the turn of the twentieth century. Similar to Zionist guidebooks and likely to have served as a role model for them, books such as *Guide to Travellers on the Maintenance of Health in Unhealthy Countries* (1896), *Health in Africa; a Medical Handbook for European Travellers and Residents* (1897), and *Health and Sickness in the Tropics: A Guide for Travellers and Residents in Remote Districts* (1913) discussed the effects of tropical climate on the body temperature, respiration, urine, nervous system and menstruation of Anglo-Saxon bodies. Johnson argues that these books were designed to 'protect' travellers and settlers from the effects of climate thus reinforcing climatic theories even after tropical medicine had supposedly denounced them.[360]

[358] Philipp Sarasin, *Reizbare Maschinen: Eine Geschichte Des Körpers 1765-1914* (Frankfurt a.M. : Suhrkamp Taschenbuch Verlag, 2001), 30, 449-50. Hirsch, 61.
[359] Seide, 106-09.
[360] Johnson, 45-50, 78, 80.

In addition, Johnson claims that these medical guidebooks were also meant to mark colonisers as 'superiors in Britain's tropical possessions'[361], thus creating a distinction between colonisers and colonised and 'legitimising the rule of a few over many'.[362] Similarly, Dafna Hirsch claims that the organised effort to disseminate hygienic practices in the *Yishuv* during the British Mandate was intended to create regulations for everyday behaviour which would differentiate the Jewish settler community from the Arab population in Palestine. According to Hirsch, the role of hygienic knowledge, which also established the fundamental relations between the Jewish settlers and their environment, can be best explained through Pierre Bourdieu's idea of *habitus* and the analysis of the physical practices of this culture. According to Bourdieu, trivial and mundane physical practices comprise a forceful component in the creation of feelings of belonging within a group, and their differentiation from other groups.[363]

In Jewish popular guidebooks, the penetration of hygiene into everyday life was regularly discussed through two central spheres: the domestic sphere and the sphere of labour. Since Zionism had attempted to break away from conceptions of traditional Jewish life – construed as depending on charity for its survival – productive work in general became an extremely important value to this society. Seide reported on foreign experiments asserting that the most productive temperature for physical work was 16 degrees Celsius and for mental work 4 degrees Celsius. Yet, accepting these conclusions would imply that the climate in Palestine was not suitable for physical work for more than six months of the year and also deemed it categorically unsuitable for mental work. For this reason, Seide had to settle on the results of another experiment

[361] "Tabloid Brand Medicine Chests: Selling Health and Hygiene for the British Tropical Colonies," *Science as Culture* 17, no. 3 (2008): 72.
[362] Ibid., 73.
[363] Hirsch, 16.

arguing that the best temperature for such activities was not above 24 degrees Celsius.[364] Similarly, Zlocisti argued that according to another study, July and August were the hardest months for labourers in the Jordan Valley. He added that this was three times truer for women, 'even though', he claimed, 'their work is much less demanding'.[365]

In order to counter the perceived ill effects of climate in Palestine, Jewish physicians acted to raise public awareness of the climatic problem by recommending the practical steps necessary to promote health. For example, in May 1936 the daily *Davar* published the 'Ten Commandments for Hot Summer Days'. The recommendations by Dr M. Shechter called upon readers to avoid – as much as possible – direct contact with the climate and to ensure maximal separation between the body and the surrounding air. Shechter recommended shutting all the windows, shutters and doors in the apartment and, furthermore, covering the body with woollen clothes 'that absorb perspiration'.[366]

In a further treatment of the topic, Prof. Walter Strauss, director of Hadassah Hospital in Jerusalem, complained that the human desire to look attractive had surpassed basic climatic needs. He simultaneously praised contemporary women's fashion for its relatively light clothing, suggesting that Jewish men in Palestine should adopt a similar fashion. Strauss explained that although this kind of fashion did not emerge from considerations of hygiene, it ultimately reflected those concerns. However, since fashion in general could not be trusted to remain faithful to climate, Strauss proposed a few basic principles to ensure that the settlers' attire would also fulfil their climatic needs. To emphasise the importance of clothing for settlers'

[364] Seide, 28-29, 35.
[365] Zlocisti, 74.
[366] M. Shechter, "Aseret Ha-Dibrot Le-Yemei Ha-Hamsin " *Davar* May 6, 1935, 8.

comfort, Strauss compared it to the role of houses in protecting humans from hazardous weather. His conclusion was that the most important principles pertaining to both clothes and houses were ventilation, the materials of which they were made, their capacity to absorb and reflect heat, and their colour.[367]

Strauss argued in particular for the wearing of light colours, capable of reflecting sunlight, although he ultimately hailed ventilation as of the utmost importance. He advised adopting several traditional Palestinian costumes, while eventually recommending a unique Russian shirt that he thought would complement the local conditions. This shirt was supposed to be worn on the outside of the trousers. Strauss stressed that it should also be worn without a belt to permit as much ventilation as possible. In addition to what he called 'horizontal ventilation' enabled by the neck, armpit, and stomach area, there would also be 'vertical ventilation' as this shirt was designed to have small holes in the back.

[367] Walter Strauss, "Ha-Aklim Ha-Ham Ve-Ha-Tilboshet," in *Ha-Adam Ve-Ha-Aklim Be-Eretz-Yisrael*, ed. S. Rosenbaum (Tel Aviv: Olympia, Unknown), 57.

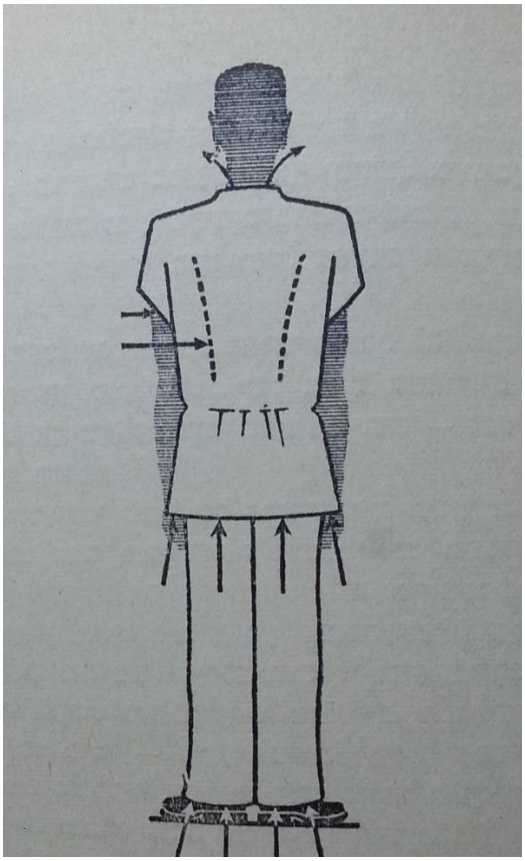


Figure 10. Drawing of a shirt designed for Jewish laborers in the Palestinian climate, suggested by Strauss.

Concerns mirroring those pertaining to the Zionist labourers were also addressed to Jewish housewives. For instance, a cookbook from 1937 entitled *How to Cook in Palestine* and published by the Women's International Zionist Organisation stated that:

> The technique of the kitchen can be adjusted to the climate in that the housewife can […] use only those [foods] that can be quickly and easily prepared, so that the heat and noise of the Primus [stove] can be reduced to a minimum.[368]

In addition, the author of this book, German-Jewish ergonomics and architect Erna Meyer, advised her readers to abandon their traditional recipes in favour of culinary acclimatisation.

[368] Erna Meyer, *How to Cook in Palestine?* (Tel Aviv: Palestine Federation of WIZO, 1937), 9-10.

> What shall I cook? This problem, the concern of housewives the world over, is particularly acute in our country. The differences in the climate and necessary adjustments arising out of these differences compel the European housewife [in Palestine] to make many drastic changes in her cooking – a change not so easy to achieve as it would seem. […] [In] most families the adjustment is slow, unwillingly and incomplete […]. Some of these [old] habits are not only injurious to the health of the family, but, in addition burden the housewife with unnecessary work.

Meyer suggested replacing what she called 'European fat-rich food', which as she saw it included beef, chicken and butter, with local fruits and vegetables. As she explained, 'cooking, suitable to the climate must place vegetables, salads and fruits in the foreground'.[369] In a different publication, Seide similarly suggested substituting the nutritional value of fats with tropical and subtropical vegetables and fruits, such as the avocado and guava, which he described as good sources of carbohydrate, vitamins and minerals.[370] However, the fruits and vegetables mentioned by Seide were not local to the country. As we have seen in the previous chapter, most tropical and subtropical fruits and vegetables were acclimatised by Jewish agronomists in Palestine starting from the 1930s. Thus, ironically, the acclimatisation of Jewish European settlers in Palestine required the consumption of acclimatised foods, a symbiosis which reflected the foreign characteristics of the Zionist project in Palestine.

Furthermore, the amount of water one ought to drink and the amount of sweat produced were measured and discussed in hygiene guidebooks for the public. Seide wrote that there was no reason to limit the amount of water for a healthy child or adult during the summer days. This is because the body is able to dispose of extra water but cannot adjust to a lack of water for very long. However, pre-empting any misunderstanding, he specified an amount of water (specifically, one and a half litres)

[369] Ibid., 8.
[370] Seide, 116-19.

as the minimum a person should drink during the summer days in Palestine. Meteorologist Rudolf Feige, moreover recommended adding cooking salt to the water on hot days as excessive sweat could leach vital body minerals, such as sodium, calcium, and potassium.[371]

The study of climate by Jewish physicians in Palestine and the publications of medical guidebooks for the general population during the 1930s and the following decades served two interrelated objectives. On one hand, the generation of this medical knowledge reflected Jewish colonial anxieties concerning degeneration in the warm climate of Palestine. Simultaneously, through the recommendation of daily practices by Jewish physicians, the *Yishuv* was able to construct and reinforce its own social conventions and living standards which in return created a clear distinction between Jews and Arabs in Palestine.

Traditions and Influences

Jewish medical publications concerning the effects of climate on the health of Jewish bodies occasionally alluded to Hippocratic medicine. However, the allusion to ancient Greek tradition, the cradle of European civilisation, did not come at the expense of citing ancient Talmudic scholars, who had also perceived the link between climate, disease and health. Theodor Zlocisti, for example, quoted Rabi Hanina of Sepphoris (180-260 BC), who explained that all diseases were the result of changes in temperature.[372] Physician Hillel Yafeh cited a famous rabbinic saying, writing that 'the air of the Land of Israel creates wisdom' (אוירא דארץ ישראל מחכים) – 'but', he added, it

[371] Feige, 37. Zlocisti, 42.
[372] Ibid, 38-39.

'also heals'.[373] The reference to a canonical rabbinic text positioned this tradition along the same lines as the Greek tradition, while also supplementing the concepts of medical climatology with further sources of ostensible historical evidence.

Isaac Kummer, the protagonist of Shmuel Yosef Agnon's classical novel *Only Yesterday*, said of the Zionists in his hometown 'they'll give you prooftexts from the Talmud that the air of the Land of Israel is healing, but when they travel for their health, they go to Carlsbad and other places outside the Land of Israel'.[374] Thus, another medical tradition utilised by Jewish physicians as a source of reference for their climatologically related practice was the work conducted by physicians in natural healing resorts. Zlocisti particularly praised the work of physicians of Jewish descent who contributed to this field of medicine. He wrote 'today we talk about the effects of climate on the body in the Alps thanks to the work of – especially – Jewish physicians such as Angelo Mosso, Nathan Zuntz, Adolf Loewy'.[375]

The reference to healing resorts reflected not only the importance of these sites to developing the branch of medical climatology. It, moreover, demonstrated their centrality within Jewish European culture at the turn of the century. As historian Mirjam Zadoff explains, healing resorts such as Carlsbad, Marienbad and Franzensbad in central Europe were extremely popular among the European Jewish middle classes.[376]

The medicalisation of spas by the late nineteenth century was in no way insignificant to this trend. As a result of the Public Health Act of 1870, and a number of later decrees in the Austro-Hungarian Empire, sanatoria had to be supervised by physicians and operated according to scientific principles. This transformation was also

[373] Yafeh, *Shmirat Ha-Briut*, 2.
[374] Shmuel Yosef Agnon, *Only Yesterday* (Princeton, N.J. : Princeton University Press, 2000), 25.
[375] Zlocisti, 18.
[376] Mirjam Triendl-Zadoff, *Next Year in Marienbad: The Lost Worlds of Jewish Spa Culture*, 1st ed. ed. (Philadelphia: University of Pennsylvania Press, 2012).

related to changes in the Faculty of Medicine at the University of Vienna, many of whose physicians practised in spas. Owing to this, the University of Vienna established physical medicine (a medical branch close to medial climatology) as a subject in its own right. According to Zadoff, on one hand, physical medicine had been developed from 'peripheral' areas of medicine that were considered redundant in metropolitan contexts, such as hydrotherapy and climatology. On the other, this new medical field had been developed on the basis of modern and innovative technology such as electrotherapy, light therapy, radiotherapy and X-ray therapy.[377]

Of particular significance was the fact that seventy-five percent of the lecturers who developed this field of study at the University of Vienna had a Jewish background. Zadoff also points out that although since 1867 discrimination against Jewish scientists had become illegal in the Austrian-Hungarian Empire, Jewish medical experts boasted better chances of developing their careers in small medical specialties within which competition was markedly lower. In addition, the fact that medical climatology and similar sub-fields were considered new and innovative, while at the same time promising a respectable income (largely at private spas), made its practice particularly attractive for Jewish physicians.[378]

During the 1920s and 1930s, a large group of educated and bourgeois Central European Jews arrived in Palestine. Many of them were physicians who had obtained their educations in German-speaking universities. Nissim Levi and Yael Levi, who collated statistical information on Jewish physicians in Palestine from the late eighteenth century until 1948, argue that during the first half of the twentieth century the most common alma maters of Jewish physicians in Palestine were the medical

[377] Ibid., 37.
[378] Ibid., 33-34, 37-38.

schools at the universities of Berlin, Vienna, Freiburg, Munich and Heidelberg.[379] Among the physicians who wrote about climate and its effect on Jewish bodies in Palestine and whom I have already mentioned was Jacob Seide, who immigrated to Palestine in 1934 following the rise of National Socialism in Germany. Seide was born in 1900 in the Austro-Hungarian city of Lemberg (today the Ukrainian city of Lviv) and studied medicine in Prague, Vienna, Munich and Würzburg.[380] Another noteworthy physician, whom we have already encountered, was Theodor Zlocisti, author of the book *Klimatologie und Pathologie Palästinas* (Climatology and Pathology in Palestine) published in 1937. Born in 1874 near the city of Danzig, he studied in Berlin and during World War I served as a doctor for the German Red Cross in Constantinople. A zealous Zionist, he visited Palestine twice before finally immigrating there in 1921.[381] In their writings, these physicians often mirrored the influence of Central European medical climatological tradition practised in healing resorts onto the study of medical climatology in Palestine.

However, healing resorts also had a strong colonial connotation. Historian Eric Jennings demonstrated how natural healing resorts during the nineteenth and twentieth centuries tended to retain a strong colonial significance. According to him, by the first half of the nineteenth century hydrotherapy had already positioned itself as one of the few countermeasures to the alleged degenerative and enervating effects of warm climates. Indeed, according to Jennings, the connection was so strong that the town of Vichy and its natural spas owed much of their growing prosperity and development to French colonial expansion. In their remarkable guide to spas for colonials from 1923, Serge Abbatucci and J.J. Matignon – practitioners of both tropical medicine and

[379] Yael Levy and Nissim Levy, *The Physicians of the Holy Land, 1788-1948* (Zikhron Ya'akov: Itay Bakhor, 2017), 62.
[380] Ibid., 236.
[381] Ibid., 241.

hydrotherapy – explained that the Frenchman in the tropics faced three central dangers 'the ethnic threat, the pathological threat and the climate threat'. Hydrotherapy spas were meant to be the answer to all three according to French doctors.[382]

In a similar vein, Sufian writes that the Zionist 'effort to distinguish between healthy and unhealthy zones was consistent with the European colonial tendency to view landscapes as either therapeutic or pathological spaces.'[383] Indeed, the popular sub-field of hydropathy was also taken up by Zionist medicine. In 1913, some Jewish physicians were already performing medical experiments in Tiberias' hot springs. However, it was only in 1932 after the refurbishment and the reopening of the springs with the help of British official institutions that they became a popular Jewish health resort. Sufian argues that despite its mission to heal – or perhaps because of it – the doctors involved in the project advocated national separation within the hot springs. Following their reopening, a professional recommendation was made to set separate hours for Jewish and Arab patients.[384] Another healing resort advocated by both the Zionist and British for malaria and tuberculosis patients was located in Hebron and was promoted on behalf of its high altitude and relatively cold climate.[385]

Like in botany A colonial approach to climate in medicine was also manifested in the frequent allusions by Jewish physicians to the contemporary medical climatological research being conducted in former settler colonies, such as the United States and Australia, which were presented as successful examples of the

[382] Jennings, 39,49-50.
[383] Sufian, 48.
[384] Ibid., 48-55.
[385] File on the sanitary condition of Hebron, 1921, CZA: L113.750. 2, 7-8. Mountains in the tropics were generally seen as key sanatoria for some of the world's most problematic diseases. Much has been written on the development of 'hill stations' in India, the Caribbean and various parts of Africa. See: G. C. D. Adamson, "The Languor of the Hot Weather": Everyday Perspectives on Weather and Climate in Colonial Bombay, 1819-1828," *Journal of Historical Geography* 38, no. 2 (2012).;M. Carey, "Inventing Caribbean Climates: How Science, Medicine, and Tourism Changed Tropical Weather from Deadly to Healthy," *Osiris* 26 (2011). J. Kenny, "Climate, Race, and Imperial Authority: The Symbolic Landscape of the British Hill Station in India," *Annals of the Association of American Geographers* 85, no. 4 (1995).

acclimatisation of white people to warm countries.[386] Seide wrote that in spite of the 'tropical' conditions in Queensland, white Australian settlers had not degenerated. However, he sceptically added that there was a chance that degeneration involved a longer evolutionary process.[387] Moreover, in the bibliography of Zlocisti's book he referred to contemporary scientific publications such as, for example, *The Metabolism of White Races living in the Tropics* and 'Tropical Australia and its Settlements'.[388]

As we saw in the first chapter, at the turn of the twentieth century Jews perceived themselves, and indeed were perceived by others, as racially inferior to Europeans. Nevertheless, by colonising Palestine they came to think of themselves as racially superior to the local Arab-Palestinians. This enabled Jewish doctors to advocate for Jewish physical and moral regeneration, while at the same time referring to themselves as 'white' European settlers, who were not used to the warm climate in Palestine. For example, following a detailed presentation of the country's environmental conditions, Seide concluded that, 'the Land of Israel is defiantly suitable for the mass settlement of the white race.'[389] By 'white race' Seide unequivocally meant to refer to European Jews.[390]

Anxieties over the civilisational and racial status of Jews in non-temperate climates were not unique to the discourse in Palestine. As we have seen in the second chapter, these discussions were also relevant to debates on Jewish colonisation of East Africa. In addition, Tara Zahra demonstrates how the agricultural colonies of the JCA in Argentina and Brazil in the late nineteenth century were attacked in the Zionist press.

[386] Seide, 9. Also see bibliography in: Zlocisti, 162-75.
[387] Seide, 21.
[388] Zlocisti, 166.
[389] Seide, 134 (for general reference of the concept of 'whiteness' in Seide's book see: 9,10, 21,22, 15, 22).
[390] Considering the consensus in ethnological literature of the late nineteenth century that defined Jews as black people, this was an immense metamorphosis in Jewish self-definition. Gilman, 171.

One article in the Zionist newspaper *Die Welt* argued that while agricultural labour in South America was unsuitable for Jewish Europeans 'the Indian, mestizo, and black man can survive because he does the hardest work in this barbaric climate with ease, and needs no more than some oranges, bananas, a little rice […] a straw house with roof of leaves and a hammock inside'.[391]

Conversely, Sephardi Jews from Arab countries were considered as having greater potential to acclimatise to Palestine.[392] Many Zionist thinkers saw in Sephardi Jews the ultimate original Jews (*Urjude*) and ideal settlers for the so-called ancient homeland.[393] In the ninth Zionist congress in 1909, for example, Warburg lectured on Jewish labour in Palestine and claimed that the only ones who would be able to cultivate the land would be the Jews who had already adjusted to its climate. According to Warburg:

> Most fitting for this purpose are Jews from Yemen and South Arabia […]. As labourers they are very desirable as their productivity resembles that of the *fellahin.* Also, the Jews of Halab, Tripoli, and Bagdad are thinkable for this purpose.[394]

As we have seen in this chapter, Zionist processes of knowledge production demonstrated the absorption of distinct metropolitan and colonial medical traditions. Fredrick Cooper and Ann Stoler claim that modern Europe was formed by its imperial projects, just as various colonial realities were shaped by the events and conflicts in Europe. In addition, Cooper and Stoler suggest that the shifting political terrain on

[391] 'Aus Suedamrika', Die Welt, March 4th1898, 7.
[392] References to Sephardi acclimatisation in the writings of Zionist experts were scarce. One potential explanation for the scant attention paid to this group in relation to climate and acclimatisation could be that before the 1950s this group was relatively small and less significant for the Zionist project that was run mainly by European Jews. As Raphael Falk and others have demonstrated, a discourse on the racial attributes of Sephardi Jews did prevail in Zionist eugenic discourses, however, these discourses tended to focus less on climate. Accordingly, the role of Sephardi Jews in this study is limited.
[393] Raphael Falk, "Zionism and the Biology of the Jews," *Science in Context* 11, no. 3-4 (1998): 595.
[394] Tahon, 134.

which the very categories of ‘colonised’ and ‘coloniser’ have been shaped must be included in order to fully understand each of them.

Here, I have argued that the Zionist merger of tropical medicine, Hippocratic tradition, race sciences, Neo-Lamarckism, the medical practices developed in natural healing resorts and hygiene reflected the transfer of knowledge from Europe and its colonies to Palestine, while simultaneously producing an internal Jewish medical discourse that was informed by the contingent position of Jews between the Occident and the Orient. In addition, the fluid and contested position of Jews during the period between 1897 and 1948 highlighted the shifting nature of the colonial boundaries and categories and their broader tensions and contradictions.[395]

[395] Katz, Leff, and Mandel, 12.

Chapter 5. Architecture and Climate

As we saw in the previous chapter, climate in Palestine was understood to be a health hazard and if not properly addressed a potential threat to public well-being. Thus, physicians aimed to educate the masses into adjusting their everyday lives to the local environmental conditions. As demonstrated, this medical discourse focused mainly upon clothes, nutrition, body cleaning and working arrangements. Yet, the fear of local climate and its implications on the body was so central to Jewish settler experience in Palestine that it transcended the medical discourse and became an integral part of discussions on local Jewish architecture as well.

This chapter examines the approach of Jewish architects and planners to the climate in Palestine. Similarly, to other experts discussed in this thesis, most planners and architects who arrived in Palestine during this period had acquired their professional training in Europe and brought with them spatial, aesthetic and technological concepts that did not always suit the natural conditions of the country. The effort to define a Hebrew building style that would express Jewish national values was shared by many architects of the time. Nevertheless, alongside ideological, aesthetic, and engineering-related concerns, architects also had to acknowledge and comply with the physical attributes of the country's unfamiliar environment. Architects and planners needed to recognise and assess topography, stone and ground makeup, and proximity to water sources – topics that were discussed extensively in professional journals throughout the period. It appears, however, that the issue of climate was the most urgent concern of these architects at least judging by the number of articles and texts dedicated to this subject.

In what follows, I present and analyse the various solutions proposed by architects to alleviate the heat within the built environment. In doing so, I refer to urban

planning and the architecture of residential spaces while also discussing physical considerations, such as building materials and roof shapes. Besides addressing experts' knowledge, this chapter also examines Jewish dwellers' experiences of the newly built environment and their responses to the degree of thermal comfort indoors, thus, manifesting the frequent tensions and discrepancies between professional and popular knowledge concerning local climate.

The first section of this chapter focuses on the garden city. This was a popular method of urban planning for residential communities of the early twentieth century, which aimed to combine urban amenities and green zones while also providing improved hygiene standards. Jewish planners in Palestine adopted this scheme and had already implemented it in the first plans of Tel Aviv during the 1910s and 1920s. However, while the concept of the garden city was developed in Europe as a response to the perceived urban ills of the Industrial Revolution, the garden city in Palestine, by contrast, was transplanted to a preindustrial setting and served largely as a means to 'manage' the local climate and environment as well as to demonstrate the Western cultural identity of the city's new inhabitants.

The second and third sections concentrate upon residential spaces. Architects of the 1910s and 1920s studied and, at times, copied various local indigenous architectural features as part of their intention to alleviate the temperature in residential houses of Jewish settlers. Their successors in the 1930s – discussed in the third section – chose instead to study local wind and sun directions and tried to adapt the Western architectural methods, with which they were familiar, with their climate observations. Although these architects often expressed their appreciation of Arab building methods for their resilience to local climate, they nevertheless consciously tended towards the rejection of these methods.

In the fourth section, I analyse roof shapes and the quality of building materials as case studies for changes in the architectural discourse relating to climate. The history of the roof in Palestine demonstrates the uncertainty that prevailed with regard to its climatic role versus its cultural representation. Moreover, in the case of building materials, despite their importance in determining the micro-climate of interior spaces, the choice of material was not always influenced by climatic considerations. As I explain, more often than not the choice of building materials was affected by economic and national impetuses. Choosing 'fashionable' materials, which were of greater national and cultural-symbolic value, created a parallel demand for supplementary materials which would compensate for the new materials' inferior climatic resilience.

The organisation of space and landscape in Palestine played a crucial role in the Zionist project throughout the period addressed in this thesis and beyond. As I demonstrate in this chapter, attempts to counter and alleviate the perceived enervating influence of local climate was influenced by metropolitan and colonial ideas and practices. This inclination was manifested in visible attempts to make a distinction between the Hebrew building style and the local Arab one and, furthermore, to maintain a spatial separation – for 'health' and security reasons – between the two communities. More than any other field of expertise, architecture left a physical imprint of climatic notions in the Jewish built environment in Palestine. Houses, streets and towns planned between the years 1897 and 1948 serve as a powerful material evidence for Jewish architects' processes of knowledge production concerning climate.

The Garden Cities of Yesterday

In 1909, a group of a few dozen Jews from Jaffa decided to build *Ahuzat Bayit*, a new residential neighbourhood outside of the old city walls that would later become the city of Tel Aviv. While the first houses and streets were being built, the founders of *Ahuzat Bayit* agreed that they would need a town plan for their growing neighbourhood. The first plan for the neighbourhood was created by engineer Avraham Goldmann. In addition, the founders requested Arthur Ruppin, the director of the Palestine Office of the ZO, to assist them in composing the first town plan regulations. Since Ruppin had very little experience and knowledge of planning, he turned to Oskar Marmorek, a Jewish-Austrian Zionist architect (who participated in the El Arish expedition mentioned earlier) and who was also a close friend of Herzl, to receive advice related to professional literature on urban planning. The list sent to Ruppin by Marmorek included Ebenezer Howard's seminal book *Garden Cities of To-morrow* and Josef Stübben's book *Handbuch der Architektur: Der Stadtbau* (Architectural Handbook: City Planning), according to which Ruppin drafted the first planning regulations for the neighbourhood.

Copying European spatial models and importing them into non-European geographies is one of the key characteristics identified by scholars in the design of colonial spaces. Studies on colonial planning argue that Western knowledge was often considered to be more reliable, ensuring 'safer' and 'better' construction and, therefore, it was preferred for building the houses and neighbourhoods of European settlers. The second planning feature identified with colonial planning was its tendency to celebrate the 'new' and 'imported' as opposed to the 'old' and 'local'. This preference was evident in architectural and planning styles but also in technological and engineering innovations, as well as in the utilisation of new building materials. Finally, the third

characteristic involved the spatial separation of colonists and natives.[396] In what follows, I demonstrate the ways in which colonial ideas and practices in the field of planning in Palestine were also intertwined with cultural and medical notions on local climate.

Among its various clauses, Ruppin's regulations for *Ahuzat Bayit* permitted constructing a single house on each parcel[397] and restricted attaching two or more houses to each other. The minimum distance between houses was to be one metre or more. In addition, only one-third of each parcel could be used for the house itself: the rest of the land was to be preserved for a garden, which was a requirement. The purpose of the regulations was not only to ensure a green appeal to the neighbourhood but also to allow the flow of fresh air between its houses.[398] This demand was often associated with concerns for hygiene as well as with the Zionist wish to distinguish its settlements from the local Arab ones. In 1935 Dr Asher Goldstein, author of hygiene training manuals and editor of the health section in the *Haaretz* daily newspaper, wrote:

> Which one of us doctors is unable to produce evidence to the extent of the people's ignorance regarding questions relating to local climate and new living conditions? And, should anyone doubt this, the proof lies in the filth, uncleanliness, and lack of trees and plants. And let none of us settle this issue by comparing ourselves to our Arab neighbours, since we do not live off them, as indeed we have come here to bring the West, the best and most refined it has to offer, not only for ourselves, but also for the entire backward Orient, which must urgently awaken to a hygienic, clean way of living.[399]

The fear of assimilating to the local environment and culture combined with the perception that cleanliness and the lack of trees are the result of the country's cultural

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[396] Tovi Fenster, *Whose City Is It? Planning, Knowledge and Everyday Life* (Tel Aviv: Ha-kibbutz Ha-meuhad, 2012), 31. Haim Yacobi, "Words and Place: The Case of the City Lod " in *Architectural Culture: Place, Representation, Body*, ed. Hatuka Tali Kallus Rachel (Tel Aviv: Resling, 2005), 85. Levine, 15. Robert Home, *On Planting and Planning: The Making of British Colonial Cities* (London: Taylor & Francis, 1997), 125-26.

[397] The size of parcels varied from a minimum of 500 square meters to a maximum of 1120 square metres.

[398] Miki Zaidman and Ruth Kark, "The Beginnings of Tel Aviv: The Ahuzat Bayit Neighborhood as a "Garden City"? ," *Zmanim: A Historical Quarterly* 106 (Spring 2009): 13.

[399] Quoted in: Hirsch, 12.

and environmental conditions are evident in many texts written by Jewish experts of the time. According to Goldstein, the local Arabs and the climatic conditions were two sides of the same malignant coin. His text also betrays the assumption that a huge cultural gap exists between Arabs and Jews and must be narrowed by the latter's capacity (and 'benevolent obligation') to civilise the indigenous population. Historian Mark Levine has argued that similarly to other colonial urban spaces, Tel Aviv was nourished by the discourse of development and, hence, it justified its separation from its mother city, Jaffa, by representing itself as a negation of the latter's existing conditions[400].

The waves of immigration during the first half of the twentieth century caused a surge in Tel Aviv's population, thereby, creating a growing demand for houses. This, in turn, led landowners to sell smaller and denser land parcels for higher prices. Ruppin's regulations were interpreted in accordance with the contemporary circumstances and, in general, were not always enforced. This situation resulted in criticism from planners, architects and inhabitants. Some architects claimed that the space between the houses was not large enough to enable the beneficial ventilation of air. Others complained that the regulations forced planners to waste pricey land that could be used for constructing more houses. In an article from 1936, architect Dov Karmi wrote:

> in the parcellation of our city […], the purpose of land division was not considered thoroughly, that is, to allow the architect to build a healthy house – a good house […]. Today we see parcels on which it is impossible to build a good house.[401]

[400] Levine.
[401] Karmi, 5.

A similar view was expressed by the city's dwellers. In a letter to the editorial board of the *Haaretz* newspaper from 1935, an anonymous writer criticised the architects' disregard for the regulations while blaming them for the heat and the lack of ventilation in Tel Aviv's flats:

> Twenty-seven years ago, when Tel Aviv was founded, and its creators aimed for a small garden city, a suburbia of villas next to Jaffa, they regulated the distance between houses […]. This is not the case anymore: houses are large because they [architects] are using every inch of parcel; they [the houses] are of three stories and thus we get a surface of walls, and this surface – besides when the walls turn to the north – heats due to the eastern, southern and western sun, and later the walls […] project this heat onto the opposite walls, i.e., on the windows of the houses that are open during the summer. This creates a reciprocal heat projection and […] increases the lack of air in the rooms. Fresh air and wind? They are very limited and sometimes do not even exist.[402]

Indeed, architects who wished to plan convenient houses and keep to the town planning regulations were forced to come up with creative solutions. In 1945 Karmi suggested three original solutions for the arrangement of houses on a parcel. He called the first solution 'the chess plan'. According to this plan, houses were built at a proximity of less than two metres distance, however their façades were not placed on a straight line and did not face each other. According to Karmi, this kind of arrangement created a sense of depth in space and, moreover, left room for a garden.

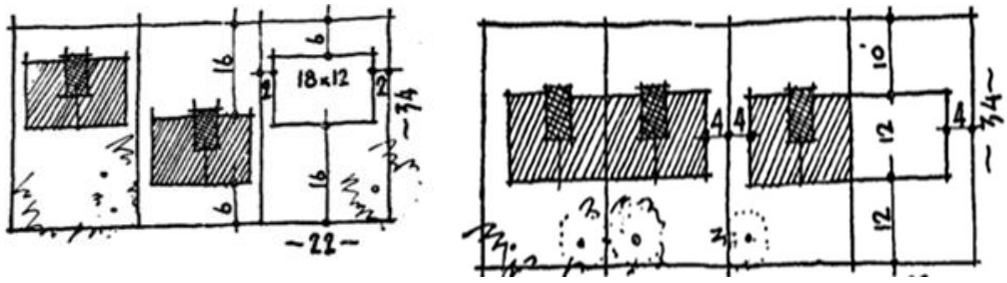


Figure 11. Right hand side: 'The chess plan'. Left hand side: 'Pair of houses'. Architect Dov Karmi, 1945.

[402] Anonymous, "Le-Takanat Ha-Batim Ha-Nivnim Be-Tel-Aviv " in *Tel Aviv – a Silver Jubilee: A Documentary Anthology*, ed. Maoz Azaryahu, Arnon Golan, and Aminadav Dikman (Jerusalem: Carmel Publication, [October 15, 1935] 2009), 180.

The second solution was entitled ‘pair of houses.’ According to this plan, every two houses were to be attached to each other, thereby, allowing a larger space of four meters between each pair of houses. Unlike the first solution, this method recommended placing the houses in a straight line in order to create a larger garden around them. The third solution (and the most preferable one in Karmi’s view) was called the ‘continuous building’. According to this method, all the houses were built in one line and the gardens in front of the houses consolidated into one green strip of seven to eight metres in length. This plan also enabled a large back yard of ten meters width, and the distance to the next row of houses on the same block reached almost twenty meters.[403] Despite the town planning regulations, which were meant to enable maximum ventilation as well as a green environment, Tel Aviv did not develop into a true garden city. Its dependence on private investment did not leave much room for public spaces and, instead the trees and flowers which were planted in private gardens became the main expression of the garden city.

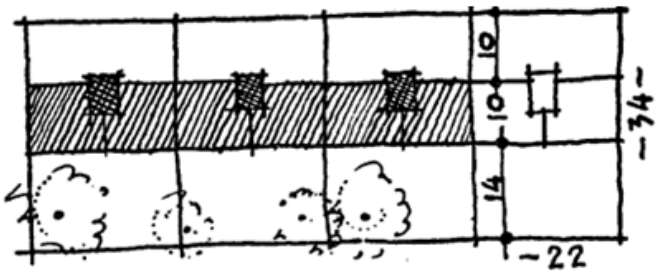


Figure 12. The ‘continuous building’, Architect Dov Karmi, 1945.

[403] Dov Karmi, "Mibe'ayot Tikun Ha-Dirot Be-Tel Aviv," *Journal of the Association of Engineers and Architects* 7 (1945): 9.

In 1921 Tel Aviv received a local council status from the Mandate authorities and then a city status in 1934. It was an urban settlement inhabited and exclusively run by Jews. In fact, the municipality was subject to British town planning ordinances, however, the level of British involvement in the construction of the city was limited. The city's rapid growth during the 1920s worried some of its leaders, who were afraid it would develop unsuitably. Thus, in 1925 the Mayor of Tel Aviv, Meir Dizengoff, contacted the Scottish city planner, Patrick Geddes, requesting him to plan the future districts of Tel Aviv in an area north of the existing town on a territory spanning 860 acres.

Patrick Geddes was among many experts who had studied in Britain and developed their professional careers in the empire's colonies. In 1914, only five years after city planning became compulsory in Britain, Geddes set out for his first job as a city planner in India. During his career as a city planner for the British Empire, he composed more than fifty reports for various cities in India, Sri Lanka, Yemen, Palestine and other countries. Geddes believed that the planning of a city must begin with a thoroughgoing familiarity with its health standards as well as with its environmental, social and economic characteristics. [404]

Geddes' plan for Tel Aviv was based on a grid model which created a north-south axis that was crossed by streets running eastward from the sea. According to this plan, most of the urban circulation was to flow between the north and south so that most buildings would face east and west. This arrangement of streets and houses guaranteed maximal air ventilation as the winds in Tel Aviv blew from the west during the day and from the east during the night. The emphasis on main roads between north and south

[404] Noah Hysler-Rubin, "A Cultural Acropolis in Tel Aviv: Patrick Geddes' Vision for the First Hebrew City," *Zmanim: A Historical Quarterly* 106 (Spring, 2009): 36. Ofra Tene, "The White Houses Were Filled – Everyday Life in Homes in Tel Aviv 1924-1948" (Tel Aviv University, 2010), 32-33.

also minimised direct sunlight on the houses' façades from the south. Hence, this plan created a hierarchy between the direction of the streets, ensuring a distinction between 'main-ways' and 'home-ways' within which the latter were supposed to be 'as few, short and narrow as possible'[405] to evade constant direct sunlight. Similar to Ruppin's regulations a decade earlier, Geddes also recommended the construction of free-standing buildings to ensure the ventilation of air between houses.[406]

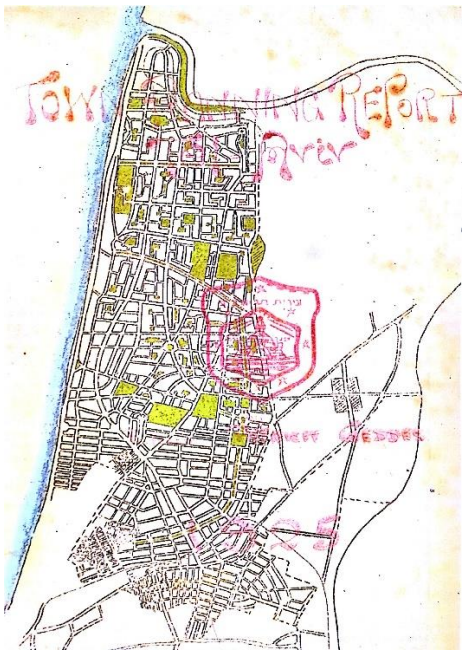


Figure 13. Map on the cover of Geddes' Report, 1925.

The spatial typology of the garden city in Jewish settlements in Palestine was not limited to urban environments. It was also integrated into the planned landscape of the communal agricultural settlements of the Kibbutzim beginning in the 1920s.

[405] Patrick Geddes, *Town-Planning Report - Jaffa and Tel Aviv* (1925), 19.

[406] Nitza Metzger-Szmuk, *Dwelling on the Dunes: Tel Aviv, Modern Movement and Bauhaus Ideals* (Paris: L'Éclat, 2004), 17-23. Historian Noah Hysler-Rubin claims that, despite the importance of the survey in Geddes' work what guided his practice above all was a unique urban theory that he developed in his early years as a planner in Edinburgh, and which he reproduced in various cities around the world. According to Hysler-Rubin, the adjustments Geddes made in the plans of the different places he visited were, in fact, so insignificant that his reports were more similar than they were different. Hysler-Rubin claims that Geddes' numerous publications indicate that during the forty years of the city planner's activities he made very little changes in his plans, despite the variety of natural and social environments he encountered. Hysler-Rubin, 36-38.

Gardens were an integral part of the Kibbutz plan. This constructed landscape was uniquely termed *noi* meaning 'gardenscape'. Architect Samuel Bikels, a Kibbutz member himself, theorised this type of landscape as a new spatial model that connected aesthetic concerns with social, political and hygienic ones.[407]

The industrial and agricultural zones in Kibbutzim were usually separated from the residential zones by a large green belt. Some architects asserted that the green belt should be at least sixty metres wide. This area was supposed to be located at the centre of the Kibbutz, where the dining hall and culture house would also be located. Architect Richard Kaufmann, who was a prominent advocate of garden city ideas, argued that the wind directions should be studied in each settlement and that the living zones should face the direction of the wind so that cold breezes would enter before moving onwards to the industrial and agricultural zones. In this way, air hazards such as dust, noise and flies would also be carried away.[408]

Nonetheless, as contemporary architect Shmuel Mestechkin explained, more than anything else the gardens reflected the Jewish European fear of the desert, dust and drought and their longing for familiar European landscapes. The gardens were usually distinctively different from the landscapes in which they were embedded. Indeed, in Palestine, architects and planners 'did not protect the green lungs, they were forced to create them'.[409] Moreover, architect Freddy Kahana noted that, during the 1940s the planning programmes of most Kibbutzim were identical and most often they did not consider the local climate or other local environmental elements.[410]

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[407] Yuval Yaski and Galia Bar Or, *Kibbutz: Architecture without Precedents* (Ein Harod: Museum of Art, 2010), 270, 341-42. Elissa Rosenberg, "An All Day Garden - the Kibbuz as a Modernist Landscape," *Journal of Landscape Architecture* 7, no. 2 (2012): 33.
[408] Yaski and Bar Or, 322, 273, 78.
[409] Muky Tsur and Yuval Danieli, *Mestechkin Builds Israel: Architecture in the Kibbutz* (Tel Aviv: Ha-kibbutz Ha-meuhad, 2008), 136.
[410] Freddy Kahana, *Neither Town nor Village - the Architecture of the Kibbutz 1910-1990* (Rishon Le-tzion: Ha-moatza Le-shimur Atarim, 2011), 65.



Figure 14. Kibbutz Ha-ma'apil, garden planning by Lifa & Yahalom.

How do you say 'Climate' in Arabic? Jewish Residential Spaces in Palestine, 1910s-1930s

In 1907 the *Hilfsverein der deutschen Juden* ('the Association of German Jews') decided to establish the Hebrew *Reali* high school and the *Technikum* institution for higher education of engineering and technology in Haifa. For this significant and costly project, the association wished to hire a Jewish architect, and in 1909 the job was offered to Alexander Berwald, a German-Jewish architect who worked in Berlin for the Prussian government at the time. Berwald received the offer but before commencing the work he decided to visit Palestine to study its local conditions. During his journey, he visited Jaffa, Acre, Jerusalem and Haifa. Berwald documented various local Arab houses in pictures and studied their building methods. Following his return to Berlin in 1910 he published an article in the ZO's newspaper *Die Welt*, which was entitled

'Building Problems in Palestine' (*Bauliche Probleme in Palästina)*, within which he described in detail the principles of local Palestinian architecture.[411]

Only a few Jewish architects at the beginning of the century gave expression to the ideas and thoughts that guided them in the process of planning and building. In contrast, Berwald explained and contextualised his ideas before commencing his plans. In this article, Berwald repeatedly emphasised the importance of adjusting houses to the local environment, noting that climate is the element that influences local architecture the most. In addition, Berwald expressed his appreciation towards traditional architecture and the ways in which it had adjusted itself to the local climate, 'to the extent that in different climatic regions in Palestine, distinct building models are used, for example, Jerusalem is different from Haifa'.[412]

The Arab artisan was presented by Berwald as possessing a deep understanding of the natural environment and, thereby, using his experience and knowledge he designed convenient houses for dwellers. While some architects viewed Arab architecture as 'natural' and 'organic', others chose to appropriate its cultural roots while arguing that it originated from biblical times. In an article published in 1927 in the journal *Binyan Ve-haroshet* ('Building and Manufacturing'), architect Josef Awin wrote:

> we have come to settle a land of great tradition. In cities and towns, we find crafted houses that seem to have grown from nature, full of loyal tradition, which is […] the continuation of our people's building traditions in ancient times […] this art of building not only fits nature but also [local] building material and the climate of our country.[413]

[411] Alexander Berwald, "Bauliche Probleme in Palästina," *Die Welt* 41 (17.10.1910).
[412] Ibid., 1049.
[413] Josef Awin, "Al Omanut Ha-Bniya Be-Eretz Israel," *Binyan Ve-haroshet* 6, no. 3-4 (1927): 3.

Despite the historical claim that asserted Jewish continuity in the country, Jewish architects in contemporary Palestine were routinely perplexed by the local environment. Owing to this, one of the declared objectives of Berwald's article was to help Jewish architects avoid unnecessary mistakes by introducing them to common and traditional building methods. Berwald argued, for example, that the reason for the construction of the thick walls in Arab houses (usually between 80 to 120 centimetres) was that they provided a local solution to the temperature differences between day and night inland, as thick walls were believed to provide thermal resistance.

Still, the choice of building methods and materials was not always a consequence of their adaptability to the local natural conditions. This choice was often also influenced by various technological, economic and social limitations. For example, an article in the Templer bulletin *Die Werte* from 1875 stated that thick walls in Arab houses were the result of the heavy weight of the traditional domes that demanded stable foundations.[414]

In response to the *ḥamsin* and its effects on houses' interior spaces, Berwald argued that rooms should be organised so that the air could always flow between them. He claimed that, 'this principle is implemented successfully in Palestine'.[415] For the same reason, Berwald also recommended planning houses with high ceilings, as this was believed to relieve the heat in rooms and, moreover, to install hatches above the windows to enable the warm air to dissipate during hot summer days.[416]

During the late nineteenth century glass was relatively rare and expensive in Palestine and windows were often closed with shutters made of wood or metal boards. Berwald stressed the need to enable maximum ventilation into houses and advised

[414] In: Gil Gordon, "Gagot Mito'fefim Baruah: Knisatam Shel Re'afim Ve-Ta'asiyat Ha-Harsit Le-Eretz Yisrael," *Zmanim: A Historical Quarterly* 96 (Spring 2006): 61.
[415] Berwald, 1048.
[416] Ibid.

against closing the shutters. However, he also acknowledged that leaving the shutters open would heat the room as a result of the radiation from the direct sunlight. As he explained, the local solution to this problem was manifested by the *Mashrabiya*, a window enclosed with carved wood latticework that prevented strong sunlight but enabled light and air to enter rooms. The Arabic word *Mashrabiya* means, among other things, 'the place where the water is cold', denoting a place protected from sun but well ventilated. The lattice-style window was an important component in the Arab house moreover because it enabled sufficient separation between private and public spaces.

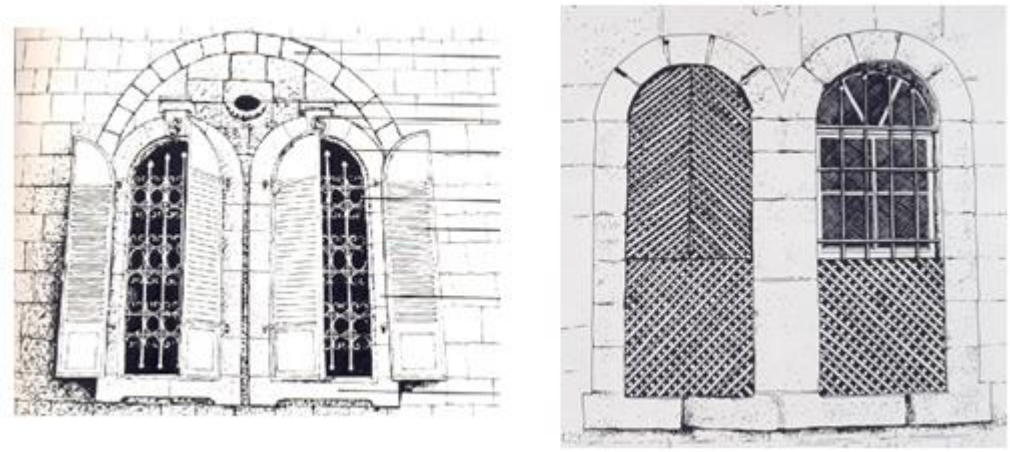


Figure 15. Right hand side: Hatch above window Left hand side: Wooden lattice Mashrabiya.

Although the purpose of Berwald's journey was to study the local conditions for the planning of a public building, most of his descriptions referred to residential houses. In this context, he also discerned a few housing models that in his eyes perfectly suited the local climate. His preferred option was comprised of one floor and had a row of rooms that were attached to one another. Each room had a door that led to a long and

covered corridor. Berwald liked this model, which, he claimed, enabled a very good flow of air. Indeed, he implemented it on the ground floor of the *Technikum* building.[417]

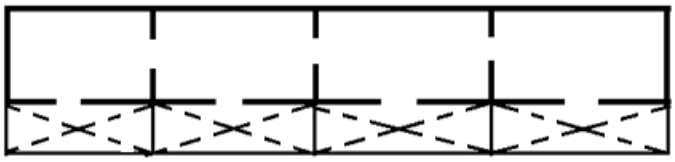


Figure 16. Above: Row of rooms. Below: Arcade corridor as described by Berwald.

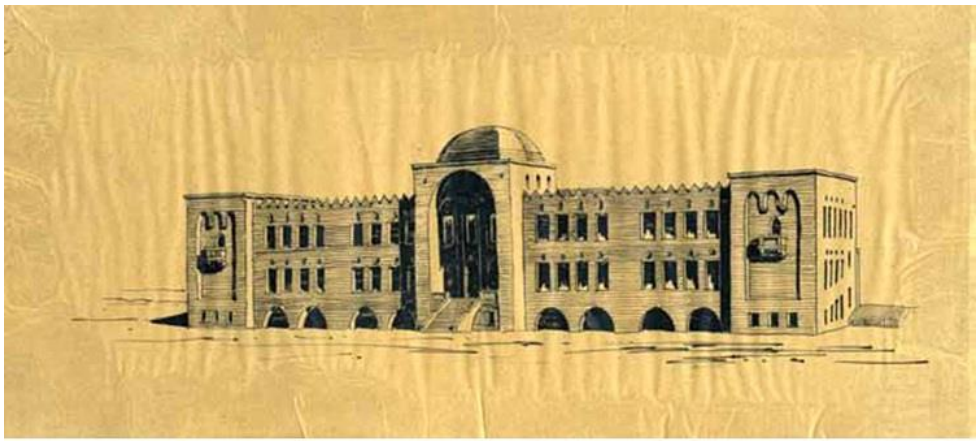


Figure 17. The Technikum building, drawing by architect Alexander Berwald, 1912-1913.

During the 1920s around forty thousand East European Jews arrived in Palestine in what is known as the third *Aliya* (immigration wave). Among them were many architects, such as Josef Berski, Judah Medovitch, Josef Berlin, Josef Minor and others. Since the architectural plans and other written materials produced by this group were often not preserved, it is difficult to assess whether they discussed and incorporated climatic and other environmental considerations into their architectural plans. Yet, like

[417] Ibid., 1049.

Berwald, these architects regularly utilised oriental motifs in the buildings they designed.

However, the adoption of oriental characteristics by architects of the 1920s was not entirely a result of their encounters with Palestine's architectural morphology. In fact, this trend began during the late nineteenth century in Europe, when synagogues and other Jewish institutional buildings were designed with oriental attributes such as domes, minarets, horseshoe arches, as well as ornaments with plant decorations, geometrical forms, Hebrew letters and psalms from the Bible. Thus, unlike Berwald, while the architects of the 1920s embraced nuances from the Muslim and oriental architectural order, they often disdained local Arab architecture and viewed it as primitive. For example, during the construction of the Herzliya Hebrew Gymnasium, when the contractor complained about the complexity of the architectural plan, he was told that he should have known that the Gymnasium 'would not be anything like a simple Arab house'.[418]



Figure 18. Herzliya Hebrew Gymnasium.

The oriental style of the 1920s not only reflected the multifaceted Jewish identity in Europe and Palestine, it also mirrored European colonial architecture. The

[418] Or Aleksandrowicz "Mishelet Hurban: Hayav U'moto Shel Binyan Ha-Gymnasia Hertselia," in *Yemei Ha-Gymnasia*, ed. Guy Raz (Tel Aviv: Eretz Israel Museum, 2013), 32.

meeting of the British and the French empires with Asian and North African architectures and morphologies often led to the adoption of local aesthetic motifs, which were then intertwined with Western architectural building methods and techniques. This new hybrid style, which is often referred to as Eclecticism, was popular in Europe at the turn of the century. According to historian Çelik Zeynep, the literature on colonial architecture often tended to emphasise the exporting of architectural models from Europe to the colonies and neglected the contribution of colonial control to the forming of architectural models within Europe itself.[419]

Most of the Eclectic style characteristics travelled back and forth between metropolises and colonies which subsequently created a hybrid architectural style. Yet, just as in the other fields of expertise described in previous chapters, in the case of Jewish architecture this amalgamation of knowledge and stylistic features was eventually transported to Palestine, thereby, adding a further colonial and transnational dimension to it. Specifically, the adoption of Eclecticism by Jewish architects assisted them in creating an architectural language that reflected not only their occidental background, but also their oriental one.

Similar to Berwald's preferred plan of the row of rooms, the flats in Eclectic houses usually included several equal sized rooms that were organised in a row, with one room leading into the other. In addition, Eclectic flats often had a corridor that provided each room with another entrance or exit. This non-functional organisation of the internal space – which may have also originated from nineteenth-century European bourgeois flats[420] – gave tenants the freedom to decide what room should be used for what purpose, thus, also allowing tenants to make their own decisions in accordance

[419] Çelik Zeynep, *Urban Forms and Colonial Confrontations: Algiers under French Rule* (Berkley: University of California Press, 1997), 8.
[420] Tene, 68.

with the wind and sun direction. The fact that each room had at least one window and at least two doors (one to the corridor and one to the next room) allowed beneficial ventilation within the flat. The ceilings of flats in the Eclectic style were usually about four metres high, which was believed to cool the indoor space. In addition, most of the windows in Eclectic houses were large and vertical and often had hatches.

During the 1930s, the main criticisms of the Eclectic style in Tel Aviv derived from modernist architects who blamed their predecessors for focusing exclusively on the houses' façades and not giving enough thought to the organisation of the rooms and their relation to air and light. As we shall see in the following pages, room and building orientations were key modernist issues in dealing with the local climate. The modernist architects viewed the uniform functions of the different rooms in Eclectic houses as the ultimate proof of the incompatibility and superfluous abilities of Eclectic architects in understanding the local environment. However, the inhabitants of the Eclectic houses did not always agree with this criticism. One contemporary wrote:

> Back in the day [1921-1927] when a man wanted to build a house and turned to an architect for a plan, the latter remembered that he was expected to plan the house in Tel Aviv, which is located in the lowlands at sea level and its climate during most of the [year] is very difficult – owing to the great heat and extensive sweat, he would plan the house in respect of the local climate.[421]

The writer further described the ways in which the architectural features in the Eclectic houses – and especially the window hatches – alleviated heat in the rooms and provided tenants with a convenient micro-climate. [422]

Both Berwald in the 1910s and the Eclectic architects of the 1920s aimed to express in their architectural constructions a Jewish national identity that would simultaneously reflect their perceived autochthonous belonging to the country. To

[421] Anonymous, 176.
[422] Ibid.

them, this combination meant complying with local architecture to different degrees as well as studying its methods in addressing the climatic and environmental issues. Although this identity often meant the importation of Western architectural ideas and methods, their buildings eventually reflected a complex multi-way exchange in which indigenous knowledge was central in shaping the colonial culture. Chang and King describe a similar process 'not as derived from the metropolitan model but as an outcome of what has been conceptualised as transculturation'.[423] Nevertheless, this trend did not last for long in Palestine. As we shall see in the next section, during the 1930s and 40s local knowledge was neglected in favour of a new and imported technology and architectural style.

Local Heat – International Style

As we have already observed, the prevailing environmental conditions in Palestine often led to confusion and uncertainty among Jewish architects in Palestine and required the adoption of new approaches to construction and, furthermore, the development of innovative building techniques in order to relieve the heat in the houses for the convenience of the Jewish European settlers. However, instead of taking advantage of indigenous experience and knowledge – as some Jewish architects had attempted in previous decades – the architects of the 1930s and 1940s preferred to study local climate and create their own solutions while implementing Western scientific building methods. By dealing directly with climate as a 'neutral' object of study, they were able to cut off the cultural link between the environmental conditions in Palestine and the architectural styles developed by its inhabitants throughout the centuries.

[423] Chang and King, 287.

This tendency was not unique to the *Yishuv* and it can be seen in other colonial enterprises in the tropics. Chang and King discuss the development of what they term 'tropical architecture'[424] which, according to them, was inherently connected to shifting colonial discourses on medicine, climate and race. Chang and King identify at least two moments in this development. The first was before the nineteenth century when colonisers in India tended to absorb and implement indigenous forms and concepts of architectural adaptations to climate. The second was in the early nineteenth century with the erosion of the former 'reverence' for indigenous knowledge. Starting from this period there was a shift towards metropolitan architectural models designed to protect Europeans from warm climates and their miasmic threats even after the advent of germ theory around the turn of the twentieth century. These architectural models were also designed to create and maintain the visible promise of the colonists' cultural identity.[425]

Moreover, Chang and King argue that the emergence of strong professional associations during the early nineteenth century was one of the reasons which led British architects to neglect former attempts to imbibe local knowledge in building techniques and develop new systematic and technoscientific ways to confront climate.[426] In Palestine, during the 1930s and 1940s a central group of modernist architects, called the *Architects' Circle* was similarly altering the architectural discourse. This group was established in 1932 by several up-and-coming architects such as Arie Sharon, Josef Neufeld, Zeev Rechter and others, who stated their case eloquently in journals and magazines of their own publication. Indeed, the group members' close connections with the leadership of the *Yishuv* and their commitment to

[424] Tropical architecture is usually identified with an architectural style prevalent in the second half of the twentieth century. Chang and King, nevertheless, identify its earlier roots and principles in architectural ideas and methods dating from the mid-eighteenth century. Ibid., 283.
[425] Ibid.
[426] Ibid., 287-88.

modern-progressive values facilitated the official adoption of their style. Within a few years they occupied key municipal positions and were involved in shaping building regulations across the entire country. These architects were considered to be at the cutting edge of the profession and played a key role in the prosperity of Palestine, which at the time was driven mainly by the construction sector. Indeed, their impact and access to resources and power were so significant that even those architects who had not been formally trained in the modernist schools soon began planning identical buildings.[427]

From the very beginning the migration of modern architecture (also known as the International Style) to Palestine was predicated on its foundational ideas of functionality, internationality and progress which were closely associated with the Zionist aspirations to create a 'new' and 'healthy' Jewish society in this land. The principles of the International Style, which made it possible to copy and transpose residential models from Europe to other countries, were based on beliefs in a 'rational' and 'productive' society that was supposedly free from local, historical, cultural or religious influences. According to Mark Crinson, modern architecture's break with national conventions and European traditions and hierarchies gave it the appearance of an anti-imperial style within historiography. However, Crinson claims that modernist architects hardly ever voiced opinions against imperialism. On the contrary, he writes:

> Perhaps it might be better to speculate that where modernism was not a disavowal of imperialism, it was actively deployed as a way of improving the functions of the colonial city, treating the colonies as a laboratory of modernity, elaborating the rhetoric of hygiene and health and the dualistic narratives of traditional and modern, even epitomising the benevolence of the West.[428]

[427] Alona Nitzan-Shiftan, "Disputes in Zionist Architecture Erich Mendelssohn and the Tel Aviv Hug," in *Architectural Culture: Place, Representation, Body*, ed. Rachel Kallus and Tali Hatuka (Tel Aviv: Resling, 2005), 206. Anat Helman, *Urban Culture in 1920s and 1930s Tel Aviv* (Haifa: Haifa University Press, 2007), 25.
[428] Mark Crinson, *Modern Architecture and the End of Empire* (Aldershot: Ashgate, 2003), 2.

Jewish modernist architects in Palestine were obsessed with scientific research and especially with contemporary notions of climate, cleanliness and hygiene. Starting in 1934 the Circle published a journal initially titled *Building in the Near East*, and later simply *Building*. Climate was discussed at length in *Building* and in similar architectural platforms. It was described among other things as 'a cause for concern for the architect',[429] an 'obstacle',[430] and a 'problem'.[431] The many articles published on this subject were written by renowned architects and were phrased in the forms of guidelines and recommendations for the beginner architect in Palestine.

Modernist architecture in Palestine focused mainly on positioning living spaces within the flats in accordance with the prevailing winds. The discussion of wind directions was central to the architectural discourse and led to different orientations of flats in places with different topographical and climatic characteristics. For example, while in Tel Aviv the prevailing winds blew from the west during the day and from the east during the night, in Haifa the Carmel mountain range blocked the eastern wind from reaching neighbourhoods to the west of the range. This led to the design of different floor plans in each city.

[429] Shlomo Ginzburg, "Ha-Orientatzya Shel Ha-Dira Be-Haifa," *Building in the Near East* 9-10 (November 1936): 6.
[430] Avraham Haim Elhanani, "Bniya Ve-Tikhnun Lefi Aklim Ha-Aretz," *Davar* (July 20, 1949): 8.
[431] Otto Schiller, "Ha-Avodot Ha-Mukdamot Letikhun Irony " *Building* 2 (1935): 1.

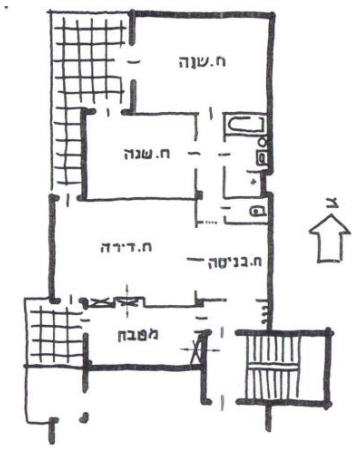


Figure 19. Haifa flat floor plan sketched by architect Shlomo Ginzburg. Clockwise: Bedroom, bathroom, entrance, kitchen, living room, another bedroom, 1936.

The standard model for Haifa flats determined that the living rooms, bedrooms, kitchen and balcony all faced west to enable maximal ventilation. Other rooms, in which tenants spent less time, such as the stairwell and bathroom, faced east.[432] In the Tel Aviv flat floor plans, on the other hand, the bedrooms faced east while the kitchen, living room and balcony – spaces used by tenants during the daytime – faced west in order to receive as much wind as possible and as little sunlight as possible until the afternoon hours. Architects preferred this model because it created a correlation between climate and the desirable and conventional working and sleeping hours. Architect Dov Karmi praised the Tel Aviv model and wrote:

> In the morning, the bedroom [facing eastward] does not have enough time to become heated up and cools later during the day, and that's the important thing. This allows for sleep and rest after the working day [...]. The east is essential for sleeping.[433]

[432] Ginzburg, 7.
[433] Dov Karmi, "Ha-Orientatzia Shel Ha-Dira Be-Tel Aviv," ibid.: 5.

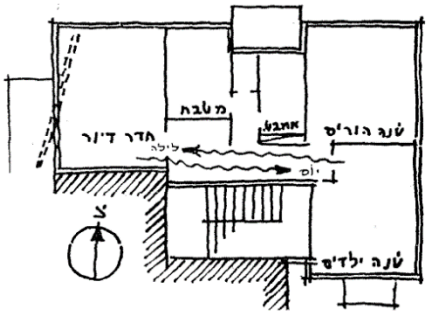


Figure 20. Tel Aviv flat floor plan sketched by architect Dov Karmi. Counter clockwise from below: Children's bedroom, parents' bedroom, bathroom, kitchen, living room; serpentine arrows indicate day winds (below) and night winds (above), 1936.

In general, the functional arrangement of the rooms in modernist houses was supposed to promote the effectiveness and productivity of the tenant. Rooms whose typical activities were related were usually located next to each other. Thus, for example, the kitchen was usually located next to the dining area where food was consumed.[434] More importantly, however – and as Karmi's words indicated – the decision to have the bedroom face east was justified not only in terms of the wind and sun directions desirable to minimise heat, but also based on the assumption that in the morning the tenant had to wake up early and start the working day. On the other hand, by the afternoon when the tenant was supposed to return from work, the room would have cooled enough to allow rest. Orienting the rooms based on the sunlight angles at each hour of the day framed their spatiotemporal location and, consequently, the activities that tenants were supposed to perform during the day and night, respectively.

Particular climatic importance was associated with the hallway, whose recommended orientation in the Tel Aviv flats was between east and west, in order to enable ventilation during both the day and night. Karmi identified the hall as a particularly useful space and praised its multiple advantages. He wrote:

[434] Tene, 86.

> The lighted hall is used in the apartment as a dining area and playroom, the baby's area if necessary, or the working and sewing area. But its main function is *to enable cross ventilation* in the flat. It is naturally desirable to place the lighted hall near the kitchen. [...] Wherever the lighted hall is located next to the kitchen and allows ventilation [...], flats are optimally organised and ventilated and family life is centred around the hall, which opens the flat to the movement of the winds.[435]

Locating the hall next to the kitchen also reflected the importance attributed to hygiene in the architectural and medical discourse of the time, articulating the emphasis it placed upon the interrelatedness of cleanliness, ventilation and health. Members of the Architects' Circle devoted considerable thought to questions of hygiene and health in planning residential spaces. 'Healthy houses', 'healthy streets', and 'healthy cities' were commonly used terms in professional publications.

The discourse on climate and health in residential spaces was not limited to architects. Physicians and climatologists were also involved in setting the conditions for the desirable Jewish flat in Palestine, and in doing so they often cooperated with architects. Yet, this cooperation did not prevent criticisms of contemporary architectural practice. The importance attached by modernist architects to ventilation was often denounced by physicians and meteorologists. Physician Walter Strauss argued, for example, that 'a system that makes the wind the main element of the flat cooling is fundamentally wrong'. According to Strauss, the key reason for what he defined as the 'harsh [thermal] conditions' in newly built flats was a 'result of building malfunctions' and an indifference to the effects of solar radiation rather than 'an inevitable outcome of the country's climate'.[436]

From the 1940s a greater number of scientific experiments were conducted upon the effects of climate on buildings, many of them focusing on solar radiation and its

[435] Karmi, "Mibe'ayot Tikun Ha-Dirot Be-Tel Aviv," 11. [author's italics]
[436] In: Aleksandrowicz "Appearance and Preformance: Israeli Building Climatology and Its Effect on Local Architectural Practice (1940-1977)," 372-73.

impact on different building materials. In 1942, architect Joseph Werner Wittkower conducted an extensive analysis of the effects of solar radiation on indoor spaces and on the health of tenants, which he summarised in an unpublished manuscript entitled *Bauliche Gestaltung Klimatisch Gesunder Wohnräume in Palästina* (*The Design of Climatically Healthy Living Spaces in Palestine*). The introduction to this paper revealed Wittkower's strong commitment to scientific research, which he believed to be a reliable and effective tool for achieving 'healthy constructions' as opposed to the 'historic methods of trial and error'.[437]

Nonetheless, despite the considerable effort devoted to studying local climatic conditions, modernist architects were often blamed for their desire to maintain a stylistic integrity which overrode the need to provide climatic solutions for buildings. Doctor Groschka, director of the Tel Aviv municipal hospital Hadassah, wrote:

> The most important hygienic demand for building houses in our country is the summer heat, just as the most important demand in Northern European countries is the cold climate. Thus, whoever builds here just the same as in England, Sweden and Holland builds according to fashion […]. [438]

The replication of European residential models in Palestine was not a result of professional carelessness or indifference. As mentioned earlier, the foundational ideas of the modernist architectural style were functionality and internationality. In 1929, Frankfurt hosted the *congrès international d'architecture moderne (CIAM),* the most important forum for European modernist architects. At this conference, the participants agreed upon a series of criteria entitled the 'Minimum Dwelling Standards', which were

[437] Ibid.
[438] Dr Groschka, "Ha-Dira Ba-Aklim Ha-Ham," in *Ha-Adam Ve-Ha-Aklim Be-Eretz Yisrael*, ed. S. Rosenbaum (Tel Aviv: Olympia, Unknown), 67.

aimed at guaranteeing a family's physical and mental health in the flat and were quantified in terms of the availability of fresh air and natural light.[439]

The design of space based on a series of rules enabled a residential concept that could be transferred from Europe to other countries with only minor modifications. In other words, the minimum criteria were a kind of 'mobile rule kit' or 'instruction manual' (terms invoked in this context by anthropologist Ofra Tene), which professionals could take with them around the globe. Wherever they arrived, architects studied the objective environmental conditions and adjusted the CIAM rules according to the local findings.[440]

The adjustments made by the Circle architects to the International Style were often a direct application of the functional and international principles laid down in CIAM's 1929 Minimum Dwelling Standards. Nevertheless, as we shall see in the following pages, climatic issues that were raised by direct encounters with the local conditions, and which were not predefined in the minimum criteria as potentially problematic, were often relegated to the side-lines of the professional discourse and did not lead to many practical adjustments even when the architects themselves believed in their potential.

When applying CIAM criteria, European architects sought to maximise the amount of light in apartments. Accordingly, modernist architecture in Europe made frequent use of glass in the 1930s. Glass had aesthetic qualities but also a functional and economic aspect. Allowing sunrays into the building's interior through large glass windows and walls helped to light and warm the structure from within, enabling a minimal use of artificial lighting and heating during the daytime. The two main stylistic

[439] Tene, 96.
[440] Ibid.

applications of this concept by European and North American modernist architects were the 'horizontal ribbon window' and the 'curtain wall' made entirely of large glass surfaces suspended in metal frames.[441]



Figure 21. Right hand side: Ribbon window in Villa Savoye, architect Le Corbusier, 1931. Left hand side: Curtain wall of the Bauhaus School in Dessau.

A modest version of the curtain wall technology found its way to Palestine in the mid-1930s. Owing to the hot summer, however, it was used sparingly for design purposes, such as emphasising the vertical element of the stairwells. Just as curtain walls were deemed unsuitable for Palestine, ribbon windows were also problematic in the sunny climate. However, the architects refused to completely abandon this fashionable form. Instead of an elongated window stretched across the entire façade,

[441] David Kroyanker, *Jerusalem Architecture - Periods and Styles the Period of the British Mandate 1918-1948* (Tel Aviv: Keter, 1989), 44.

they created a horizontal concrete slab, which was occasionally emphasised by a narrow awning where small windows were installed. These windows were set at a maximal height of 2.10m above the ground to minimise the penetration of the sunlight. In addition, narrow shade awnings were installed above the windows and balconies. Apart from their aesthetic resemblance to the European ribbon window, these awnings were supposed to provide shade in summer and shelter the windows against the winter rains. Nevertheless, their aesthetic significance overrode their functional significance.



Figure 22. Horizontal concrete slab. 34 Jaffa Street, Jerusalem.

Another way of quoting the ribbon window in Palestine was by planning elongated balconies that highlighted the façade's horizontal section. The balcony's significance was primarily aesthetic and only occasionally did the architectural discourse refer to it in climatic terms. This is evidenced primarily in the limited number of texts referring to the balcony as an element of climatic function. In Palestine, the balcony was a common architectural element long before the advent of the International Style. Already in the 1920s it had become an important and central space within the *Yishuv*'s residential culture, owing both to the climatic comfort it offered and its unique character as a liminal space. The balcony offered some of the privacy and protection associated with home, while also presenting possible opportunities to interact with the

street. During the twentieth century, its centrality in daily life was also widely articulated in urban poetics. But despite its popularity, the balcony of the Tel Aviv International Style houses was criticised as its shape prevented air from flowing into the house and, furthermore, for its tendency to quickly overheat. In 1935, a contemporary wrote:

> And the balconies! I set aside the question of architectural style: [...] In terms of the climate conditions in Tel Aviv, the balconies in the new houses – airtight concrete boxes instead of iron lattices – are really an outrage, that nothing but sheer idiocy could have blinded the architects to their disadvantages. Concrete boxes blocked against the wind, and on the other hand their large and continuous area may be overheated by the sun during the daytime [...]. And whoever sits on the balcony at sundown for a breath of wind feels as though he is bathed in steam, and must the architect be an expert in physics for this purpose? Where indeed has such elementary knowledge disappeared when balconies of this kind were allowed? It appears that this is not a financial issue. Or had stylistic preferences decided the issue? Stylistic integrity and public health – which is to be preferred? And our architects have determined that stylistic integrity comes first and people's health a distant second![442]

An additional hallmark of the International Style in Tel Aviv was the white colour of the buildings, which eventually came to be associated with the city as a source of pride. This feature had climatic significance and was discussed extensively by contemporary physicians and climatologists. Nevertheless, it was almost entirely ignored in the architectural climatic discourse. The only text I have located that refers to the choice of colour was written by architect Julius Posener and in any case was related to a completely different issue. According to Posener, the white house was devoid of historical traces and 'free of past memories',[443] rendering it suitable for the newly recreated Jew in Palestine. White was the trademark colour of modernist villas built in this period in Europe. These were the villas Posener mentioned when observing

[442] Anonymous, 178.
[443] Julius Posener, "Batim Bnei Dira Ahat Be-Eretz Yisrael," *Building* 1 (1934): 1.

Tel Aviv's new houses ('The houses being built today are reminiscent of the modern German villas from the years 1925-1930').[444] Thus, for him, the question was not about climactic practicalities but about the symbolic dimension of the white colour, which was culturally coded as 'modernist'.

Like the balconies, however, the public often manifestly disliked the choice of the white colour. In 1933, renowned painter and author Nahum Gutman wrote in the *Tel Aviv Municipality News*:

> White radiates from within itself and the eye cannot bear it (this matter was commented upon several times by the ophthalmologist Dr D.A. Friedman). The houses' colours require softening, darkening, and shading. But one thing is clear: the determination of colours must not be left to individual taste.[445]

Fritz Kahn addressed this same issue when he described the necessity of wearing sunglasses in Palestine, which according to him were indispensable for maintaining sight and comparable to the necessity of an umbrella in the English climate.[446] Finally, the anonymous *Haaretz* reader quoted above also did not mince words on this issue. Following his criticism regarding other features of modernist houses, he wrote:

> The snow-white colour – in our country [...] and when the bright sunlight shines on the white houses the place becomes a sea of light – and also of heat in the summer – which is really blinding. And we have no shortage of people with eyesight disabilities in our country as it is![447]

Thus, the Circle architects' faithful observation of the CIAM guidelines may explain the importance they placed upon studying wind directions, which came at the

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[444] Ibid.
[445] Nahum Gutman, "Mashehu Al Tzurata Ha-Hitztonit Shel Ha-Ir," in *Tel Aviv – a Silver Jubilee: A Documentary Anthology*, ed. Maoz Azaryahu, Arnon Golan, and Aminadav Dikman (Jerusalem: Carmel Publishing, [1933] 2009), 129.
[446] 'Die Orientalischen Augenkrankheiten' in Fritz Kahn's manuscript *Naturgeschichte Palästinas*, 1930s, LBICJH, AR 7144/MF 746, II,4, 2:42.
[447] Anonymous, 179.

expense of the almost total neglect of other architectural factors that might have affected the level of comfort within the residential building, such as the balcony and the colour of the houses. The next section in this chapter further demonstrates the discrepancy between the emphasis on climate in the architectural discourse during 1930s and 40s and the practical solutions provided to address this issue.

Climate, Roofs and Building Materials

Throughout the first half of the twentieth century, the Arab house and its perceived aptness with regard to the local climate continued to serve as a point of reference for architects even when they chose consciously to neglect it. Historian Or Aleksandrowicz points out that while questions relating to building materials are often understood as 'objective' engineering considerations aimed at ensuring stable and secure houses, throughout history different materials have become more desirable than others, in spite of offering poorer quality and climatic reliance. Aleksandrowicz attributes the reason for such choices to economic, cultural, political and other deliberations, which eclipse concerns related to the materials and their environment.[448]

Up until the beginning of the twentieth century, most of the houses in Palestine were built of the available local stone (usually limestone, chalk, sun-dried silt and sandstone). Local stone was often utilised both for the foundation of the house itself (i.e., the house was built on an existing stone), as well as for the construction of walls, stairs and flooring.[449] The stone industry was central to the entire building industry in Palestine for centuries. Nonetheless, during the twentieth century this industry

[448] Or Aleksandrowicz "Kurkar, Melet, Aravim, Jehudim: Eich Bonim Ir Ivrit," *Teorya U-Vikoret (Theory and Criticism)* 36 (2010): 62.
[449] David Kroyanker, *Jerusalem Architecture - Periods and Styles Jewish Neighborhoods and Public Buildings Outside the City Walls* (Tel Aviv: Kotar, 1988), 27.

experienced unprecedented changes. The growing Jewish settlement in Palestine and the accelerating building industry that developed as a result, increased the production of stone in Palestine on the one hand and created a demand for cheaper building materials on the other. Engineer T. Tinovitch, who in 1945 wrote an article about the history of building material in Palestine, pointed out that while the Jewish building industry utilised local stone during its first years, it slowly neglected the stone for alternative building materials. The reasons for this negligence were primarily economic and national.[450]

Although new building materials began to arrive in Palestine in the late nineteenth century, the old stone strip mines continued to use old-fashioned, traditional techniques. The work of extracting the stone was performed manually and accordingly the pace of production was slow. Under these conditions, there was no possibility of the local natural stone competing with the prices of the new industrial materials, owing to which it became an expensive commodity overnight.[451]

Another important reason for the gradual neglect of the local stone by Jewish settlers and builders was tied to national motives. Aleksandrowicz explains that during the first decades of the twentieth century the question of materials was deeply bound up with a central ideological question, namely, that of Hebrew Labour (*Avoda Ivrit*). Jewish immigrants to Palestine at the beginning of the twentieth century believed that the return of the Jewish people to its homeland also demanded a return to labour. Jewish landowners could often not supply work for all the Jewish settlers and, on the grounds of competition, they sometimes preferred Arab workers, who demanded a lower wage and were in any case more experienced and better acquainted with stonework.[452]

[450] T. Tinovitch, "Hitpathut Ha-Taasiya Shel Homrei Binyan Ba-Aretz " *Journal of the Association of Engineers and Architects* 7 (1945): 3.
[451] Ibid.
[452] Aleksandrowicz "Kurkar, Melet, Aravim, Jehudim: Eich Bonim Ir Ivrit," 68.

However, the greatest shift in the Jewish building industry's move away from stone occurred during the 1936 Arab Strike, when the Palestinian stone industry was not available for Jews.[453]

The alternative material chosen to replace the traditional stone was concrete. Concrete was not only easy to produce owing to the availability of cement in the country, it also enabled the design of flexible architectural forms desired by modernist architecture. Furthermore, it enabled the *Yishuv* to be independent of Arab labour and industry.[454] Thus, it gradually gained great Zionist symbolic value. Building with concrete was understood to be supporting the same cause as the Zionist afforestation and harvest. The renowned poet Natan Alterman positioned concrete in a large spectrum of Zionists practices in his poem 'Morning Song', published in 1934. The poem describes the local natural conditions – the burning sun, the dew, the desert, the swamps – and the ways to harness and civilise them – harvesting, gardening, drying swamps and building with concrete ('We shall dress you in a gown of concrete and cement').[455]

Nonetheless, the main disadvantage of building with concrete was its low durability in the local climate. According to renowned architect Avraham Yaski, 'In most of the houses that were built along the sea and which observed its humidity, the iron infrastructure swelled and after only a few years it blew up the concrete'.[456] An article from 1967 stated, moreover, that 'the problem is: how to prevent the quick wear

[453] Hadas Shadar, *Sunstroke: Brutalist Construction in Be'er Sheva Re-Examination of National Architecture* (Jerusalem: Yad Ben Zvi), 11.
[454] Modernist architecture developed around the constructive possibilities of concrete and its ability to form a foundation for pillars and rafters that were independent of the walls as the main carriers of the weight of the construction. The qualities of concrete not only transformed the exterior possibilities of constructions (as in the case of the roof) but also enabled a different internal structure, one that could, for example, enable large horizontal windows. Ibid., 7.
[455] Natan Alterman, *Morning Song* (1934). Translated by Nili Schneidman.
[456] In: Zvi Efrat, *The Israeli Project, Building and Architecture 1948-1973* (Tel Aviv: Tel Aviv Museum of Art, 2004), 106.

of houses' façades as was the case here in the 1930s and 1940s, especially along the coast'.[457]

Moreover, the use of concrete increased the need for external insulation materials in order to reduce the heat, cold and wetness within the houses. Doctor Groschka wrote:

> We need good insulation. In the past this was achieved by very thick walls. New building methods […] reduce the volume of material and require the search for new [insulation] solutions.[458]

During the 1930s and 1940s, insulation materials such as tar, cork, sponge, stone and light concrete were imported from Europe to compensate for the deficiency of new building materials that were not always suitable for the local climate. From the abundance of articles that were dedicated to this issue in professional journals, we learn that the urgent need for insulation materials created an unregulated market. An article published in 1935 in *The building in the Near East* stated:

> In the last few years, the market has been flooded with dozens of new materials that are being announced as the best solution for the insulation of heat, wetness, and noise. In one of the last issues of this journal we have called for our readers' attention […] not all products that are advertised as protecting from wetness indeed improved [insulation]; the same is true for heat and noise. […] the research on building insulation can be complex and is not yet developed enough and some of our architects did not have a chance to become familiar with it abroad. [459]

In addition to economic and national considerations, it seems that architects and investors also preferred concrete on account of its cultural value. Instead of choosing the building materials that would ensure the security and comfort of the inhabitants, they chose to use new technologies that had international prestige. As previously mentioned, owing to the deficiency of these materials and their incompatibility with

[457] Unknown, "Hova Le-Havtiah Hasit Neota Le-Batim Hadashim," *Davar* (28.04.1967): 9.
[458] Groschka, 82-83.
[459] Ernstein, "Mador Le-Homrei Binyan," *Building in the Near East* 4 (1935): 15.

local conditions, architects and engineers regularly had to compensate with additional insulation materials. However, a study from 1944 demonstrated that due to the high price of insulating materials most houses were eventually not insulated at all.[460]

Another way to alleviate the heat in the houses was by considering the impact of solar radiation on the roof. Until the 1870s, Western travellers who arrived in Palestine encountered a scenery of flat or domed stone roofs. The winter of 1874 marked the beginning of a shift in this respect. As a result of heavy snow hundreds of roofs collapsed and even more were cracked. The Templers were the first to draw practical conclusions and soon after the weather disaster, they began importing roof tiles into Palestine. They advocated the use of the tiles as, according to them, it was not only better-suited for managing precipitation but also because it enabled the use of new building techniques and materials, since the light tile roof permitted the construction of thinner walls. In addition, they preferred its cultural-symbolic value, which was associated with a European rural landscape. The Jewish European architects who settled in Palestine during the first decades of the twentieth century also preferred the tile roof because they were more familiar with its use and the building techniques it required.[461]

It was only after the modern style entered Palestine that the flat roof returned to fashion. In 1935, architect Julius Posener described the irony embedded in the cultural meanings that were attributed to this architectural style. He wrote: 'in Germany, they called this type of architecture – of flat roofs […] 'an architecture of huts' that originates in our Oriental blood; and here, this architecture seems foreign and European'.[462]

[460] *Mehkarim: Avodot Hamosad Leheker Habniya Ve Hatekhnika*, vol. 2 (Jerusalem: The Association of Engineers, Architects and Measurers in Eretz Israel, 1944), 80.
[461] In: Gordon, 61.
[462] Uzi Agassi, *W.J. Wittkower: The Cool Breeze Comes from the West* (Tel Aviv: Tel Aviv University 1993), 27.

Indeed, alongside the modernist admiration of steel, glass and concrete which had originated from industrial construction, various modernist architects also wrote about the influence of the stylistic language of Muslim architecture on their work. In Le Corbusier's book, *Poesie sur Alger*, the renowned architect praised the oriental beauty of North African towns and cities. He wrote that 'excellent architecture is square'.[463] A year after his death in 1966, Le Corbusier's book *Voyage d'Orient* was published. This book assembled different texts that he had written during his journeys, and within which he described his first encounter with Muslim architecture. In these texts and others, Le Corbusier often emphasised the perfection implicit in the square and modular Arab geometry, which in his view amplified monumental buildings, thereby, creating what he described as a 'holy' proportion.[464]

Research conducted by the Institute for Building and Techniques in Palestine (*Ha-mosad Leheker Ha-bniya Ve-ha-tekhnika)* in cooperation with the Meteorological Department at the Hebrew University of Jerusalem in 1944 asserted that the domes in Arab houses contributed to reducing the heat in interior spaces since the sun's rays heated different parts of the roof at different times of the day.[465] As we have seen, modernist architects in Palestine often distanced themselves from the local building traditions. Owing to this, they completely ignored the dome roofs often used in Palestinian houses.

On the other hand, some architects advocated the tile roof for climatic reasons. In an article that focused on the desired roofs for industrial buildings in Palestine from 1946, Wittkower wrote that 'the best means […] for the efficient cooling of the building

[463] Çelik Zeynep, "Le Corbusier, Orientalism, Colonialism," *Assemblage: Critical Journal of Architecture and Design Culture* 17 (April 1992): 61.
[464] Ibid., 61-62.
[465] *Mehkarim: Avodot Hamosad Leheker Habniya Ve Hatekhnika*, vol. 1 (Jerusalem: The Association of Engineers, Architects and Measurers in Eretz Israel, 1944), 125.

during the night hours is any non-insulated roof that is made of one single layer. Every roof made of tiles or metal sheet is good for this purpose'.[466] In another article from 1950 that focused on building forms in social houses, the architect Asher Allweil wrote that 'in terms of thermic insulation the tile roof is much better than a concrete roof'.[467]

Despite the opinions concerning the suitability of the tile roof for the local climate, modernist architects continued to design flat roofs in the houses they planned. Similar to the other architectural elements that were previously discussed, the choice of the roof was more likely related to aesthetic concerns than to functional ones. This feature was not unique to the International Style in Palestine. To illustrate the priority given by modernist architects to stylistic features over considerations relating to concrete environmental conditions, architectural historian and theoretician Reyner Banham examined the effectiveness of the flat roof in modernist buildings in Western countries. According to Banham, most flat roofs in Europe suffered from leakage problems in the 1920s and 1930s. This fact was well-known to all the architects who built in this style, but it did not prevent them from continuing to plan flat roofs. This evidence led Banham to conclude that European architects did not rely enough on personal experience in the field but mainly on the dictates of fashion.[468]

As we have seen in this chapter, the issue of climate was central to the Jewish architectural discourse in Palestine throughout the first half of the twentieth century. Discussions on the effects of climate in the built environment were embedded in a medical as well as a colonial discourse that continuously compared itself to local building traditions and indigenous knowledge on climate. The issue of climate acquired

[466] Werner Joseph Wittkower, "Aklim Be-Binyanei Ta'asiya Be-Eretz Yisrael," *Journal of the Association of Engineers and Architects* 7 (1945): 3.
[467] Asher Allweil, "Nituah Tzurot Ha-Binuy Ve-Shitot Ha-Bitzua Be-Mifa'lei Ha-Shikun La-Olim," ibid.9 (1950): 9.
[468] Nigel Whiteley, *Reyner Banham: Historian of the Immediate Future* (Cambridge: MIT Press, 2002), 401.

a central role in the architectural discourse, not only because Palestine was particularly hot but rather because the discussion concerning climate was inseparable from a wider discourse on hygiene and climate, which had emerged in the nineteenth century and prevailed in Europe and in the colonies well into the twentieth century. Given the concrete health hazards that were associated with the climate in Palestine, modernist architects made considerable efforts to study its characteristics. Nonetheless, in most cases these studies did not contribute to the formulation of a new architectural style. Instead, modernist architects were keen to reproduce the formal idiom of the International Style with the adjustments pre-designated as potentially problematic in CIAM's Minimum Dwelling Standards. Additional architectural and engineering elements that affected the micro-climate in residential spaces, such as the shape of the roof and construction materials, were side lined in the professional discourse despite the architects' awareness of the problems this involved.

The garden city was supposed to enable the effective ventilation of air in the streets (an aspiration that became harder to fulfil with the surge of the Jewish population beginning in the interwar period). However, it was also meant to distance and differentiate the Jewish towns from the perceived poverty, squalor and disease identified by the Jewish settlers in the Arab towns and cities.

During the 1910s and 1920s, architects had experimented with new architectural features and techniques and had, moreover, searched for novel ways to express their national identity as well as find solutions to the challenges presented to them by the local climate. Nevertheless, the import of a modernist, Western idiom to Palestine during the 1930s marked an act of isolationism rather than an attempt at assimilation into the local environment.

In addition, despite the importance of the houses in determining the daily thermal comfort of the tenants, the position of architecture between the arts and the sciences enabled Jewish architects to interpret the scientific evidence concerning climate in selective and flexible ways, and simultaneously encouraged non-professionals as well as professionals from other fields of expertise to intervene in the architectural discourse. The fluidity and the relative openness of the architectural discourse to external commentators once again reveals the cultural construction of experts' knowledge, and the ways in which processes of knowledge production refracted and built upon, the interplay between professional and popular discourses. Moreover, the overwhelming majority of Jews in Palestine during the interwar period lived in cities. Therefore, climate discourse and policy in architecture affected the public in a way that the discourse on irrigation, agriculture and forestry did not.

More than any other field of expertise discussed in this thesis, architecture left a physical mark on the Jewish built environment in Palestine. Houses, streets and towns planned throughout the first half of the twentieth century, which are still in use today, provide a powerful material evidence of Jewish architects' processes of knowledge production in what concerns, among other things, contemporary notions of climate.

Conclusions

In his book *Weathered* historian Mike Hulme writes that 'ideas about climate are always situated in a time and a place' since they are tied together with human culture.[469] Hulme adds that 'to historicise [climate] is to interpret it as the product of historical development [and] to recognise how and why its meaning have changed over time.'[470] In my thesis I have explored the political, social and cultural ideas and conventions which constructed and informed professional and popular knowledge concerning climate in Palestine between 1897 and 1948. In so doing, I analysed the role of climate – both as an abstract concept and a concrete condition – in shaping and reshaping Jewish national, racial, cultural and spatial identities both in Europe and in Palestine.

Throughout the period commencing from the establishment of the ZO in 1897 to the end of the Mandate period in 1948, Jewish perceptions of climate in Palestine underwent several transformations reflecting developments in Jewish-Zionist history and politics. As I have demonstrated, persecutions of Jews and the rise of nationalism during the late nineteenth century led many Zionist leaders and thinkers to emphasise what they perceived as the 'natural' relations between the Jewish people and the environmental conditions in Palestine. Influenced by German Romanticism, Jewish intellectuals and race scientists utilised climate theory during this period to stress the so-called organic link between Jews and the natural conditions in Palestine. According to them, the Jewish people was created in Palestine and thus its 'return' to the biblical homeland would complement its physical and moral traits.

However, following the actual encounter of Jewish settlers with the natural realities in Palestine, discussions on climate gradually lost their romantic attributes and

[469] Hulme, *Weathered: Cultures of Climate*, 15.
[470] Ibid.

became increasingly associated with colonial scientific ideas on the perceived dangerous implications of non-temperate climes on European bodies and minds. Nevertheless, during the first half of the twentieth century, Zionist approaches to climate in Palestine reflected a gradual shift from imperial approaches to non-temperate environments, which generally aimed to protect Europeans from the so-called enervating influence of warm climates, to a growing reliance on scientific approaches which were common in former settler colonies and which emphasised the need for Europeans to adapt and acclimatise to their new environments. Within climate research, these notions manifested themselves most vividly in relation to bodily and botanical affairs.

The transformation in Zionist colonial attitudes also mirrored shifts in the political status of different Zionist institutions, demonstrating the solidification of the *Yishuv*, which towards the late 1920s came to supersede the ZO's institutions outside of Palestine. The increasing power of the *Yishuv* was a result of three interconnected historical and political developments. The rise of fascist movements in Europe during the 1930s and the limitations imposed on Jewish immigration to the United States and the United Kingdom during the interwar period transformed Palestine from a marginal destination for Jewish immigration into a central one. Moreover, the intensification of the Arab-Jewish conflict following the Arab uprisings of 1921 and 1929 and the subsequent publication of the White Papers by the British administration led to the gradual Jewish rejection of both British rule and the Arab population. Starting from this point the Jewish community in Palestine became more aware of its need to justify its settlement project and while in many aspects Jews attempted to distance themselves from the local Arabs, they nevertheless placed great scientific emphasis on acclimatising to the natural environment. Indeed, in some ways, the desire to adjust to

the local climate and the hardships of coming to terms with it shaped an emerging sense of a national identity.

Simultaneously, I have argued that throughout the period addressed in this thesis, Jewish experts and lay people continuously evoked and at times constructed collective sentiments that were meant to assist them in confronting or adjusting to the alien reality of their new homeland. Although these collective sentiments were often intertwined, for the purpose of my analysis I divided them into three types. The first collective sentiment concerning the climate in Palestine was based on the descriptions of the Land of Israel in the religious texts common to both Jewish and Christian traditions. The Hebrew Bible served as an essential component in the Zionist development of a national narrative as it highlighted the historical 'continuity' of the Jewish people from the ancient past to the present and gave legitimacy to the settlement project. The importance of the biblical narrative also lay in the link between the nation and the territory that it claimed.

Another prominent collective sentiment was related to the climate with which Jewish settlers were familiar in their countries of origin, which was frequently compared to the climate in Palestine. This collective sentiment was often an expression of the Jewish settlers' difficulties in adjusting to the unfamiliar climate and environment in Palestine, and it was also frequently associated with questions of acclimatisation. The study of acclimatisation in Palestine was mainly manifested in the fields of medicine and botany and it largely influenced physicians' attempts to construct and reinforce social conventions and living standards through hygienic practices as well as botanists' efforts to introduce new and economically profitable crops into the country.

Yet the concept of acclimatisation was also related to a long tradition of colonial sciences and the transportation of humans, animals and plants between the metropoles

and their colonies. Thus, the third sentiment that influenced climate research in Palestine was related to the European colonial experience of warm climates mentioned above. The Zionist absorption of colonial sciences enabled European Jews who initially perceived themselves (and indeed were perceived by others) as an Oriental minority in the Occident to begin perceiving themselves as an Occidental minority in the Orient.

In my thesis, I have focused on the fields of expertise which were mostly affected by and occupied with the issue of climate. As we have seen, these fields included: climatology and meteorology, race sciences and medicine, agriculture and botany, and architecture and planning. Despite the exchange of knowledge between experts in these fields, each scientific discipline operated within specific parameters and featured specific concerns. In addition, each of these fields evoked general popular reactions to and perceptions of climate among European Jewish settlers, thus enabling me to discuss in tandem the cultural construction of expert knowledge and the interchange between professional and popular discourses.

The first chapter presented Jewish concepts on the role of climate in the physical and mental evolution of the Jewish people from the eighteenth century to the beginning of the twentieth century. Despite the rise of hereditarian accounts in explaining the formation of peoples and nations at the turn of the twentieth century, Zionist thinkers often continued to adhere to environmental, cultural and historical categories. According to them, the 'return' of Jews to their so-called primal natural and climatic conditions in Palestine would contribute to their active regeneration. The employment of climate – as a physical, moral and geographical category – by Jewish thinkers was a result of its attributes as an abstract, amorphous and fluid concept, which was also a concrete, physically sensed and empirically proven condition. This liminality, which was embedded in the concept of climate, perfectly suited the tantalising position of Jews

as both similar to and different from Europeans. Thus, during the eighteenth century, those who wished to advocate Jewish emancipation and stress the potential feasibility of Jewish integration in Europe usually argued that because Jews shared the same climate with Europeans, their constitutions were absolutely identical. In the nineteenth century climate theory waned, European nationalism became illiberal and antisemitism flourished. At this point, some Jewish thinkers began to view climate as a cause of Jewish dissimilarity to Europeans and employed it to justify the Jewish colonisation of Palestine. Influenced by German Romanticism, these intellectuals wished to stress the organic link between Jews and the natural conditions in Palestine.

The second chapter focused on the empirical investigation of climate in Palestine as well as other destinations considered by the Zionist movement for Jewish colonisation at the beginning of the twentieth century. I presented the evolution of climate sciences during the nineteenth and twentieth centuries and the utilisation of contemporary scientific paradigms and practices within the Zionist context. I claimed that the Zionist elevation of this scientific field before World War I was designed to present the ZO as a political entity that possessed of the necessary knowledge and authority required to become a future state. One piece of evidence for this argument was the incongruity between the ZO's investment in climatic research and the small role it eventually played in the Zionist decision-making concerning choosing a territory. Following the war, climate research in general increasingly became an applied field of investigation. In Palestine, the establishment of the British Mandate as well as the immigration of a large group of German-Jewish experts, transformed Zionist climate research into a prominent science – a fact which considerably impacted the development of other applied sciences which absorbed its knowledge in the following decades.

The third chapter discussed the role of climate in British and Zionist forestry and agriculture. First, I presented desiccation theory and the ways in which it was realised in Palestine. As I demonstrated, by aiming to 'restore' an imaginary climate and revive its biblical characteristics through afforestation, the British and Zionists manifested the centrality of the scriptures in Judeo-Christian culture and science. Second, I demonstrated the centrality of acclimatisation to Zionist forestry and agricultural practices and its significance in enhancing the cultivation of profitable crops. In addition, I argued that both the transfer of seeds and plants as well as the transfer of knowledge concerning their acclimatisation stemmed mainly from British expertise and even to a greater extent from the settler colonial experience. The Zionist reliance on Western sources was so fundamental among agronomists and botanists that they often preferred transferring seeds or learning how to cultivate them from the United States, Australia and Europe rather than from the local Palestinian Arabs. Third, I discussed the irrigation initiatives that were introduced into Palestine during the first half of the twentieth century as a response to its climatic challenges. I stressed the important role of irrigation in enhancing the materially and conceptually imbalanced power relations between Jews and Arabs in Palestine reflected in their access to and utilisation of water. In addition, I argued that, ironically, the study of the local climate became a tool with which to negate both the climate and the local vegetation.

The fourth chapter explored the encounters of Jewish physicians with the climate in Palestine during the Mandate period. Zionist medical interest in climate manifested itself mainly within two medical branches – tropical medicine and medical climatology. Even though tropical medicine was based on germ theory and contradicted medical accounts based on climate theory, the tendency to view malaria as a result of climate continued to prevail within the Jewish community during the first decades of

the twentieth century. However, the main focus of this chapter was on medical climatology, which was entirely concerned with the effects of climate on the human body and mind. Here, I examined in tandem the evolution of this medical branch within the Western tradition as well as its transfer to Palestine by Central European Jews and its contribution to the formation of social conventions and living standards through hygienic practices in the *Yishuv*. The body of medical knowledge, as it was consolidated among Jewish physicians in Palestine between the years 1921 and 1948, mirrored the discomfort of some of the population, in particular their alienation from – and even fear of – their new homeland. These feelings of alienation and fear were not directed at the potentially enervating influence of Palestine's environment alone. They also included the fear of resembling Palestine's native population.

In the last chapter, I presented and analysed the various solutions proposed by architects to alleviate the heat within the built environment in Palestine. In doing so, I referred to urban planning and the architecture of residential spaces, while also discussing technical considerations, such as building materials and roof shapes. Jewish architects devoted considerable thought to questions of climate and health in planning residential buildings. 'Healthy houses', 'healthy streets' and 'healthy cities' were commonly used terms in relation to climate in architectural professional publications. The issue of climate in architecture was accordingly addressed not only by architects but also by physicians and meteorologists. Nonetheless, the position of architecture between the arts and the sciences often allowed the flexible interpretation and selective utilisation of medical ideas by architects.[471] The architectural discourse on climate during the first half of the twentieth century also reflected contemporary confusions

[471] Aleksandrowicz "Appearance and Preformance: Israeli Building Climatology and Its Effect on Local Architectural Practice (1940-1977)," 371.

and tensions between scientific knowledge, artisanal practice and dwellers' experiences; between foreign and local building methods; and between colonial and indigenous approaches to climate.

Through the prism of climate, I have examined processes of knowledge production within Jewish and Zionist science, medicine and technology. In doing this, I have also explored the political, social and cultural ideas and conventions which constructed and informed the professional and popular knowledge on climate. This knowledge was influenced by existing Western scientific and colonial ideas and practices. However, it also reflected cultural perceptions which were exclusive to Jewish history and identity and mirrored a long tradition of awe and wonder towards the Land of Israel. By means of the examination of this complex combination of ideas and practices, I have suggested a novel – spatial and environmental – perspective on the evolution of modern Jewish national, racial, and cultural identity.

In addition to examining the formation and transformation of Jewish-Zionist identity in Palestine through notions on climate, this thesis also scrutinised the material aspects which were intertwined with the study of climate in Palestine such as economy, food production, food consumption, water management, building materials, labour routines, living standards and hygiene practices.

Furthermore, I argued that placing Zionist climate investigation within the context of colonial relations and manifestations can contribute to our general understanding of Zionism as a political and ideological entity for two main reasons. First, the history of climate research in Palestine emphasises the global and transnational dimension of Zionist processes of knowledge production. Second, the absorption of colonial ideas on climate allows us to trace the development of Zionist self-understanding over the course of the first half of the twentieth century. Bearing the

influence of a wide swath of contemporary cultural currents, including racial thinking, Zionism presented itself as an anti-colonial movement aspiring to liberate itself from a long history of persecutions and oppressions in Europe, yet it assimilated, and explicitly delineated, colonial ideas and practices as part of its attempt to obtain a non-European territory.

By drawing on approaches honed by colonial historians my thesis offers a more thoroughly historicized rethinking of the early Zionist relationship with its environment in Palestine. Nevertheless, this thesis also aspires to contribute to colonial studies in general. In doing so, I follow Katz, Leff and Mandel's argument according to which 'Jews offer an exceptionally rich entry point for new efforts to write comparative and transregional accounts of empire'.[472] In addition, Jewish history raises critical conceptual questions for colonial history and the uncertain and contradictory position of Jews within colonial history can subsequently reveal new aspects and nuances in this field. In other words, considering the 'in betweenness' of Jews as part of the colonial story enables us to rethink imperialist ideas and practices through the complexities of their relationship with imperial power as well as their periphery. Finally, because Zionism emerged in an imperial context and assumed colonial and anti-colonial stances and alliances at various moments, its study requires grappling with the ambiguities implicit within colonial history and demands the rethinking of binary categories such as 'metropole' and 'colony', and 'coloniser' and 'colonised'.[473]

The 1948 war and the ensuing establishment of the State of Israel changed the geopolitics of the region and immediately transformed the politics, economy, society and culture of Palestine's Jewish community. These changes, however, did not

[472] Katz, Leff, and Mandel, 10.
[473] Ibid., 13-15.

necessarily influence the ways in which climate in this country was understood and contended with by Israeli society. On the contrary, from the 1960s Israel became globally known for its national triumph over nature. This triumph has been manifested mainly in the development of advanced irrigation technologies, which have subsequently been exported to other countries with warm and dry climates. During the following decades Israel also developed a pioneering air conditioning industry and its climatological studies in architecture contributed significantly to the development of new building methods.

An interesting subject for further research on this topic would be the case study of the Negev in relation to the climatic 'challenges' it evoked in Zionist eyes after 1948.[474] The Negev is a large desert area which comprised about half of Israel within its pre-1967 borders. In pre-statehood Palestine, the position of the Negev in Zionist thought was relatively unclear and undetermined and only very few Jewish settlers were willing to dwell in this area during the British Mandate. However, in 1947 the UN partition plan determined that most of the Negev would become part of the future Jewish state. This decision transformed the status of the Negev and the meanings attributed to it overnight and increased official statements on the need to 'redeem' it from its desolate conditions. Aspirations to paint the Negev in green were embedded, among other things, in a political discourse of anxiety regarding the 'emptiness' of this contested territory and the urgent need to settle it. The reconfiguration of the Negev; the development of innovative irrigation technologies to meet its unique characteristics and the experimental agricultural projects initiated in the Negev during the 1950s and 1960s (which included among other things, the development of artificial climate control

[474] Important recent research on the Negev by Eyal Weizman and Yael Zerubavel has not specifically addressed the issue of climate. Weizman. Zerubavel, *Desert in the Promised Land*.

to increase rainfall) demonstrated how Western science and technology could be used to overcome nature itself.

Further historical and sociological research is also needed to examine why contemporary discourses on climate change have not yet taken root in Israel today. In Western countries, the discourse on climate change is often associated with other discourses on science, politics, economy and ethics. It appears that the absence of a similar discourse in the Israeli context is not disconnected from the colonial history of this country and the relation of the Jewish society to local climate which I have discussed in this study. The local political, cultural and religious ambiguity embedded in this relation on one hand, and the Zionist aim to negate the longstanding Jewish reality of rootlessness and displacement on the other, appear to hinder the Israeli absorption of new political ideas on the global dimensions of human accountability to climate change.

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