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**From Dazzle to the Desert:
A Cultural-Historical Geography of
Camouflage**



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Abstract

To bewilder the enemy and mislead him continually as to our real positions and attentions is one of our most hopeful tasks and to do this ingenuity, imagination and daring are required.

(Ronald Penrose, 1941, *Home Guard Manual of Camouflage*, p.13)

This thesis approaches the cultures and geographies of military conflict, charting the history of military camouflage through a multi-faceted biography of this technology's life-path. By studying the scientific biography of Dr Hugh Cott (1900-1987), eminent zoologist and skilful artist turned camoufleur in WWII, entwined with the fragmentary mobile biographies of other camouflage practioners, including artists, animals and even a magician, the sites and spacings of camouflage's life-path from the late-nineteenth century into the Desert War are traced. The military's enrolment of diverse outside specialists practised in visual literacy is examined to reveal that technological development led to transformations, not only in military knowledge, but also in the militarism of knowledges such as science and art. Moving through the scientists' fieldsite, the committee boardroom, the military training site and the soldiers' battlefield, this thesis uncovers the history of a most ambiguous military invention, exposing its darker patterning and thus subverting a long-dominant narrative of camouflage as solely a protective technology. Furthermore, this camouflage biography is narrated from the perspective of the technology's inventors and practioners as a means to encounter the situated and also embodied nature of technological innovation in military conflict. It demonstrates that, as camouflage transformed battlefields into unsettling theatres of war, there were lasting consequences not only for knowledge and technology, but also for both the ethics of battle and the individuals enrolled in this process. Overall, this *geographically* structured biography explores how camouflage is a jarring technology, combining aesthetic and artistic appreciation with complex scientific theory, to guileful and deadly effect.

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Author's Declaration

I declare that except where explicit reference is made to the contribution of others, that this thesis is the result of my own work and has not been submitted for any other degree at the University of Glasgow or any other institution.

Signature

Printed Name

List of Abbreviations

Archive Abbreviations

CZM - Cambridge Zoology Museum
DG - Dean Gallery
GUA - Glasgow University Archives
IWM - Imperial War Museum
NA - National Archives
RCAHMS - Royal Commission on the Ancient Historical Monuments of Scotland
RELM - Royal Engineers Library and Museum
SCA - Selwyn College Archives
WLT - Wren Library Trinity College

General Abbreviations

AA - Anti-aircraft
AFV - Armoured Fighting Vehicle
BDE - Brigade
CAP - Camouflage Advisory Panel
CD&TC - Camouflage Development and Training Centre
CID - Committee of Imperial Defence
DEW - Distant Early Warning
HO - Home Office
Inf - Infantry
IPR - Intellectual Property Right
LRDG - Long Range Desert Group
MEF - Middle East Forces
MoD - Ministry of Defence
MT - Motor Transport
OR - Operations Research
OSS - Office of Strategic
POW - Prisoner of War
RASC - Royal Army Service Corps
RCAHMS - Royal Commission on the Ancient Historical Monuments of Scotland
RE - Royal Engineers
R&A - Research and Analysis
WO - War Office

Chapter 1.

Introduction

The advent of WWII was accompanied by the disturbing realisation that this was to be ‘a war of extermination’.¹ Technological developments in weaponry had increased the scale of conflict and the horror of violence. In response the British military, in addition to employing such means of bloody conflict, also sought new methods to mitigate and protect against these terrors. Initially camouflage was one such technology, and thus it was characterised by its seemingly benign nature and was variously likened to a magic cloak of invisibility, a game of hide-and-seek and a bad joke in *Punch*.² This view of military camouflage as creativity and occasionally comedy has prevailed as the dominant narrative of the technology, even though the history of camouflage has been narrated through numerous texts from a variety of disciplines. It is depicted as a story of a clean, sanitary military technology, with prevailing narratives drawing attention to the interdisciplinary nature of camouflage and stressing its ingenuity and innovation. These studies in military camouflage can be divided into four main categories: cultural, artistic, scientific and military. As will be discussed in pages to come, each has revealed something of the technology, but each has also *concealed* something of its character too. They have fashioned too simple a tale for a technology that altered the character of the battlefield and reconfigured the ethics of warfare. Thus, one aim of this study into the cultural-historical geography of camouflage, from the late-nineteenth to mid-twentieth centuries, is to challenge the assumption of military camouflage as a benign technology, and to expose its hidden, shadier past. As such, it is important to consider the texts which have already contributed to camouflage’s history.

First, cultural studies in camouflage have traced the diverse roots and routes of its military history, concluding with its incorporation through various guises into popular culture. These studies often take the form of in-depth catalogues depicting the different knowledges and disciplines, in particular art, that contributed to military camouflage, while through, fashion and art, camouflage was employed to challenge and undermine militarism. For example, Behrens’ extensive study into modern military camouflage examines the use by the British and US military of camouflage throughout WWI and WWII, exploring the contribution of art and science, and the ways in which, via modern and contemporary art, camouflage has been

¹ BOOKLET: CAMOUFLAGE SPRING 1942 – DG GMA A64/1/16/2/4.

² Ibid & typed notes for Trevelyan, J. (1944) Camouflage *Architectural Review* - TWL JOT 54/4 (142).

appropriated by contemporary culture.³ The entanglement of art and militarism, acknowledging its engagement with natural history and further contributions to art and design, has been set out even more expansively by Newman and Blechman in *Disruptive Pattern Material: An Encyclopaedia of Camouflage*, an inventory of the various military and non-military uses of camouflage. From hunter-gatherer societies to the scientist's collections cabinet, through art movements such as Cubism to the evolution of military uniforms, and into the work of artists such as Andy Warhol and fashion houses such as Christian Dior, Newman and Blechman chart the scope of camouflage's biography and history, stressing its mutability and persistence.⁴ Although rich in detail, texts focusing on the cultural input and output of camouflage have often listed its influence without reflecting upon the relationships between different disciplines and the military. Also, they have predominantly figured camouflage as the application of art to science and the military, emphasising its connections with art movements such as Cubism, Surrealism and Dadaism and the subsequent reclamation of camouflage by art in post-war eras.⁵

The second area of camouflage literature, centres on the narrative of camouflage framed specifically by its artistic roots and innovators. These studies concentrate on the influence of artists in military camouflage by charting the career of those recruited and involved in the development and production of military camouflage. Goodden narrates the story of the artists involved in WWII British camouflage, such as Ronald Penrose and Hugh Casson.⁶ Shell and Behrens consider the role of the American naturalist and artist Abbott Thayer, acknowledged as the 'father of camouflage',⁷ a pivot for their studies of the intermingling of art and militarism.⁸ Despite the insights offered by this work, into the contribution of art and artists to the military and the development of camouflage, the inputs of science and scientists have only been touched upon lightly, and the workings of the military, although well described, are not critiqued or explored in-depth. The relations and networks involved in the development of military camouflage were surely far messier and more heterogeneous than can

³ Behrens, R. (2002) *False Colors: Art, Design and Modern Camouflage*. Behrens has further extended this work in a recent volume that also links camouflage, art and architecture: Behrens, R. (2009) *Camoupendia: A Compendium of Research on Art, Architecture and Camouflage*.

⁴ Newman, A. & Blechman, H. (2004), *Disruptive Pattern Matter: An Encyclopedia of camouflage*. This interplay between modern military camouflage development and the world of art, fashion and popular culture has also been explored in Newark, T. (2009) *Camouflage*.

⁵ Behrens, R. (2002) op cit. Goodden, H. (2007) *Camouflage and Art; Design for Deception in World War 2* & Kerns, S. (1983) *The Culture of Time and Space, 1880-1918*.

⁶ Goodden, H. (2007) op cit.

⁷ Behrens, R. (1988) The Theories of Abbott H. Thayer: Father of Camouflage, *Leonardo* 21 (3) pp.291-296.

⁸ Behrens, R. (2002) op cit; Behrens, R. (1988) op cit; Shell, H.R. (2009) The Crucial Moment of Deception, *Cabinet* 33 Deception pp.53-60.

be allowed in a narrative taking only art at its centre, when other areas of expertise transparently also require attention.

The third perspective from which camouflage has been explored is through its scientific heritage. Alongside Goodden, Elias tells the history of WWII camouflage through the biography of an unusual military career, this time focusing on the role of a scientist. Elias' study is concerned with the zoologist and Australian camoufler William Dakin, considering the application of biology to military knowledge and practice, as well as the enrolment of unusual disciplines and skills in the military during war.⁹ Further, Forbes recently has made an effort to address this scientific lacuna in camouflage's biography by exploring the influence of biological sciences and natural history knowledge on human warfare.¹⁰ The technique of mimicry is at the core of this study and is used to consider how it is more than just 'a fantastical tale of visual punning in nature',¹¹ but instead offers a means to study the mutually informative roles of biology and militarism in conflict. Forbes' research on WWI and WWII reveals how science not only informed modern military technology, but was in turn influenced as research into, and knowledge about, the role of genes in evolution was aided by combining military and scientific knowledge and practice. Behrens extends the role of science in the development of camouflage from zoology and biology to include psychology. He begins to draw out the links in twentieth-century warfare between Cubism, Gestalt psychology, natural history, Surrealism and psychoanalysis which also featured in the development of military camouflage, notably informing how they mutually tackle the nature and workings of vision and perception.¹² Although both Forbes and Behrens acknowledge that the visual nature of biological camouflage was effectively mediated by artists, in a fashion similar to the studies of camouflage which focus predominately on art, inquiries into the science of camouflage do not critically consider the character of this engagement between different professions and skills, nor the possible transformative effect such an engagement had back upon these fields of concern. Also, both sets of texts study the role of outsiders transferring their knowledge and skills *into* the military, informing novel military practice and technology during conflict. As a result, the military is positioned as the *backdrop* to the activity of developing camouflage and, at

⁹ Elias, A. (2008) William Dakin on Camouflage in Nature and War, *Journal of Australian Studies*, 32 pp.251-263 & Elias, A. (2003) The Organisation of Camouflage in Australia in the Second World War, *Journal of the Australian War Memorial* 38 pp.1-10.

¹⁰ Forbes, P. (2009) *Dazzled and Deceived: Mimicry and Camouflage*.

¹¹ *Ibid* p.4.

¹² Behrens, R. (2002), *op cit*.

its most dynamic, is cast as merely providing an amusing oppositional temperament to the creative artists or carefully methodical scientists.¹³

The fourth area of camouflage studies, offers the possibility of redressing this imbalance by focusing on the military's perspective in the development of modern military camouflage.¹⁴ These studies chart the succession of camouflage innovations, phases and fashions in relation to wider shifts in the technology and character of warfare throughout WWI and WWII. Focus has variously fallen upon camouflage designs, uniforms¹⁵ and technologies.¹⁶ Rankin more precisely shapes the scope of his study by positioning camouflage within the British military's wider use of deception in WWI and WWII. In this work camouflage is considered as one method of deceptive warfare, which is utilised alongside other techniques such as radio silences, propaganda and double agents.¹⁷ These studies into the role of the military reveal the creativity and ingenuity within the military and its own internal dynamism when incorporating outside and diverse disciplines, people and skills during periods of intense conflict. Triangulated with studies on both the art and the science of camouflage, this perspective reveals the military as less an inert stage on which the history of camouflage has been acted out, but instead the military becomes lively and adaptable in its utilisation and transformation of its own and other knowledges and practices.

These four areas of study into camouflage - whether their focus is on a cultural, artistic, scientific or military engagement - each open different sightlines on the development of the technology. Further, they all acknowledge that military camouflage was born of interdisciplinary engagement and thus is pluralistic in its knowledge and practice. Nonetheless, it arguably remains the case that the biography of camouflage has been narrated as a cosy cohort of eccentric artistic (and sometimes scientific) individuals who often were pitted against the strictures of military procedure, yet still managed to develop inventive camouflage solutions to concealment conundrums;¹⁸ or it is depicted as a story of the ingenuity of the military in pooling a diverse group of military specialists and outside experts to develop deception techniques,¹⁹ a tale of derring-do. Yet, much of this established literature, although acknowledging that military camouflage was a synthesis of disparate

¹³ Newman, A. & Blechman, H. (2004) op cit. p.273.

¹⁴ Hartcup, G. (1979) *Camouflage; A History of Concealment and Deception in War* & Reit, S. (1979) *Masquerade: The Amazing Deceptions of World War II*.

¹⁵ Newark, T. Newark, Q. & Borsarello, J.F. (1996) *Brassey's Book of Camouflage*.

¹⁶ Reit, S. (1979) op cit.

¹⁷ Rankin, N. (2008) *Churchill's Wizard: The British Genius for Deception 1914-1945*.

¹⁸ Goodden, H. (2007) op cit.

¹⁹ Rankin, N. (2008) op cit.

knowledges and skills, captures and encloses the technology within one disciplinary genesis or merely catalogues its various guises and permeations. This geographically-centred inquiry into the history of camouflage aims to capture the complexity and the conflicts within the technology's development by uncovering, and bringing into conversation, the diverse voices and experiences of camouflage in order to think through their co-mingled roles (and spaces) in the development of military technology, as well as illuminating the lasting consequences of the militarism of knowledges.

It is important, therefore, from the outset to clarify the purpose behind employing different, and at times simultaneous terms, such as craft, technology and practice, within this study to describe camouflage. Throughout the early to mid-twentieth century camouflage underwent phases of innovation through the assembling and blurring of skills and knowledges. This was a period of intense experimentation and trial and error, of scrappy and *ad-hoc* battlefield techniques: therefore camouflage was evidently a battlefield craft. Once experimental camouflage schemes were proven to be effective they went into military production and became standard issue technology. Yet, camouflage was also a practice. Soldiers were continually reminded to carry out camouflage, whether by covering their vehicles with scrimmed nets, or moving across and through the battlefield in a particular manner; and so camouflage was a way of being in, and importantly surviving, the battlefield.

The reasoning for my study in the main focusing on WWII camouflage is also worth explanation. Although camouflage had first systematically been introduced into the British military in WWI²⁰, it was during WWII when it grew in scale and import. In WWI the aeroplane as a new weapon in warfare had greatly expanded the aerial dimension of conflict, but by WWII, with increased technological developments, camouflage became increasingly triangulated with the aeroplane and the camera in a deadly game of cat and mouse. As the Camouflage Officer grew ever more expert in concealing the military, the aerial interpreter was ever more precise in deciphering the earth's surface and the aerial bomber ever more proficient in targeting and attacking. Thus, WWII represents an unprecedented phase of camouflage's history, witnessing a battle of cunning, continually adapting in order to find novel ways to outwit the eyes of the enemy. Further, and more chilling, developments in camouflage technology and practice in WWII led to an alteration in the nature of camouflage

²⁰ Limited experimentation with camouflage had only on the small scale been tested by the military prior to WWI but this was not co-ordinated. See Rankin, N. (2008) op cit.

as it increasingly moved, due to the demands of total war, from a mainly passive defence to a disturbingly aggressive form of offensive warfare. It is this element in the history of camouflage that has, so far, been overlooked in camouflage literature and is a theme which this study in particular aims to address through its structure and design, as follows:

A Genealogy of Camouflage through Geography will, at one level, trace the history of camouflage, from the animal kingdom to the battlespaces of modern warfare. It will bring often discrete areas of geographic inquiry, such as animal geographies and military geographies, into dialogue through hybrid geographies, historical geographies of science, technology studies and ANT. It is structured to parallel the biography of military camouflage, in order to reveal the potentials of engaging with geographical literature for a study which aims to account more fully for the biography of a technology.

Abundance, Fragment and Scraps will then set out the design of this thesis, explaining the three uses of biography – scientific, fragmentary mobile and life-path – utilised to narrate a cultural-historical geography of WWII camouflage. This chapter aims to explain how a geographically framed biography of camouflage can more fully capture camouflage’s multiplicities and complexities, and importantly recover something of the embodied experiences that it provided in warfare. It will also describe and account for the archive employed to study military camouflage, explaining how it was constructed and studied through dispersed and diverse sources and sites, ranging from traditional military archives, to zoology museums, university archives and art galleries. This dispersed archival method, encountering the abundant, fragmented and scrappy, has led to an expanded notion of a ‘military’ archive, and reflection is given on how piecing together camouflage’s interdisciplinary heritage can reveal a little of the visceral and bloody experience of conflict.

Disrupting and Dazzling Conflict provides a prehistory and context for WWII camouflage through the study of three men – Abbot Thayer, John Graham Kerr and Solomon J Solomon – and their WWI camouflage geographies. In this chapter, place, environment and site are employed to examine the experiences of those who approached the military in WWI to offer their services for camouflage development. This highlights that “knowledge-transfer” and working with the military often led to lasting and difficult consequences for those involved. From this early foray into camouflage experimentation and implementation, the ambiguous character of the technology is explored, the dynamism of the military highlighted and the lasting effects of these experiences on individuals exposed.

Hiding in Plain Sight then narrows the focus of military camouflage to one key individual by introducing the figure of Dr Hugh Cott, zoologist, artist and WWII camoufleur.²¹ Through a scientific biography focusing on the interconnecting sites and spacings between Cott, his science and camouflage, the history of an emerging military technology will be explored. By locating Cott and his science in the fieldsite, the university and the battlefield, one thread of camouflage's entangled life-path is followed, and the embodied and interdisciplinary nature of knowledge and technological production is considered through the relationship between scientific practice and knowledge and militarism.

The Politics of Position follows Cott to the committee room and his involvement with the Camouflage Advisory Panel (CAP). This chapter is a study in the short history of a failed network exposing the difficulties and tensions encountered by the military in bringing together a group of diverse and at times divergent people and skills. By utilising Latour's understanding of scientific knowledge as a precarious accomplishment and his account of Aramis, a failed technology, Cott becomes the lens through which to study the fractured relations within the CAP, and also between the Panel and the military. The chapter also examines the consequences that such failed networks have for military knowledge and technological production.

Tricksters Transformed to Soldiers continues to follow Cott's camouflage trajectory, this time to the Camouflage Development and Training Centre at Farnham Castle, a key site for British military camouflage experimentation and training. The focus on Cott will zoom out and the scope of the study will include other trainee camoufleurs, such as artists, film makers and stage performers, who had - like Cott - been identified by the military as possessing essential skills for developing visual warfare. Unlike the failed advisory panel network, Farnham proved to be a site of interdisciplinary success. In this chapter particular attention will be given to the military training of these outside professionals in the new practice of aerial literacy, which set camouflage within wider networks of military technological innovation in

²¹ 'Camoufleur' refers to a Camouflage Officer. The term does not appear in official military documentation, but is used amongst camouflage staff. In Stephen Sykes' memoir of camouflage in the Desert War there is reference to *The Fortnightly Fleur* which was the magazine produced by camouflage staff for camouflage staff dispersed across the desert. Sykes explains the magazine's title was derived from the term camoufleur, the name they Camouflage Officers gave themselves. Sykes, S. (1990) *Deceivers ever; Memoirs of a camouflage officer 1939-1945*. The term, camoufleur, also appears in Maskelyne's memoir M, J. (1949) *Magic Top Secret &* in *The ABC of Camouflage* Major D A Pavitt Lectures and Training - IWM86/50/3/13, see p. 85.

the mid-twentieth century. Furthermore, the process of militarising knowledges, disciplines and skills to develop further an effective military technology is described and explored.

Fleurs on the Offensive journeys across seas with these newly trained Camouflage Officers to the extremes of the desert environment. In WWII, the desert as a battlescape was open and exposing, thus demanding a departure from concealment and a move to visual deception. The desert was an environment which, in the process of becoming a militarised landscape, in turn transformed war into an increasingly sly and duplicitous affair. Camouflage's move to the offensive is narrated through entwining Pickering's WWII regime and 'the mangle'²² with Taussig's critique of the enrolment of art in war to produce a mix of play and horror,²³ revealing that, as the desert was redesigned as a space of conflict, camouflage manifested an unresolved tension between comedy and horror.

Finally, the conclusion reflects upon this tension inherent in camouflage's history and discusses the unexpected and unsettling consequences of the development of camouflage in WWII on the disciplines, knowledges, skills, practices and people that it enrolled. By focusing on the afterlives of individuals, the military and camouflage, it will be revealed that camouflage has diffused throughout culture in more subtle, uncomfortable and intriguing ways than thus far been described. It is suggested that this study into one seemingly ordinary man, Hugh Cott, and one seemingly benign technology, camouflage, can historicise discussions on contemporary military technologies and ethics in warfare, and offer questions that warrant closer attention on the militarism of places, knowledge, practices and culture.

Overall, this geographically structured biography of camouflage aims to examine the militarism of knowledge through the spaces and sites of technological innovation. It also attempts viscerally to narrate conflict by drawing closer to the soldier's eye view of camouflage (although inevitably keeping a safe distance), in order to examine how the development of camouflage was indeed a mutually transformative engagement of the military with science and art, but also drawing in the even more unlikely worlds of magic, theatre and comedy in the attempted prevention and perpetuation of violent militarism. In summary, this study pays tribute to the ingenuity of camouflage's practitioners, but also works to distort the prevailing

²² Pickering, A. (1995a) *The Mangle of Practice: Time, Agency and Science* & Pickering, A. (1995b) Cyborg History and the World War II Regime, *Perspectives in Science* 3 (1) pp.1-49.

²³ Taussig, M. (2008) Zoology, Magic, and Surrealism in the War on Terror, *Critical Inquiry*, 34, pp.99-116.

narrative of camouflage by making visible its history as a mercurial aesthetic which has evaded sustained scrutiny, until now.

THE ABC OF CAMOUFLAGE: A-C

A stands for Aeroplane: his is the eye that Camouflage tries to defeat: this is the why:-

B is for Bomber: he's coming so fast, if he can't see you quickly, why, damn it, he's past.

C is the Camera. Try to confuse the interpreter's reading of aerial views.

Chapter 2. A Genealogy of Camouflage Through Geography



INTRODUCTION

Military camouflage is a technology and aesthetic which attempts to disrupt and disturb. Yet, as has been demonstrated through discussing inquiries into the history of modern military camouflage, there is little sense of any unease surrounding the ambiguous and at times sinister character of camouflage. The predominant narrative is one of the ingenuity of artists alongside the efficiency of soldiers; camouflage as a fantastical sleight of hand, the tree that holds a soldier on lookout or a city protected by a mask of seeming bomb damage. This may offer an interesting window on to British military ingenuity, but it is too simple and certain an account. Thus, in this study I will centre *geographically* the history and biography of camouflage, in order to mimic but also invert camouflage by disrupting this prevailing narrative of militarisation, making visible the complexities which have to date gone unnoticed or unspoken. This chapter focuses on the conceptual grounding of my research into the biography of modern military camouflage, by tracing the genesis of camouflage from the natural world into the human, through technology and science into militarism. It will connect the biography of a military technology with corresponding geographical literatures by drawing out camouflage's, and academic geography's, mutual engagement with: nature; animal geographies; hybridity; the historical geography of science and technology; and, critical military geographies. This device will be utilised to propose a history of camouflage that not only injects the life-blood back into a military technology, but also a history of camouflage that does not shrink from the violence of its own indirect bloodletting.

ENGAGEMENTS WITH NATURE

Now that the natural and physical sciences are finally convincing politicians that half a century of research really does show that human activity is the dominant influence on the earth surface processes, the human sciences have entered their post-humanist moment and want to talk about the agency of trees and wolves.²⁴

Head's recent critique levelled at contemporary human science's engagement with nature perhaps appears just during a period of environmental uncertainty and fragility. However, it is in a sense short-sighted to assume that discussions about 'the agency of trees and wolves' are not politically relevant. After all, it was scientists' understandings of the biological agency of animals that informed certain aspects of twentieth-century military technological innovation, which in turn impacted upon current methods of conflict. Camouflage can be understood as

²⁴ Head, L. (2007) Cultural ecology: the problematic human and the terms of engagement, *Progress in Human Geography* 31(6) p.837.

a means of visual warfare both in human and biological conflict, and the techniques of modern military camouflage were observed in the naturalist's fieldwork *before* they were reworked for the battlefields of twentieth-century conflict. This transfer of knowledge from nature through science and into the military raises new questions about how to conceive of human engagements with nature. Yet, just as Castree explains, WWII can be understood as a turning point in academic geography and its approach to the study of nature-society relations;²⁵ as a moment when many academic geographers who had served in the military during the war increasingly held the 'belief that precision, measurement and rationality were virtues to be aspired to'.²⁶ These changes, Castree argues, bolstered geography's intellectual standing and led, at least in part, to the abandonment of studying human-environment relations.²⁷

The precedence afforded to the separation between nature and society has a longer history than disciplinary shifts which characterised the post-war era. Philo echoes Latour in that the division of nature and society lies 'at the heart of Western rationality' and has helped to construct simplified perceptions of identity and difference.²⁸ Similarly, Whatmore describes the 'binary impulse' permeating the geographical imagination in relation to the 'social/natural', resting upon the premise that the world has been constructed according to 'magnetic polarities of the 'natural' and the 'cultural''.²⁹ When viewed through this lens, Castree explains that every worldly phenomena is imbued with socially constructed knowledges which are accepted as legitimate, and therefore social categorisations often unquestioningly and unexamined become 'reality'.³⁰ This framing of nature-society relations has unavoidably affected understandings of what is perceived to be 'natural'.

Elden emphasises how a consequence of this binary separation is that nonhuman animal life 'is determined by the measure of, and in opposition to the human'.³¹ The divide between society and nature has worked to position the nonhuman animal as lacking; constructed negatively in relation to the human. Barnett argues that nonhuman animal geographies here entail an 'othering', organised in spatialised ways 'around tropes of here and there, inclusion

²⁵ Castree, N. (2011) Nature and Society. In Agnew, J. & Livingstone, D. (eds.) *The Sage Handbook of Geographical Knowledge*, p.290.

²⁶ Ibid.

²⁷ Ibid.

²⁸ Philo, C. (2005) Spacing Lives and Lively Spaces: Partial Remarks on Sarah Whatmore's *Hybrid Geographies*, *Antipode* 37 (4) p.825. See also Latour, B. (1993) *We have Never been Modern*.

²⁹ Whatmore, S. (2000) Heterogeneous geographies: Reimagining spaces of N/nature. In Cook, I. Crouch, D. Naylor, S. & Ryan, J. (eds.) *Cultural Turns/Geographical Turns: Perspectives on Cultural Geography*.

³⁰ Castree, N. (2005) *Nature: Key ideas in Geography*.

³¹ Elden, S. (2006) Heidegger's animals, *Continental Philosophy Review* 39 p.285.

and exclusion, presence and absence, in-place and out-of-place'.³² Comparably, Howell suggests that the reason humans have set themselves apart from animals is to assert a moral superiority.³³ This separation is based on 'essential criteria' from which meanings surrounding human and animal identities, and the places in which they are embedded, have been constructed. Howell employs Ingold's work on human animality to explain that this view of animality, including its perceived failings in comparison to humanity, has been reproduced throughout time: 'every generation has recreated its own view of animality as a deficiency in everything that we humans are uniquely supposed to have, including language, reason, intellect and moral conscience'.³⁴ Therefore, although society and nature have been fixed in a binary, it is evident that the categories 'nature', 'society' and 'animal' have altered spatially and temporally, the boundaries shifting in meaning to fit with societal and cultural contexts. Meanwhile, nonhumans who transgress the boundary between nature and society become matter out of place.

The realities of nature-society relations are too complex to fit within this neat divide, since breaches of the boundary between nature and society are continual - both intentionally and unintentionally. As Emel and Wolch explain, 'the frontier between civility and barbarity, culture and nature increasingly drifts, animal bodies flank the moving line. It is upon animal bodies that the struggle for naming what is human, what lies within the grasp of human agency, what is possible is taking place'.³⁵ Human engagement with nonhuman animals exemplifies this point, as Ingold shows, elaborating that humans have variously enrolled animals into their lives for sport, pets, sustenance and labour; and that people's 'ideas about animals, and attitudes towards them, are correspondingly every bit as variable as their ways of relating to one another'.³⁶ The enrolment of the nonhuman body in science, such as the study of biological camouflage, offers one insightful means to examine the diverse and at times conflicted relationship between human and nonhuman, nature and society.

³² Barnett, C. (2005) Ways of relating: hospitality and the acknowledgement of otherness, *Progress in Human Geography* 29 (1) p.7.

³³ Howell, S. (1996) Nature in culture or culture in nature? In Descola & Palsson (eds.) *Nature and Society: Anthropological Perspectives* pp.127-144.

³⁴ Ingold (1994) *What is an animal?* p.15.

³⁵ Emel, J. & Wolch, J. (1998) Witnessing the Animal Moment. In Wolch, J. & Emel, J. (eds.) *Animal Geographies: Place, Politics and Identity in the Nature-Culture Borderlands* p.19. See also Anderson, K. (1995) Culture and Nature at Adelaide Zoo: at the Frontiers of 'Human' Geography, *Transactions of the Institute of British Geographers* 20 (3) pp.275-294.

³⁶ Ingold, T. (1994) op cit. p.1.

The place of nature in science

White takes the space of the laboratory as a means of investigating constructions of animal identities in Victorian Britain.³⁷ With the rise of modern science and disciplines such as biology and physiology, the Victorian period saw the laboratory as a key site for human/nonhuman interaction, a highly regulated space where ‘all manner of creatures, from single-celled organisms to mammals, resided together with a growing array of instruments of observation, manipulation and measurement’.³⁸ Frogs in particular were a staple for dissectors’ experimentation; their soft fleshy bodies reduced to little more than examples of mechanisation, becoming ‘indistinguishable from machines’,³⁹ while scientific books and manuals ‘virtually erased animal subjects from the scene of experiments’.⁴⁰ As White demonstrates, frogs were no longer animals in and of themselves; instead, they were part instrument, provoking little emotional engagement during their very close relationship with the scientists who worked upon them. From this example, it is evident that nonhuman animals were allowed into the human sphere of the laboratory, but they were to be compliant and controlled. White nonetheless then complicates this perspective by drawing attention to other instances and other nonhuman bodies in science which have provoked very different responses. During the same period as the frog was splayed upon the laboratory bench, there were calls to exempt dogs and cats from scientific experimentation because they were thought akin to members of the household. White reveals that the invitation from science for nonhuman animals to breach the boundary between nature and society was extended for differing purposes, and to differing degrees dependent upon the role bestowed upon different species of nonhuman life and the varying spaces where they were to be encountered and engaged.

Studies into biological camouflage in the late-nineteenth and early-twentieth centuries were, due to the visual specifics of the science in relation to local environments, necessarily a scientific practice requiring immersion for humans and nonhuman animals in the natural world. Observations made in the field were vital to emerging knowledge about the techniques of adaptive coloration and pattern perception. Studying camouflage fieldwork therefore offers a different scientific space than the laboratory, namely the field, thus prompting the dichotomised relation of nature and society to be further disrupted. Tracing camouflage’s journey from the naturalist’s fieldsite into the modern battlefield not only reveals how

³⁷ White, P. (2005) The Experimental Animal in Victorian Britain. In Datson, L. & Mittman, G (eds.) *Thinking with animals: New Perspectives on Anthropomorphism* pp. 59-82.

³⁸ Ibid p.60.

³⁹ Ibid p.62.

⁴⁰ Ibid p.63.

indistinct categories of nature and society can be in practice, it also offers the possibility to study lively encounters which unavoidably enlisted the agency of both human and nonhuman animals.

ANIMAL GEOGRAPHIES

Many different species of animals and insects were closely studied by the scientist intrigued by biological camouflage, by the artist attracted to the visual intricacies of nature and the military strategist concerned with concealing military intentions. From peacocks to partridges, leopards to lapwings, moths to mackerel, each species offered a different perspective on the complexities and employment of form, colour and pattern that held potential interest for scientific, artistic and military knowledges. Thus, camouflage as studied in nature required an entangling of human and nonhuman animals' lives and knowledges, necessitating an intimate knowledge of animals' relationships with their environments, their geographies. Philo states that in academic geography there has been a 'tendency either to overlook nonhuman "living things" altogether, or to investigate them only insofar as they have an impact upon the lives of human beings'.⁴¹ This view is shared by others,⁴² who discuss how animals have often been subsumed into larger discussions about the environment, appearing merely as 'biotic elements of ecological systems, available for human use'.⁴³ In recent years, the cultural turn has brought new potentials for animal studies in geography. Castree describes how the 'cultural turn' extended the scope of what could be considered culture by eroding analytical divisions that 'for too long imprisoned [culture] in a discrete ontological space';⁴⁴ and so increasingly inventive conceptual spaces and methods have seen 'cultural' researchers striving to get closer to nonhumans lives and experiences.⁴⁵ In this sense not only have the social sciences and humanities attempted to include the 'other', by enmeshing nature with society, but nonhuman

⁴¹ Philo, C. (1995) Animals, geography, and the city: notes on inclusions and exclusions, *Environment and Planning D: Society and Space* 13 (6) pp.655-681.

⁴² See Emel, J. Wilbert, C. & Wolch, J. (2003) Animal Geographies *Society and Animals* 11 (1) pp.68-74

⁴³ Wolch, J., Emel, J., & Wilbert, C. (2003) Reanimating Cultural Geography. In Anderson, K. Domosh, M. Pile, P. Whatmore, S. and Thrift, N. (eds.) *Handbook of Cultural Geography* p.188.

⁴⁴ Castree, N. (2003) Geographies of Nature in the Making. In Anderson, K. Domosh, M. Pile, S. & Thrift, N (eds.) *The Handbook for Cultural Geography* p.171.

⁴⁵ Hinchliffe, S., Kearnes, M., Degen, M. & Whatmore, S. (2005) Urban wild things: a cosmopolitical experiment, *Environment and Planning D* 23 (5) pp.643-658; Lorimer, H. (2006) Herding memories of humans and animals, *Environment and Planning D: Society and Space* 24 (4) pp.497-518; Whatmore, S. (2002) *Hybrid Geographies: Natures Cultures Spaces*.

animals have entered into the discourse on marginalisation, enabling the unequal power relations between human and nonhuman animals to be explored.⁴⁶

Thus, current work on animal geography has emerged in response to increased concerns regarding environmental degradation, such as habitat loss, and is linked to the rethinking of a more inclusive culture.⁴⁷ By examining animals lives through their particular ‘spatial narratives’, Jones has attended to why issues concerning animals have a particular resonance within geography.⁴⁸ He explains that animals’ lives are embodied and practised across scales and times, which can vary incredibly from humans and other nonhumans, and yet these ‘narratives of becoming’⁴⁹ intersect in numerous ways with human becoming. As he describes it, ‘animal geographies suffuse through ‘social spaces’ in many strange, beautiful, and mostly unregarded ways’.⁵⁰ In similar fashion, the naturalists and zoologists who studied biological camouflage had to pay close attention to the unregarded elements of animal lives; and to learn the diverse ways in which nonhuman animals interacted with each other. In so doing, these scientists themselves participated in a ‘social’ engagement across human and multiple nonhuman lives. This connection between human and nonhuman, and the scientific knowledge produced by the engagement, offers a means to explore intersecting spatial narratives of human and nonhuman. As Daston explains, we can only ever understand other minds subjectively, but the persistence ‘to draw closer’⁵¹ has led to studies that acknowledge presence and closeness between human and nonhuman.

For example, Despret demonstrates how an interpretation of the human/nonhuman interface can develop our understanding of the ways that humans and animals commune, here in the case study of ‘Hans the Clever Horse’ who managed to communicate with humans.⁵² As she explains, although Hans could not actually count or spell (as his human audiences interpreted his hoof taps to be), he was cleverer still as he could read bodies and also ‘make human bodies be moved and be affected, and move and affect other beings and perform things without their owner’s knowledge’.⁵³ Hans offered his human questioners the possibility to become a new

⁴⁶ Philo, C. (1995) op cit.

⁴⁷ Wolch, J. (2003) op cit.

⁴⁸ Jones, O. (unpublished) Close to: on embodied, emplaced (and thus) geographical becomings of animals

⁴⁹ Ibid p.4.

⁵⁰ Ibid p.10.

⁵¹ Daston, L. (2005) Intelligences, angelic, animal, human. In Daston, L. & Mittman, G. (eds.) *Thinking with animals: New Perspectives on Anthropomorphism* p.14.

⁵² Despret, V. (2004) The Body We Care For: Figures of Anthropro-zoo-genesis, *Body & Society* 10 (4) pp. 111-134. The horse read the muscle movements his human questioners were ‘communicating’ without conscious will. These minute muscle twitches unwittingly transmitted from humans to horse enabled the latter to mimic the muscles rhythms by the tapping of a hoof, therefore answering the question correctly.

⁵³ Ibid p.113.

entity, to become horse-like, just as they offered him the chance to be 'with human'. Bodies changed throughout the encounter in subtle (minute muscle movements) and obvious (hoof tapping) ways. Despret describes this process as 'making available',⁵⁴ whereby the body - human or nonhuman animal - can be affected and induced to be different, which in turn can affect and induce difference in other bodies.

In a similar vein, Hinchliffe and Whatmore also complicate boundaries between human and nonhuman animal in more overtly spatial ways in their study of nonhuman animals in urban areas, revealing that places are rarely solely human. In particular, they discover the resourcefulness for change in nonhuman animal behaviour, and the importance of spatial embodiment, through deep-investigating the ecology of Birmingham.⁵⁵ They argue that urban theory has taken humans to be the only active participants in the urban world, which has ignored the true heterogeneous make-up of the cityscape.⁵⁶ Hinchliffe and Whatmore reveal that nonhuman animals do not 'just exist in cities, precariously clinging to the towers and edifices of modernity, but potentially shape and are shaped by their urban relations'.⁵⁷ Nonhuman presences and realities means that urban life is more-than-human, and that the city can be mapped by humans and others in numerous and entangled ways. By mapping these spaces, which mingle human and nonhuman, a geographical sensibility can allow a sighting of increasingly complex sites of co-dwelling. Through interpretations of human and nonhuman animals relations, the world becomes a messier and more unstable place; a perspective that has great potential to complicate a narrative of military camouflage as a history of technological development, now recast as a history of the transformation of knowledges, relations and bodies. By tracing the technology's biological roots to encounters and relational experiences between scientists and nonhuman animals in the field, camouflage also becomes a shared historical geography of the embodied practices of protection and preservation performed by human and nonhuman alike.

Furthermore, Lorimer has considered how engaging creatively with relations between animals, humans and machines can allow for the possibility of invigorating work into 'the cutting edge worlds of biotechnology, genopolitics, and transspecies hybridity'.⁵⁸ This inclusion of technology within animal geographies additionally blurs distinctions between nature and

⁵⁴ Ibid p.114.

⁵⁵ Hinchliffe, S. & Whatmore, S. (2006) Living Cities: Towards a Politics of Conviviality, *Science as Culture* 15 (2) pp.123-138.

⁵⁶ See also Wolch, J. West, K. Gaines, T. (1995) Transspecies Urban Theory, *Environment and Planning D* 13 (6) pp.735-760.

⁵⁷ Ibid p.127.

⁵⁸ Lorimer, H. (2006) op cit. p.517. See also Thrift, N. (2005) From born to made: technology, biology and space, *Transaction of the Institute of British Geographers* 30 (4) pp.463-476.

society, but also boundaries between once distinct bodies, relations and knowledges. To this end, Lestrel *et al* argue that, ‘ultimately the study of these hybrid communities should not even be limited to human/animal relations but extended to include artefacts with a more or less ambiguous standing’.⁵⁹ This idea renders the term ‘nonhuman’ increasingly inclusive, whereby objects and technology can also be incorporated. Therefore, a narrative of military camouflage attending to the sites of biological camouflage inquiry have the potential to provide a history to contemporary interminglings of humans and nonhumans, animals *and* technologies, and therefore the historical geography of camouflage’s science is worthy of consideration.

HISTORICAL GEOGRAPHIES OF SCIENCE

Until recently, the importance of local scientific spaces - the geographies of scientific knowledge production - have been erased from the history of science, partly because the validity of scientific knowledge depended upon its supposed universal (placeless) applicability.⁶⁰ It is now understood that science is not a ‘triumph over place’ and does not produce pristine and objective knowledge.⁶¹ Increasingly it can be agreed that science, like any other form of knowledge is culturally and socially produced, ‘shaped by the local environments in which its practitioners carry out their tasks’.⁶² Geographers have begun to appreciate the need to attend to the local environments of science, considering how these spaces shape and influence knowledge production.⁶³ In particular, the ‘performance spaces of science’⁶⁴ have captured the interest of geographers: from expedition and exploration⁶⁵ to the museum⁶⁶ and the laboratory;⁶⁷ from public lectures⁶⁸ to books⁶⁹ and scientific societies,⁷⁰ the

⁵⁹ Lestrel, D. Brunois, F. & Gaunet, F. (2006) Etho-ethnology and ethno-ethology, *Social Science Information* 45 (2) p.156.

⁶⁰ Livingstone, D. (2003) *Putting Science in its Place: Geographies of Scientific Knowledge*. See also Haraway, D. (1988) Situated Knowledges: The Science Question in Feminism and the Privilege of Partial Perspective, *Feminist Studies* 14 (3) pp.575-599.

⁶¹ Naylor, S. (2005) Introduction: historical geographies of science – places, contexts and cartographies, *British Society for the History of Science* 38 pp.1-12.

⁶² Naylor, S.(2005) op cit.

⁶³ Ibid.

⁶⁴ Livingstone, D. (2005) Text, talk and testimony: geographical reflections on scientific habits. An afterword, *British Journal for the History of Science*, 38 (1) pp.93-100.

⁶⁵ Driver, F. (2001) *Geography Militant: Cultures of Exploration and Empire*; Driver, F. & Jones, L. (2009) *Hidden Histories of Exploration*.

⁶⁶ Alberti (2009) *Nature and culture: Objects, disciplines and the Manchester Museum* & Naylor S. (2002), The field, the museum and the lecture hall: the spaces of natural history in Victorian Cornwall, *Transactions of the Institute of British Geographers* 27(4) pp. 494-513.

⁶⁷ Kohler, R. (2002) *Landscapes and Labsapes, Exploring the Lab-Field Border in Biology* & White, P. (2005) op cit.

sites, spaces and flows of scientific knowledge practice, production and consumption have come under increased scrutiny. The task has been to shed light on aspects of science's lifeworld,⁷¹ which will, 'enable us to work with a more realistic picture of geographical knowledge as a cultural product and a political resource, without assuming that scientific knowledge is unique and therefore somehow immune from such forces'.⁷²

Moreover, Livingstone importantly acknowledges the role of the historical geographer as a stage manager of facts, whose performance in the 'contemporary scene'⁷³ enrolls these facts in the continual shaping and reshaping of understandings and interpretations of scientific knowledge. The selection of Dr Hugh Cott as the pivot for a historical study on camouflage allows for an examination of the spatial elements contributing to the scientific development of the technology, and also demonstrates how a single scientific biography can contribute to wider ongoing discussions on knowledge production and scientific practice. Due to the nature of Cott's science this led him to spend much time immersed in many different environs in order to appreciate and understand the full spectrum of biological camouflage techniques. Cott's scientific practice was, arguably, profoundly geographical and deeply rooted in the Darwinian tradition of close observation and field study, derived from an embodied engagement with the natural environment. Further to this entwinement of the history of biology and geography, Stoddart has hinted at the threads of commonality between natural history and geographical study during the early-twentieth century, explaining that, historically, geographical research has explicitly and implicitly looked to biology, in particular Darwin, for inspiration.⁷⁴ Elsewhere in the history of the disciplinary tradition, Lorimer argues that we need to 're-inhabit' fieldwork practices so that scientific knowledge is understood to be both spatialised and social.⁷⁵ These spaces of data collection and analyses, and the people operating within them, are worthy of geographic investigation in researching the historical development of science.

⁶⁸ Keighren, I. (2008) Giving voice to geography: popular lectures and the diffusion of knowledge, *Scottish Geographical Journal* 124 (2-3) pp. 198–203; Naylor, S. (2002) The field, the museum and the lecture hall: the spaces of natural history in Victorian Cornwall, *Transactions of the Institute of British Geographers* 27(4) pp. 494-513.

⁶⁹ Keighren, I.(2006) Bringing geography to the book: charting the reception of Influences of geographic environment. *Transactions of the Institute of British Geographers* 31(4) pp.525–540 & Keighren, I. (2010) *Bringing Geography to Book: Ellen Semple and the Reception of Geographical Knowledge*.

⁷⁰ Finnegan, D. (2009) *Natural History Societies and Civic Culture in Victorian Scotland*; Withers, C. (2010), *Geography and Science in Britain, 1831-1939: a study of the British Association for the Advancement of Science*.

⁷¹ Naylor, S. (2002) op cit. p.2

⁷² Livingstone, D. (1992) *The Geographical Tradition: Episodes in the History of a Contested Enterprise*.

⁷³ Ibid.

⁷⁴ Stoddart, D. (1966) Darwin's impact on geography, *Annals of the Association of American Geographers* 56 pp.683-698.

⁷⁵ Lorimer, H. (2003a) The geographical field course as active archive, *Cultural Geographies* 10 (3) p.279.

This field science and natural history raise cultural questions surrounding the practice of science. As Jardine, Secord and Spary explain, the history of natural history has often been a narrative of linear progress, ‘culminating in the present state of the subject’.⁷⁶ The field is a place where culture is enacted, constructed, contested and renegotiated. Richards states that fieldsites can encourage contradictory views; ‘being more than the place where knowledge in particular fields is formulated and tested; it is also where the personal and the professional collide’.⁷⁷ To this Baker reveals the field to be a creative and sensual space for the production of scientific knowledge, a space where imaginative possibility fuels scientific inquiry: ‘The Earth can speak to us semiotically just as great books speak to us. We can converse in these inquiries if only we possess the imagination to do so’.⁷⁸ Baker explains that fieldwork requires attentive listening and imagination to decipher the systems and processes which work across the Earth, describing the interaction of the scientist with ‘the systems of signs or clues encountered in the natural world’.⁷⁹ This embodied consideration of fieldwork as a place for conversing with the Earth offers an appealing way to scrutinise Cott’s scientific practice. Cott’s science was highly visual and aesthetically particular, and his chief scientific method was observing the natural world, reading the bodies, patterns and colours of animals in order to elucidate their means of camouflage, requiring him to conduct numerous expeditions to different continents and to a variety of environments and ecologies

In considering the history of field science, the rhetoric of adventure dominates the general perception of this scientific practice, conjuring the well-rehearsed image of a site where the heroic, privileged, white male uncovers the workings of nature. But geographical research has now explored the numerous ways in which the field is a contested space, one engaging and undermining issues of gender, class and the personal. The field was not only where structures of society were reproduced, it was also a flexible space where boundaries could be destabilised.⁸⁰ For example, Blunt in her study on Mary Kingsley, a nineteenth century travel writer and scientist, reveal that the traditionally masculine space of the field could successfully and visibly be occupied by women.⁸¹ The *where* of scientific practice could at times be liberating, the colonies in particular affording women space for practising science. Finnegan

⁷⁶ Jardine, E. Secord, J & Spary, E. (1996) *Cultures of Natural History*.

⁷⁷ Richards, K. (2011) The Field. In Agnew, J. & Livingstone, D.(eds.) *The Sage Handbook of Geographical Knowledge*, p.54.

⁷⁸ Baker, V. (1999) Conversing with the Earth: The Geological Approach to Understanding, In Frodeman, R.. (ed.) *Earth Matters: Philosophy and Geology*, p.8.

⁷⁹ Baker, V. (2004) Fieldwork. In Harrison, S. Pile, S. & Thrift, N. (eds.) *Patterned Ground: Entanglements of Nature and Culture*, pp.136-137.

⁸⁰ Livingstone, D. (2003) op cit.

⁸¹ Blunt, A. (1994) Mapping Authorship and Authority: Reading Mary Kingsley’s Landscape Descriptions. In Blunt, A. & Rose, G. (eds.) *Writing Women and Space: Colonial and Postcolonial Geographies*, pp51-72.

draws attention to the connections between the practice of science and wider cultural, societal and national endeavours which entwined the liberating with the restrictive. By exploring the Victorian period, when disciplined and instructive leisure activities with an emphasis on self-improvement were promoted, Finnegan reveals the close relations between civic duty and participation in natural history activities *across* the classes.⁸² Thus, field science not only reconfirmed and reconfigured gender roles, but it could also blur boundaries between class, amateur and professional, and contribute to definitions of national identity. Local scientific practices were enrolled into and operated ‘within larger networks of intellectual cultures’,⁸³ as an enfolding of scalar networks of knowledge production, but as seen in this list the seemingly mundane and local spaces of science clearly do deserve attention.

Focusing specifically on the local and small elements of fieldwork, in order to elucidate wider insight into scientific knowledge, has been the aim of Lorimer and Spedding. They consider how the historical geographies of science ‘present scientific knowledge and practice as phenomena that are made in place and shaped by spatial relations’.⁸⁴ By attending to the field diary records, themselves integral to the practical and mundane routines of scientific practice, the material and personal processes of science are acknowledged. Such a focus broadens the range of activities considered to comprise science in the field, making it possible to dwell in place and on the personal, which reveals that the location of field science is ‘distributed and relational’ and comprises many intersecting geographies and histories.⁸⁵ Lorimer and Spedding duly explore how to ‘get behind the science itself is to explore the underlying motives and actions that make it happen’.⁸⁶ The history of science through an appreciation of the unremarkable can arguably enable researchers to capture the character of science in the making.

The study of camouflage fieldwork told through the biography of Cott, including consideration of his routine field practices, can circumnavigate the pitfalls of scientific heroism, and instead, investigate the field as an ambiguous and fluid space of scientific practice and performance. It will focus on the personal and small narrative,⁸⁷ but still offering insight into grander narratives of knowledge production, not at least because Cott’s fieldwork

⁸² Finnegan, D. (2005 & 2009) op cit.

⁸³ Naylor, S. (2002) op cit. p. 510.

⁸⁴ Lorimer, H. & Spedding, N. (2005) Locating field science: a geographical family expedition to Glen Roy, Scotland, *British Society for the History of Science* 38 p.33. By focusing on the historical geographies of a family holiday and field trip in 1952 to Glen Roy to study the Parallel Roads they reinsert the personal back into the practice of field science through close study of the field notebook.

⁸⁵ Ibid p.30.

⁸⁶ Ibid p.13.

⁸⁷ Similarly to the work of Blunt, A. (1994) op cit and Finnegan, D (2005) op cit.

was configured by, and intermingled with, scientific and artistic endeavour, as well as, geopolitics and militarism. Here, then, the fieldsite will be considered a complex, plural space of science, art and militarism, which in time were altered by the work in the field and the violence of the battlefield. This orientation will draw on Kirsch's study of the buffer zone surrounding the US Department of Energy's Savannah River Site as both a political and ecologically experimental landscape, which reveals how sites of scientific practice can be constituted through broader geopolitical constructions.⁸⁸ Toal explains that battlefields can provide a stimulus to 'new forms of geographic intelligence',⁸⁹ and Cott's scientific biography, intersecting with military camouflage's life-path, reveals that militarised spaces, such as the desert in WWII, required military practitioners to utilise traditional geographical knowledge to understand the battlefield environment. In turn, battle altered understandings of these places, as new, novel hybrid camouflage technologies were developed.

HYBRID GEOGRAPHIES

Hybridity initially entered into geographical literature through postcolonial theory⁹⁰ and Homi Bhabha in particular who considered how the colonial encounter could be better described through the 'hybridity of identities and the 'ambivalence' of colonial discourse, than through notions of fixed and stable identities'.⁹¹ Hybridity became a means to challenge essentialist ideologies in postcolonial theory, and has since been embraced in other areas of geographic inquiry. Whatmore has explored hybridity at the human/nonhuman interface, which enmeshes human and nonhuman life with the technological. Hybrid geography is described as 'the performance of multiple lived worlds, weaving threads of meaning and matter through the assemblage of mutually constituting subjects and patterns of association that compromise the distinction between the "human" and the "nonhuman"'.⁹² She deploys it as a means to ally 'the business of thinking spaces – to that of thinking through the body'.⁹³ Whatmore goes on to explain that geographers are well placed here, because the discipline 'stakes its identity on

⁸⁸ Kirsch, S. (2007) Ecologists and the experimental landscape: the nature of science at the US Department of Energy's Savannah River Site, *Cultural Geographies* 14 pp.485-510.

⁸⁹ Toal, G.(2011) Battlefield. In Agnew, J. & Livingstone, D. (eds.) *The Sage Handbook of Geographical Knowledge*, p.220.

⁹⁰ The origins of the term hybridity, lie in biology and specifically the botanical notion of 'hybridity' (the splicing of one plant onto the root of another) prior to its employment in postcolonial theory. This origin of the term in the biological world brings another interesting layer to the term and adds resonance with its use in this study into a more-than-human study of camouflage.

⁹¹ Loomba, A.(2005) *Colonialism/Postcolonialism* p.92.

⁹² Ibid p.59.

⁹³ Ibid p.3.

attending to the interface between social and natural worlds'.⁹⁴ This geographic approach to understanding human/nonhuman relations aims to produce a more performative conception of life, allowing humans to realise the 'wild on the inside'⁹⁵ and to be open to the connectivity between humans and nonhumans.

Ambitious in its aim to disrupt boundaries by embracing a fluid sense of spatial and temporal relations, Hinchliffe warns that studies in hybridity should be clear that the process of becoming 'hybrid' does not begin with two or more distinct and discrete objects or knowledges. He duly states that; 'it helps to jettison the notion that forms are a result of the combination of already existing and completely self-contained kinds'.⁹⁶ Instead, he argues that hybrid geographies are the mobilisation of hybrids which are continually relational, as spatial and temporal products always partaking in making of histories and geographies.⁹⁷ Therefore, within this research project, whilst acknowledging that military camouflage was a hybrid of human and nonhuman animal, as well as of technology, of science, art and militarism, these categories are not considered themselves to be somehow fixed and pure prior to this engagement. Instead, military camouflage can be understood as causing a rupture between boundaries of active, fluid objects and knowledges, in an effort to produce a new military practice, aesthetic and technology.

Whatmore celebrates such 'unstable and porous borders between human, animal and machine',⁹⁸ and in particular draws attention to how technology is increasingly pervading all sectors of life. Technology, it is argued, makes still hazier distinctions at the human/nonhuman interface, where life is at once human, nonhuman and technological. In a similar vein, Thrift considers how to understand this process, which has changed the 'background of being',⁹⁹ as these human-animal-machine hybrids make problematic the categories of human/nonhuman and living/inert. Rather he claims, human, animal and thing have combined to become something which is not explicitly one, yet not independent of any. Thrift talks not in terms of human or nonhuman, but instead through a world that contains a series of 'intelligencings', which are not the property of an organism but 'of the organism and its environment'.¹⁰⁰ These 'intelligencings' and their extended geographies have the potential to be mapped. Such a map takes not just geography at its centre, but also biology and

⁹⁴ Whatmore, S. (2002) op cit. p.2.

⁹⁵ Ibid p.5.

⁹⁶ Hinchliffe, S. (2007) *Geographies of Nature* p.51.

⁹⁷ Ibid.

⁹⁸ Whatmore, S. (2002) op cit. p. 59.

⁹⁹ Thrift, N. (2005) op cit. p.464.

¹⁰⁰ Ibid.

technology, and therefore the spatialities of organisms and things need to be reimagined not as sealed entities, but as bodies that are spatially extended. To illustrate this spatial imagining of intelligencings, Thrift draws upon the early twentieth-century zoologist Uexkull's term '*umwelten*', which was used to describe how there is no one unitary world, and nor is there a single sense of time and space: 'The fly, the dragonfly, and the bee that we observe flying next to us on a sunny day do not move in the same world as the one in which we observe them, nor do they share with us - or with each other - the same time and space'.¹⁰¹ Yet, as Agamben explains with the example of the symbiotic relationship between the spider and the fly, although their worlds do not communicate directly, they are still 'perfectly in tune'.¹⁰² Each species has its own geography, and its own history (of variant life spans and memories) yet they exist in relation and attuned to one another, creating a hugely complex web of worlds and lives. In addition to this engagement, Thrift considers the role of technology as porous within this process, embodying how life flows through its veins, continually changing shape and direction. Thrift's world of 'intelligencings' is appealing to this study of military camouflage, as it offers the means to describe the multiple actors and enmeshed knowledges enrolled in the development of British military camouflage by threading material culture through with the embodied presences of humans and nonhumans influential in shaping the technology.

Lulka, nonetheless argues that much of the work in geography on hybridity is 'still embedded with a residual humanism',¹⁰³ and expresses instead a desire to 're-hijack hybridity from the social sciences and take it back across town to another disciplinary village' in order to form more productive links between geography and the biological sciences. Research into the development of modern military camouflage could have the capacity to allow hybridity to reside in both the social and biological sciences, because it is an inquiry into the history and geography of scientific and military practice and knowledge production, as well as considering how they have interconnected, which depends upon social, cultural and political contexts. Furthermore, like Thrift suggests, technology has a vital role within this history as camouflage was configured through and as a technological innovation.

¹⁰¹ Agamben, G. (2002) *The Open: Animal and Man*, p.40.

¹⁰² Ibid p.42.

¹⁰³ Lulka, D. (2009) The residual humanism of hybridity: retaining a sense of the earth, *Transactions of the Institute of British Geographers*, 34 (3) p.379.

TECHNOLOGY

Within this narrative of military camouflage, technology has an important dual role. First, scientific technology translated the practice of biological camouflage knowledge production and experimentation into military camouflage. Second, this history of military camouflage is a biography of a hybrid technology enrolled into military practice during the early to mid-twentieth century. In particular, camouflage as technology deserves closer attention for this study, and it is useful to look at Haraway's 'cyborg' as a means to consider the place of technology in the world and its role in producing the world.¹⁰⁴ Haraway describes the 'cyborg' as a hybrid of machine and organism,¹⁰⁵ suggesting that cyborgs are 'creatures simultaneously animal and machine who populate worlds ambiguously natural and crafted'.¹⁰⁶ In a similar vein, Braun explains that, as societies increasingly become technologised, humans and nonhumans, including technology, should not be seen as existing independently from one another because these distinctions have been increasingly blurred.¹⁰⁷ Thus, identities are 'made and re-made in response to new technologies, new scientific expertise, public consultation, funding crises, institutional expansion and reform'.¹⁰⁸

Technology today is not only changing how the human body is perceived, but has also impacted upon the nonhuman animal, for example GIS trackers on migratory birds. Thrift argues that animals have not simply been influenced by technology, but rather the two are in a process of mutual change. For example, since the 1970s writers of software have drawn on biological models to shape programmes and biological metaphors litter our language for software.¹⁰⁹ Technology not only creates hybrids, then, but is itself a hybrid because it demonstrates a 'certain kind of animality'¹¹⁰ and creates an informational ecology. Camouflage as a technology, can be argued to have grown from a history of animality, speaking directly to the history of modern military camouflage, as it enrolled knowledge on the nonhuman animal

¹⁰⁴ Haraway, D. (1991) *Simians, Cyborgs and Women: The Reinvention of Nature*.

¹⁰⁵ Ibid.

¹⁰⁶ Ibid p.191.

¹⁰⁷ Braun, B. (2005) Writing Geographies of Hope, *Antipode* p.834. To this Parry and Gere describe how these emerging, new artefacts are 'simultaneously corporeal and informational, biological technological, natural and artificial'. Parry, B. & Gere, C. (2006) Contested Bodies: Property Models and the Commodification of Human Biological Artefacts, *Science as Culture* 15 (2) pp.139-140.

¹⁰⁸ Ibid p.141. This sentiment is shared by White and Wilbert who comment, 'knowledges of our worlds are ever more technologically mediated, produced, enacted and contested', and the result, they conclude, is that people are seeing themselves entangled in a milieu of technology, nature, science, ecology, urbanity and culture. White, D. & Wilbert, C. (2006) Introduction: Technonatural Time-Spaces, *Science as Culture* 15 (2) pp. 95-104.

¹⁰⁹ Thrift, N. (2004) Electric Animals; New Models of Everyday Life? *Cultural Studies* 18 pp.461-482.

¹¹⁰ Ibid p.462. Thrift suggests that this entwinement between animal and technology can be attributed to our increasing curiosity about the animal, as it is replaced by new forms of technology. Even as far back as the early nineteenth century, when steam engines took the role of the horse drawn carriage, images of horses were placed on tramcars to secure a sense of continuity.

body, specifically through its aesthetic use of colour and patterning, for the battlefield. Modern military camouflage in the two world wars arguably comprises an historical genesis to the current nature of these lively technologies, at once biological, technological, natural and artificial, camouflage diffused throughout militarised spaces, unsettling boundaries between object and background, and blending bodies and technologies. The biography of military camouflage, therefore, is a project historicising the roots of contemporary engagements with, use of and knowledge about technology.

Anderson *et al* demonstrate another way in which a biography of military camouflage can contribute to geographical engagements with technology, through exploring the sites of experimentation as spaces of anticipatory hope. As camouflage was reworked and innovated in WWII, it was in a continual process of becoming, positioned 'between dream and reality, and suspended between the future and the present'.¹¹¹ Recently, developments in nano-technoscience, as an emerging science and technology, have been of interest to geographers. Anderson has considered questions of anticipatory knowledge and the hopes that are placed in such technological experimentations and materialities. He explains that such emerging technologies are animated by hopes about their potential impacts on science and human life, rendering nano-technologies unstable and inherently affective.¹¹² However, Kearnes reveals that currently there is a mismatch between nanotechnology's dizzying potential and the more mundane reality of what so far has been achieved.¹¹³ This attention to the disjuncture between hope and reality could resonate with the dynamic affective influence of camouflage's development, as well as its active effect on bodies and in battlefields. Such a narrative, which includes the potential of and hopes for military camouflage, could illuminate military motivations behind such technological development, reflecting upon the networks of knowledge and practice that shape the nature and execution of technology and violence in conflict.

ACTOR NETWORK THEORY

So far it is evident that military camouflage's journey - from nature, through scientific engagements with nonhuman animals, to a hybrid knowledge encompassing technological engagements and innovations - has enrolled diverse actors, knowledges and relations. Latour,

¹¹¹ Anderson, B. Kearnes, M & Doubleday, R. (2007) Geographies of nano-technoscience, *Area* 39 (2) p.139.

¹¹² Anderson, B. (2007) Hope for nanotechnology: anticipatory knowledge and the governance of affect, *Area* 39 (2) pp.156-165.

¹¹³ Kearnes, M. (2007) (Re) making matter: design and selection, *Area* 39 (2) pp.143-155.

through Actor Network Theory (ANT), therefore offers a means to map these relations by ‘paying close attention to the details of scientific practice’.¹¹⁴ This approach started as a study into the laboratory, which has traditionally been seen to epitomise human command over the environment, a space devoid of subjectivity and emotion where the scientist controls, manipulates and exposes nature’s universal truths. Latour and Woolgar’s laboratory ethnography re-adjusted the gaze of the social scientist, revealing laboratories as sites full of complex and heterogeneous socio-spatial relations between humans and nonhumans, and thus offering an alternative social approach for researching the history of scientific practice.¹¹⁵ As Law describes, ANT is concerned with how science is *practised*, a study of science-in-action.¹¹⁶

By the mid-1990s, ANT was increasingly influencing human geography, in part because of its appealing spatial dimension: ‘Spaces become multiple and perhaps multi-topological for *networks* imply the possibility of proximity or distance in an informational as well as a geographical sense’.¹¹⁷ Hetherington and Law explain that in ANT, ‘networks are complex arrangements of space with no clear centre or dependence upon hierarchical relations of difference’;¹¹⁸ and thus, as Murdoch reveals, ‘ANT seeks to analyse how social *and* material processes (subjects, objects and relations) become seamlessly entwined within a complex set of associations’.¹¹⁹ The effect of this concept of network is to remove humans from the centre of studies, with human presences and relations described as equally dynamic as the presence of nonhumans. Latour explains that ANT is a project in inclusion, aiming to ‘extend the list and modify the shapes and figures of those assembled as participants and to design a way to make them act as a durable whole’.¹²⁰ Consequently, ANT has created the possibility for innovative and dynamic approaches with studies of science and technology, chiefly focusing on all of the components that make up a network.

¹¹⁴ Latour, B. (1999) *Pandora’s Hope: Essays on the Reality of Science Studies*, p.24.

¹¹⁵ ANT’s approach disrupted boundaries and circumnavigated the ‘Science Wars’, which, as Demeritt explains, entailed a tension between scientific realism and social constructivism that led to a stark division between belief in absolute scientific objectivity and the argument that scientific knowledge was the product solely of social processes. Demeritt, D. (1996) Social theory and the reconstruction of science and geography, *Transactions of the Institute of British Geographers* 21 (3) pp.484-503.

¹¹⁶ Law, J. (2001) Situating Technoscience: an Inquiry into Spatialities, *Environment and Planning D* 19 (5) pp.609-621.

¹¹⁷ Harada, T. (2000) Space, Materials, and the ‘Social’: in the aftermath of a disaster, *Environment and Planning D* 18 (2) p.209.

¹¹⁸ Hetherington, K. & Law, J. (2000) Guest editorial, *Environment and Planning D* 18 (2) p.127.

¹¹⁹ Murdoch, J. (1998) The Spaces of Actor-Network Theory, *Geoforum* 29 (4) p.359.

¹²⁰ Latour, B. (2005) *Reassembling the Social: An introduction to Actor-Network-Theory* p.72. As Murdoch explains the reason that objects or nonhumans can be considered as active entities within relations and networks is because they are never neutral and it is the very mixing and coming together of human and nonhuman that allows a network to function. Murdoch, J. (1998) op cit.

However, there is a fear that ANT can be a process of ‘flattening everything out and producing a world where everything is related to everything else, with no tools for differentiating matters of importance’.¹²¹ Further, Hardwick argues, from a Marxist perspective, that the flattening of human and nonhuman actors detracts from concerns over human rights which can be exploited by certain networks and the power relations they articulate.¹²² It is argued that ANT produces a ‘spatial fetishism’¹²³ whereby describing networks becomes more important than attempting to understand the effects these networks have on those (in particular humans) that are connected within them. ANT, hence, needs to be utilised cautiously and with sensitivity, particularly in a project that is engaging with issues of violence and conflict.

Even so, ANT does offer a means for articulating the complexity and dynamism of military camouflage, and researchers have effectively utilised it to engage with networks of humans, nonhuman animals and technologies. Hinchliffe *et al*, apply ANT notions of actors and network spaces during their investigation into the presence or absence of water voles within Birmingham city boundaries. They discuss that through the process of ‘water vole writing’,¹²⁴ human and nonhuman were ‘woven together’.¹²⁵ The researchers describe how tracking water vole traces, as well as the use of field guides, changed and trained their own bodies and therefore, their experiences in the field. These experiences were then circulated beyond place in texts, not in a process of representation but of diagramming¹²⁶, with the aim of ‘knowing around water voles’,¹²⁷ and learning ‘the ability to listen to the vagueness of the epistemic thing’.¹²⁸ This allowed Hinchliffe *et al* to appreciate the differences that exist *within* species and employed this as a means to engage politically with particular types of environmentally damaging land uses.¹²⁹ Such a scientific and politically enmeshed approach offers the possibility to be sensitive to myriad and heterogeneous nonhumans, achieving a nuanced

¹²¹ Hinchliffe, S. (2007), *op cit.* p.55. See also Laurier, E. & Philo, C. (1999), X-morphising: review essay of Bruno Latour’s *Aramis, or the Love of Technology*, *Environment and Planning A* 31 (2) pp.1047-1071.

¹²² Hartwick, E. (2000) Towards a geographical politics of consumption, *Environment and Planning A* 32, pp. 1177 – 1192.

¹²³ *Ibid* p.1182.

¹²⁴ ‘Water vole writing’ is deciphered from the water vole traces, such as footprints. Hinchliffe, S. et al (2005) *op cit.* p.647.

¹²⁵ *Ibid.*

¹²⁶ ‘Diagramming’ refers to the process of becoming alert to water vole presences or absences without defining water voles or their spaces. Through this approach the water voles became more real to the researchers and the researchers found they presented themselves differently to the water voles and the fieldsites they were studying. The researchers suggested this allowed a way of knowing without being representational so species, such as water voles can become things worthy of debate and politics. Hinchliffe, S. et al (2005) *op cit* p.648 & p.655.

¹²⁷ *Ibid* p.651.

¹²⁸ *Ibid* p.645.

¹²⁹ See also Jones, O. (2000), (Un)ethical geographies of human-non-human relations: encounters, collectives and spaces. In Philo, C. & Wilbert, C. (eds.) *Animal Spaces, Beastly Places: New geographies of human-animal relations* pp.268-291.

incorporation of nonhumans. In particular, it is the notion of 'knowing around rather than a knowledge of',¹³⁰ with an emphasis on description rather than explanation, that allows ANT to include, reveal, deconstruct and describe. This is appealing for a history of military camouflage which entangles the human and nonhuman, the latter entraining animals and technology, and also acknowledges the politics and consequences of conflict and violence.

Another appeal of ANT is that it acknowledges how human and nonhuman lives, networks and relations cannot be fixed, even when they fail. This is demonstrated by Law's inquiry into the process of problem solving which had to be undertaken by engineers in search of the cause of the explosion of the Olympus 22R aeroengine. Law employed ANT to disrupt 'obvious' notions about the relational effects of size and scale in influencing technological developments.¹³¹ Law reveals that 'small variations led to very large consequences',¹³² since the explosion had, it was discovered, been caused by a single component of a complex technology failing. The failing of one small mechanism within a complex assemblage in turn affected not only the material function of the aeroengine, but also the administrative, political and economic elements of the aeroengine network, which were all brought into previously unforeseen relations. Law's article suggests that a history of military camouflage can be traced not only through its biological and technical lives, but also as a biography mediated through a complex network of political, economic, administrative and material relations.

In an inquiry into the cultural-historical geographies of camouflage, ANT should be considered as offering a partially influential approach. It proposes a way to acknowledge and describe the complex network that emerged in the development of camouflage as a military technology in Britain throughout the two world wars. Latour started his work on ANT in laboratories, but realised that this 'tool' (ANT) could also be applied to scientific work done on field expeditions.¹³³ This study will also be looking at science in the field, which at times was experienced as a site-scientific investigation and also military engagement. Latour reminds us, by attending to the networks, practices and circulations of science and its actors, that science does not produce a 'realist painting' which is an exact copy of the world. Instead, through 'successive stages' science links us 'to an aligned, transformed and constructed world';¹³⁴ here, is a constructed world of military conflict within which scientific, and other, knowledges are investigated.

¹³⁰ Hinchliffe, S. (2005) op cit. p.653.

¹³¹ Law, J. (2000) Transitivity, *Environment and Planning D* 18 (2) pp.133-148.

¹³² Ibid p.143.

¹³³ Latour, B. (1999) op cit. pp.24-79.

¹³⁴ Ibid p.78-79.

MILITARY GEOGRAPHIES

Biological camouflage made its way from the natural world into science through field observations, and through technological engagement was then placed into the battlefields of twentieth-century warfare. As such, the biography of camouflage is also a narrative of military geographies. Of late, there has been an increased attention in geographical studies to issues of conflict, violence and warfare. Flint states that 'war, whether interstate or guerrilla, is a political process that has as its purpose the control of territory to enable subsequent projections of power'.¹³⁵ War is inherently geographical as it is the articulation or enactment of power through and across space. Bateman extends this idea by suggesting that 'the effect of the military ... stems not from military action itself ... but from its other activities. Plainly, much time, effort and finance is expended on preparing for the event of war',¹³⁶ such as the development of defences and military training activities. Therefore, militarism becomes a pervasive presence not only within battlefields, or during conflict, but in diverse explicit and implicit ways is diffused throughout culture and society, thus deserving of study and scrutiny.

Significant advances in the study of militarism in geography have been made by Woodward, who has compelled military geography to become visible because of this pervasive presence of the military. She explains that the control which the military exerts is 'essentially geographical, in that it is expressed in and constitutive of space, place and landscape'.¹³⁷ Importantly, she suggests that a critical military geography would recognise the significance of armed conflict, and further 'look beyond it for what this tells us about the wider geographical imprint of militarism and military activities'.¹³⁸ Such a critical approach takes militarism 'in its varied guises, examine its influence, pays attention to the conditions which make war and state-sanctioned violence possible'.¹³⁹ The focus is not just on descriptions of military control and authority, but also on explanations for the roots and its mechanisms of maintenance. This project, Woodward suggests, calls for a better understanding of the socio-materialism of military activities, the material presences and the social relations created across space, which also in turn produce space. To achieve this end, it is proposed that greater attention should be given to the small and seemingly mundane aspects of military activities, such as the supply

¹³⁵ Flint, C. (2005) *The Geography of War and Peace; From death camps to diplomats*, p.6.

¹³⁶ Bateman, M. (1987) *The Geography of Defence – An Overview*. In Bateman, M. & Riley, R. (eds.) *The Geography of Defence* p.3.

¹³⁷ Woodward, R. (2004) *Military Geographies*, p.3.

¹³⁸ Woodward, R. (2005) *From Military Geography to militarism's geographies: disciplinary engagements with the geographies of militarism and military activities*, *Progress in Human Geography* 29 (6) p.720.

¹³⁹ Woodward, R. (2004) *op cit*. p.159.

chains or deployment of weapons.¹⁴⁰ Investigating the ordinary and prosaic holds the possibility of making militarism more visceral and tangible, and therefore critically and meaningfully engaging with issues of violence, conflict, and power.

A study which takes at its centre the cultural-historical geography of military camouflage could historicise contemporary military systems and, by considering the seemingly unremarkable, explore the materialities of a military technology that worked both to constrain and to enable violence. A critical military geography of camouflage must investigate the ambiguity of the seemingly unremarkable and interrogate a technology which has, in large measure, been regarded as defensive, and so relatively unproblematic, in order to reveal the surprisingly offensive dimensions of camouflage which emerged, in particular, during WWII.

Geography and WWII

As an arena of conflict WWII has drawn the attention of geographers because it had lasting consequences for the discipline. Farish explains that in WWII, regional intelligence took supremacy in the militarisation of geographical knowledge; as a period when ‘every place, and every type of place, possessed a potential wartime purpose’,¹⁴¹ and so the earth’s surface, and ways of understanding and knowing it, became assimilated with geopolitics and militarism. In an effort to achieve this outcome, networks of research were established to get to grips with knowing the world as divided into regions.¹⁴²

Barnes looks at the role of geographers in Research and Analysis (R&A) in the US Office of Strategic Services (OSS),¹⁴³ describing the OSS as a collective of ‘boffins and mad scientists, [whose] weapons were not the normal armoury of war, but included Pavlovian theories of stimulus and response, [and] Zipf’s Principles of Least Effort’.¹⁴⁴ In WWII, the OSS saw a great expansion of military directed R&A as it employed various scientists, social scientists included, in the production of military knowledges, to gather and interpret sources that would be of use for tactical military purposes. Barnes claims that this crew of ‘mad scientists’ can be understood through an engagement with Latour’s writings on scientific knowledge and practice, as a means of understanding ‘scientific knowledge as a fragile accomplishment,

¹⁴⁰ Woodward, R. (2005) op cit. p.731.

¹⁴¹ Farish, M. (2010) *The Contours of America’s Cold War*, p.51.

¹⁴² Ibid.

¹⁴³ Barnes, T. (2006) Geographical Intelligence: American geographers and research and analysis in the Office of Strategic Services 1941-1945, *Journal of Historical Geography*, 32 (1) pp.149-168.

¹⁴⁴ Ibid p.149.

always the result of persuading various agents, both human and non-human, to work in concert'.¹⁴⁵ He describes how the documents of the R&A fixed meaning in material form, comprising 'immutable mobiles' circulating geographically to the battalions and officers who required certain place specific information.¹⁴⁶ This claim engages with Latour's notion of 'action at a distance', since the documents produced were disseminated from the 'centre of calculation' through a network of outposts and by different actors, human and nonhuman (such as historians and travelogues); all reflecting Woodward's call to engage with the material so as to get at the processes and systems of the military. The parallel between Barnes' work on the OSS and this study into British military camouflage is clear, for both are narratives that involve 'mad scientists' enrolled into military institutions in order to establish novel networks of knowledge for better executing warfare.

Furthermore, by specifically considering the American geographers employed by the military during WWII, Barnes notes how their geographical training was applied to war and the consequences in altering future geographical research. He notes that WWII helped to 'propel the discipline to a different form',¹⁴⁷ specifically towards spatial science. These changes could be seen by the 1950s when geography began to emphasise multi-disciplinary collaboration, adopting problem focused research through numerical methods and mathematical analysis. WWII drew on geographical knowledge and this engagement between geography and militarism transformed geographical research, empirically and theoretically, altering the trajectory and character of the discipline. The proposal must of course be that other disciplines and professions employed in WWII must also have been altered by this engagement. WWII camouflage offers a means to explore this notion because as well as drawing on disciplines such as zoology, it also enrolled visual artists, raising the 'spectre' of war-led alteration extending beyond the academy and across culture.

Farish has shown from examining the workings of the Ethnographic Board, and its use of geographical research that the R&A branch of the OSS was not the only military employer of geographers during WWII in America.¹⁴⁸ When facing WWII, America felt underprepared by its limited understanding of the diversity of the globe, and therefore set up an interdisciplinary group of scholars to dissect and disseminate information about the world's places and peoples. Thus, geographical knowledge in the Ethnographic Board became tied to

¹⁴⁵ Ibid p.151.

¹⁴⁶ Ibid.

¹⁴⁷ Ibid p.162.

¹⁴⁸ Farish, M. (2005) Archiving Areas: The Ethnographic Board of the Second World War, *Annals of the Association of American Geographers* 93(1) pp.663-679.

technologies and methods of military activities and geopolitics, and the OSS archives become filled with texts, narratives and photographs, created in wartime clearinghouses, which were 'both physical and imaginative'.¹⁴⁹ From these archives, the world was systemised, generalised and carved up into neat geopolitical bundles. Farish acknowledges that the geographical activities of WWII echo earlier imperial projects, but they also reveal that, in the history of geography, this period can be seen as 'a discourse of discovery and a more material practice of spatial articulation'.¹⁵⁰ Such a critical history of geography and militarism can explore the roots of contemporary global spatial knowledges, and extend this overview to include an influence upon other areas of the sciences, social sciences and even the humanities within this process. The history of modern military camouflage can clearly add an insightful contribution to this historicising project. Additionally, it contributes a particular British perspective, tracing moments and spaces in WWII of convergence and diversion in military and geographical knowledge production, which to date has not been explored in detail. The militarism of geographical knowledge is worthy of study because an informed military spatial knowledge did not end with WWII, but continued to be shaped by the geopolitics of the Cold War, as did its military practitioners.

Geography and the Cold War

Barnes and Farish have also considered the relationship between geography and the military during the Cold War.¹⁵¹ Involvement in the 'military-industrial-academic complex' incurred changes for the discipline - academics returned to their institutions with newly acquired skills and contacts, which influenced both their future work and their further involvement in the militarism of Cold War knowledge - and also changes in the military and knowledge.¹⁵² Barnes excavates the place of geography in this complex by examining the changes that took place in geography from WWII into the Cold War, also marking a shift in the long relationship between geography and the military.¹⁵³ Instead of utilising existing geographical knowledge, the military began directing a new kind of quantitative model-driven knowledge. Barnes

¹⁴⁹ Ibid p.664.

¹⁵⁰ Ibid p.665. This has been studied in more depth by Hudson, B. (1977) *The New Geography and the New Imperialism: 1870-1918*, *Antipode* 9 (2) pp.12-19 & Driver, F. (2000) op cit.

¹⁵¹ Barnes, T. & Farish, M. (2006) *Between Regions: Science, Militarism, and American Geography from World War to Cold War*, *Annals of the Association of American Geographers* 94 (4) pp.807-826.

¹⁵² Pickering, A. (1995a) *The Mangle of Practice: Time, Agency and Science* & Pickering, A. (1995b), op cit. The 'mangle' is a dynamic collaborative process, which mutually alters all components and actors involved in the production of new cyborg objects or sciences during warfare.

¹⁵³ Barnes, T. (2008a) *Geography's Underworld: The Military-Industrial complex, mathematical modelling and the quantitative revolution*, *Geoforum* 39 (1) pp.3-16.

focuses on the military and academic careers of three different geographers - Waldo Tobler, William Garrison and Arthur Strahler - to reveal the mutual influence that the 'cyborg' entity of the military-industrial-academic complex had on a diverse group of people, objects, disciplines and technologies not previously enrolled in such multi-disciplinary work. Through these small individual stories, Barnes describes the complex network of relations that contributed to the 'quantitative revolution' that altered geography from the early 1950s. He states that the 'discipline's very centre was displaced, shifted and realigned; mangled in part because of its connections to the military'.¹⁵⁴ This focus on the individual experiences of geographers in order to elucidate wider trends in the discipline reveals the potential for employing scientific biographies, such as Cott's, to gain a broader insight into shifts in knowledge production.

This biographical narrative of the quantitative revolution within geography has not gone without critique. Johnston *et al* claim that Barnes' portrayal of this process is simplistic, finding the biographical engagement to be too narrow to be reflective of the whole process. They suggest that 'individuals were freely deciding to reorient their discipline' but this 'seems submerged in a more deterministic argument that, in effect, geographers had no alternative',¹⁵⁵ claiming that Barnes' depiction makes smooth a much messier process. But, Barnes argues, through the frame of the mangle, which rejects mono-causality, he has enrolled the lives' of individuals to show the complex and multiple conditions (including the social, cultural and political, as well as the geographical) that shaped the life and work of the geographers involved.¹⁵⁶ He explains that the Cold War should not be interpreted as 'sealed and static, a black box imbued with causal force',¹⁵⁷ but always changing and becoming, an assemblage that Barnes privileges because of its pervasive influence throughout the world in the 1950s and 1960s. The use of Cott as the pivot to the study of British military camouflage is designed to sit within a biography of a technology that does not make a smooth or simplified its history. Similarly to Barnes, this project employs the tool of biography to complicate, and to acknowledge, the lasting effects of conflicts on diverse knowledges, utilising Pickering's mangle and ANT along the way to trace a technology's life, cross-stitching with a single human life.

¹⁵⁴ Barnes, T. (2005) op cit. p.15.

¹⁵⁵ Johnston, R. Fairbrother, M. Hayes, D. Hoare, T & Jones, K. (2008) The Cold War and geography's quantitative revolution: Some messy reflections on Barnes' geographical underworld, *Geoforum* 39 (6) p.1802.

¹⁵⁶ Barnes, T. (2008b) Stuck in a mess (again): A response to Johnston, Fairbrother, Hayes, Hoare and Jones *Geoforum* 39 (6) pp.1807-1810

¹⁵⁷ Ibid p.1808.

THE MANGLE AND CAMOUFLAGE

'The mangle' is a concept of worth to this inquiry into the cultural-historical geography of camouflage. Pickering describes the analysis of scientific practice in warfare as 'the mangle' and extends this notion towards an understanding of the reciprocal production of science, technology and society. *Mangling* is a process where disciplines are brought into an interlinked heterogeneous assemblage during warfare to develop new 'cyborg' sciences and objects. These 'cyborgs' have the effect of materially, socially and conceptually transforming all components and people who are engaged in the process. Pickering argues that the mangle offers a decentred perspective concerned with doing things in the world, which he describes as being in a process of becoming through the '*dance of human and nonhuman agency*'.¹⁵⁸ Such an approach to the history of science acknowledges the master narratives of scientific development as problematic, and suggests that the project should be attending to the opened and continually changing nature of science: 'it seems to me that nothing is a fixed or reliable cause in history'.¹⁵⁹ Therefore, Pickering's attention is concentrated on the material, conceptual, technical, social and cultural as being always 'open-endedly transformable into the future',¹⁶⁰ which allows historians of science to articulate science as a continual flow of becoming and change.¹⁶¹ This conception of science in 'the mangle' as performative leads it to be considered as a multiple, fragmented and heterogeneous practice, which draws on ANT's symmetrical relationship between human and nonhuman agency, as a means to describe networks that produce scientific knowledge and objects. The mangle also engages with Haraway's work on the 'cyborg' to suggest that the history of science should be written as the 'situated, heterogeneous couplings of the human and the nonhuman in their visible performativity'.¹⁶² In particular, Pickering's research focuses on WWII, when both material and social transformative effects on all actors were increased due to the interlinked diverse assemblage of the sciences and the military.

Pickering suggests that there were four areas for the formation of science associated with WWII that require consideration. First, how the expansion of 'big science' throughout WWII was resolutely multidisciplinary and necessitated the creation of new institutional spaces, such as the MIT Rad Lab, outside traditional disciplinary boundaries. Second, focus on the military

¹⁵⁸ Pickering, A. (2002) Cybernetics and the Mangle: Ashby, Beer and Pask, *Social Studies of Science* 32 (3) p.414. Italics are the author's own.

¹⁵⁹ Pickering, A. (1995b) op cit. p.2.

¹⁶⁰ Ibid. See also Massey, D. (2005) *For Space*. Massey draws attention to 'happenstance' and 'juxtaposition' as guarantors of the 'openness' of the future, which can be an alternative approach to studying space.

¹⁶¹ Pickering, A. (2008) New Ontologies. In Pickering A. & Guzik, K. (eds.) *The Mangle in Practice: Science, Society and Becoming* p.9.

¹⁶² Ibid p.5.

perspective of the ‘technoscientification’ of the military and its practices, which have led to contemporary ‘hi-tech’ warfare. Third, the setting up and sustaining of committees that were dedicated to the enfolded of civilian scientists, through firing imaginative dreams of future ‘cyborgs’, into the military during and after WWII. Finally, studying Operation Research (OR) as the spilling out of military enterprises into wider social, political and economic networks, which continue to influence the character of research and valued knowledge. These four projects stem from a concern to trace the evolution of the performance and assemblage of humans and nonhumans during WWII. As Pickering states, ‘it seems to me that a whole range of cyborg sciences were born in World War II, often taking specific cyborg objects as their surface of emergence’.¹⁶³

The idea of the mangle, however, is not unproblematic. Thomas has suggested that there is a need to reject the notion that disciplines and knowledges had a mutually coherent influence on one another.¹⁶⁴ He argues that there should be an understanding of scientific studies not as opposed to traditional military thinking. He uses the example of the British OR work on camouflage in WWII, which included reports detailing specific camouflage problems and suggesting paint schemes that could overcome these issues. Thomas states that the camouflage schemes suggested by the scientists in the OR could potentially have been independently developed by the military at their technical establishments.¹⁶⁵ He argues that the scientists involved in such investigations to solve military problems were part of a creative process in a military framework. This involvement did not necessarily result in there being a significant priority for scientific knowledge as scientists took on military methods of practice. Therefore, in framing the nature of military knowledge, Thomas suggests, it is unhelpful to discuss scientists’ contributions as successful on the grounds of whether or not they made the military more scientific, since as he explains, it was precisely the military which defined and informed scientific research.

Thomas is correct that researchers do indeed need to be cautious not to overstate the ‘cyborg’ sciences arising as a result of discrete forms of knowledges being brought into a mutually transformative relation. Consider the pre-history of the WWII military-industrial-academic complex: looking at WWI and back further still, there appears to have been over half a century

¹⁶³ Pickering, A, (1995a) op cit.pp.19-21.

¹⁶⁴ Thomas, W. (2007) The heuristics of war: scientific method and the founders of operations research, *The British Journal for the History of Science* 40 (2) pp.251-274.

¹⁶⁵ Ibid.

of prior merging and combining.¹⁶⁶ It is important to appreciate that scientists were required to operate differently in wartime experiments than they did in peacetime. That said, this claim can be complemented by considering how the military *also* had to operate differently; and surely this would indeed have been the case since the military was now employing the skills of people with whom they did not normally engage, not only scientists but also artists too. It is this aspect of ‘mangling’ which is most attractive for researching military camouflage, for it appreciates the multiplicities and plasticities of the knowledges and actors enmeshed in the hybrid assemblages and networks. The final critique of ‘Thomas’ interpretation of ‘the mangle’ is the example of camouflage upon which he draws. The suggestion that, through creative trial and error, the military technicians could have developed camouflage schemes effectively as multidisciplinary research groups is troublesome. The military *was* creative in looking to bring into its camouflage initiatives people from science and art with the skills recognised as necessary for camouflage innovation. The imperative for camouflage in the military lay beyond one framework of knowledge, even if it is accepted that each framework was never sealed or discrete: military camouflage necessitated plural and pliable knowledges.

In considering the aims of my own research on the development of systematic British military camouflage from its beginnings in WWI until the end of the Desert War, the framework of the mangle in discussing the long-term transformative effect on the scientists, artists and military departments involved makes space for the heterogeneity and multiplicity of experience to be explored. This biography of camouflage aims to interrogate the diverse knowledges, practices and skills involved here, and their entanglements in the production of camouflage, by paying particular attention to the sites of camouflage development, with the aim of exposing the lasting consequences for both military technology and the militarism of knowledge and culture. Therefore, forcing the technological and the biological, as well as the scientific, artistic and military, through the mangle, it is hoped that this project will historicise critical military studies that focus on late modern warfare and which are attending to the spectacular nature of *current* military technology and hardware.

¹⁶⁶ Hartcup, G. (1988) *The War of Invention: Science in the Great War, 1914-18* & Hartcup, G. (2000) *The Effects of Science on the Second World War*.

GEOGRAPHY, WAR AND TECHNOLOGY

The dawn of the twenty-first century marks a period of geopolitical uncertainty: as Flint comments, ‘the awareness of war among the general population of the Western World emerged after 9/11; perception rather than reality drives commentators to define the current period as one of conflict and not peace’.¹⁶⁷ One of the key changes visible between mid-twentieth century warfare and that of the emerging twenty-first is the huge and varied technological advance and development that has occurred. This section of my chapter focuses on research into contemporary warfare, by considering: first, the characteristics of the sites that have become battlespaces throughout the twentieth and into the twenty-first century; second, to consider how these sites are visualised and mediated through technology and imaginative geographies; and third, to examine in greater depth the impact of the aerial perspective on the construction and conduct of twenty-first century conflict. This focus on contemporary conflict will frame military camouflage as part of an ongoing and evolving relationship between technology, knowledge, geography and militarism which has influenced the prosecution of warfare, the production of knowledge and the militarism of spaces.

Militarised Sites

This study takes the desert as a key site transformed by military camouflage from a natural environment to a dangerous and deceptive battlefield. Farish has sought to consider how military knowledge has informed the geographies of areas and landscapes, with specific reference to the physical and imaginative construction of the Arctic in the Cold War.¹⁶⁸ The Arctic entered the Cold War imagination for two reasons. First, it was a frontier between North America and Russia, and so was an area with the potential threat of invasion, positioning the Arctic as a political and sovereign boundary where a heavy military presence could be justified. Second, a scientific presence was also required because the Arctic lacked a ‘systematic body of scientific data’,¹⁶⁹ and was considered a homogenous, empty space ideal for carrying out experiments requiring interdisciplinary research. As a result, the scientific and military projects that took place in the area during the Cold War were often inseparable.¹⁷⁰

¹⁶⁷ Flint, C. (2005) op cit. p.3.

¹⁶⁸ Farish, M. (2006) Frontier engineering; from the globe to the body in the Cold War Arctic, *The Canadian Geographer* 50 (2) pp.177-196. See also Powell, R. (2007) The rigours of an arctic experiment?: the precarious authority of field practices in the Canadian High Arctic, 1958 – 1970, *Environment and Planning A* 39 (8) pp.1794-1811.

¹⁶⁹ Farish, M. (2006) op cit. p.179.

¹⁷⁰ Doel, R. (2003) Constituting the Postwar Earth Sciences: The Military’s Influence on the Environmental Sciences in the USA after 1945, *Social Studies of Science* 33 (5) pp.635-666. Doel’s research bolsters the argument

Farish does not suggest that the military determined scientific research, but instead considers how the military enlisted scientists in an effort to control a landscape and thereby to further national security aims. This approach considers the Arctic as a flexible, changeable object of knowledge, where the multiple geographies of the region constructed during the Cold War were produced by the entanglement of military strategy and science. Farish gives the example of the Distant Early Warning (DEW) Line,¹⁷¹ explaining that it was the ‘*physical* presence, that gave the DEW Line imaginative significance as a political boundary’.¹⁷² The Line was a technological *and* moral border informing how the Arctic became to be known in the popular imagination, and Farish uses it to explain how human interaction with nature informs the knowledge and history that is created about a place or environment. This raises interesting questions about how the diverse camouflage practitioners who inhabited the desert in WWII conceived of and developed camouflage that would be effective within that particular environment, and how in turn that version of camouflage influenced how the desert came to be known.

Clayton has also explored how the military continually shapes and informs knowledge of habitats and landscapes throughout history, in his study on militant tropicality.¹⁷³ He explains that, for Westerners, the term ‘tropics’ generally invokes three images of ‘otherness’ that have been informed temporally by the shifting and plural discourse of tropicality. First, is the image of a tropical paradise; the second of primeval sultry, oppressive jungles; and the third of ‘capitalist and colonialist fantasy, rapacity and misadventure’.¹⁷⁴ Through these three images, constructed by travel narratives from empire and imperialism, the tropics have figured the tropics as ‘other’; positioned and constructed against the perceived normality of the temperate zone.

Clayton also reveals a fourth, more modern image of this zone that began to emerge in the 1950s: the image of the tropics as militant. This image is used to explain the post-war ‘militarisation of the tropical world within a force field of insurgency and counterinsurgency, armed struggle, wars of decolonisation and ideological conflict’;¹⁷⁵ for example, conflicts in Cuba, Kenya and Vietnam. Militant tropicality, as described by Clayton, shifts the focus from

that during the Cold War, thirst for such intelligence intensified, when there was the greatest expansion of military funds for geophysics.

¹⁷¹ The DEW line was an integrated chain of radars that could track incoming enemy planes.

¹⁷² Farish, M. (2006) p.184. Author’s own emphasis.

¹⁷³ Clayton, D. (2007) Militant tropicality: Decolonisation, the Cold War and the re-invention of the tropical world, 1950-1975, conference paper RGS-IBG Annual Conference, September 2007.

¹⁷⁴ Ibid p.1.

¹⁷⁵ Ibid p.2.

imperial powers to examine ‘the causes of revolutionary and socialist transformation’.¹⁷⁶ The military knowledge required for conflict in the tropics - the jungle environment and guerrilla warfare - was very different from the skills that had been developed through the experiences of warfare in WWII. Therefore, during the 1960s the US military returned to its WWII task of collecting, collating and interpreting geographic knowledge of previously largely unknown areas, in order to “Know your jungle enemy”.¹⁷⁷ The tropical environment was being (re)constructed in an archive of texts, photographs and personal experiences of the tropics. But, just as the US was writing a military geography of the tropics, so the revolutionary activists were constructing and practising an alternative, subversive geography. To this end, geography was a political and cultural tool of imperialism, but it was also a means to subvert and challenge power. An intimate knowledge of the geography of Cuba and other tropical environments could strengthen guerrilla warfare against a numerically and technologically superior enemy. ‘Militant Geography’, through this interpretation combining history, militarism, culture and politics, becomes a dynamic and complex understanding of military activities. WWII desert camouflage could also be examined through a similar lens as a militant ecology. Whereas, unlike the tropics, the Desert War was a symmetrical pitting of military against military, it too demanded an intimate knowledge of its geography in conflict. In comparable ways to Clayton’s study, the desert, through its encounter with military camouflage, becomes a site of subversion, as camouflage technologies responded to the desert terrain and moved from concealment to grander schemes of offensive deception in battle. Sites and surfaces were enrolled in the articulation and enactment of power, conflict, warfare and subversion. This encounter with the desert for the camoufleurs was a visual and multi-sensual engagement with landscape and militarism. Therefore, to understand the intentions and techniques of camouflage, it is important to understand the imaginative and technological visualisations of battlefields.

Militarised Visualisations

War, since the end of WWII, has been increasingly visualised as ‘unmoored’ and the military seemingly unfixed and mobile. New modes of warfare have led to a ‘new slipperiness’ in conflict, which has real and serious material consequences.¹⁷⁸ Graham describes that contemporary battlespaces, due to the role of evolving technology, physically and virtually,

¹⁷⁶ Ibid p.3.

¹⁷⁷ Ibid.

¹⁷⁸ Gregory, D. (2010a) War and Peace, *Transactions of the Institute of British Geographers* 35 (2) p.159.

now offer a vision that military matters encompass everything; ‘nothing lies outside of the battlespace, temporally or geographically’.¹⁷⁹ Smith has explored geography’s role in this technological revolution through the evolution of GIS software, which was comprehensively employed by the US military in the 1990-1991 Iraq war.¹⁸⁰ He examines how media and GIS technologies have allowed the global public to become ‘video voyeurs’¹⁸¹ of violence, and suggesting technologies have also enabled soldiers physically remote from the battlespace to become ‘deliriously detached’.¹⁸² In particular, Smith has discussed how the military has increasingly envisioned and known conflict from above, a shift influencing and being influenced by technological developments. He highlights that, as GIS technology produces a virtual image, this representation can substitute and replace reality, and therefore allow and enable those who are managing, directing and watching the denial of violence.

However, this persuasive coupling of distance from battle and detachment from killing has been complicated by Bourke, whose study into killing in twentieth-century warfare exposes that killing from a distance has, for the military, at times been problematic. In WWI, the British military feared that technological developments enabling fighting to take place over greater distances, such as artillery and sniping, would cause passivity amongst soldiers. Soldiers also found killing at a distance disconcerting, some even feeling that killing without witnessing the effects of their violence was an illegitimate method of battle, while others found it unnerving, like fighting phantoms.¹⁸³ A key point from which Bourke problematises issues of proximate/distant killing is that the anonymity allowed by technological innovation did not lead to less brutality in warfare,¹⁸⁴ something that can also be observed in the hi-tech conflict of the twenty-first century. Gregory discusses how current aerial technologies allow for meticulously detailed visualisations of the battlespace, but for the soldier operating them these technologies also work to disorientate and unnerve.¹⁸⁵ Whereas the WWI soldier only caught glimpses of their distant enemy, the modern enemy is far too visible, observed everywhere and yet elusive in material form, as another ‘target’ in death is proved to have been a misread civilian. Like the WWI soldier, the soldier of the twenty-first century with the most innovative technology is chasing phantoms. Visual anonymity, physical or imaginative, of the

¹⁷⁹ Graham, S. (2009) Cities as battlespace: The new military urbanism, *City*, 12, p.389.

¹⁸⁰ Smith, N. (1992) History and philosophy of geography: real wars, theory wars *Progress in Human Geography* 16 (2) pp.257-271.

¹⁸¹ Ibid p.257.

¹⁸² Ibid.

¹⁸³ Bourke, J. (1999) *An Intimate History of Killing: Face to Face Killing in 20th Century Warfare* pp.65-71.

¹⁸⁴ Ibid.

¹⁸⁵ Gregory, D. (2011a) Lines of descent online essay 8th November 2011 <http://www.opendemocracy.net>

enemy, coupled with technological development, still leads to brutality; and thus, whether distant or proximate, the effects of battle on the ground are the same.

In WWII it was the technology of the aeroplane and the camera, through the aerial photograph, that dominated how military strategists knew their battlefield and enemy. By studying camouflage, this consideration of the view from above as distanced and remote from the effects on the ground can in a small way be disrupted. Although camoufleurs worked to conceal from the air view, this subversion required a familiarity with the air view and also a close connection to the earthly experiences of war. Distance and proximity for the camoufleurs were not trapped in a binary, but were an entangled engagement with their battlefield. The WWII camoufleurs, who form the predominant focus of this study, have not been alone in operating with both grounded and aerial perceptions of warfare, for this relationship has continued to be important for the military in contemporary conflicts. For example, during recent conflicts such as the Iraq war, although GIS technologies allowed an increasing physical detachment from sites of action, some field commanders began to complain that knowing the geometry of the city was not a substitute for knowing its human geography.¹⁸⁶ The ways in which the military need to know and visualise their battlespaces seemingly need to be appreciated from both sky and ground.

It is this grounded interest in and promotion of cultural intelligence and cultural-centric warfare through non-kinetic modes of engagement that has seen a 'cultural turn' in late modern warfare, affecting conflicts in Afghanistan and Iraq,¹⁸⁷ and leading to suggestions that the social sciences could work with the military to supply knowledge of civilian populations and enemies. It is this cultural element of late-modern warfare that has been of interest to Gregory,¹⁸⁸ who explores how cultural knowledge has become essential to the military in order to combat insurgency and also to address the social and political concerns of the occupied and domestic populations. One such attempt at preparing the military for this 'cultural turn' has been the introduction of training centres, which are prefabricated villages and towns used to prepare troops for operations in urban areas of Iraq and Afghanistan. Like the camouflage training centres of WWII, these sites aim, visually and corporeally, to prepare the soldier for their theatre of war, with the focus not on combat but on interactive realism. Whereas the WWII camoufleur was being prepared to hide in another environment, the modern soldier is being prepared to engage openly with 'other' populations, and thus the 'settlements' are filled

¹⁸⁶Gregory, D.(2007a) 'The Rush to the intimate' Counterinsurgency and the cultural turn in late modern war, online essay <http://web.mac.com/derekgregory/iWeb/Site>.

¹⁸⁷ Ibid.

¹⁸⁸ Ibid.

with actors portraying civilians, aid workers, community leaders and journalists, so to help train military personnel in cultural interactions and negotiations. These villages exhibit the same physical features for Iraq and Afghanistan, so the two places in training are represented and performed as interchangeable. This led one journalist to comment during a visit to a site that the architecture was 'like an impressionist painting'.¹⁸⁹ Although the 'cultural turn' is meant to soften the image of the spaces of the Middle East, once seen as dangerous and queer, it is still represented as 'other' and the discourse of Orientalism is not abandoned, but rather reworked.¹⁹⁰ Even though the 'cultural turn' acknowledges the importance of understanding cultural practices and values, the latter are always to be located and visualised as spaces disconnected from modern Western society.¹⁹¹

Therefore, the visualisation of the battlespace that technology and knowledge have enabled, in WWII and continuing today, has important consequences for the character and conduct of warfare, whether in the seeming detachment enabled by long-distance and precision weapons or through demanding a return to earth in order to know the local geographies of battlespaces. In particular, by considering the role of camouflage in WWII, there is the potential to historicise and add insight to work on contemporary conflicts. Camouflage was developed in order to undermine and subvert the aerial gaze, and so it offers a distinct perspective on wider reflections upon the aerial visualisation of battlespaces.

Military Aerial Geographies

Military camouflage by WWII, as has been explained, was necessarily entwined with the aerial view of battlespaces, since it worked to trick the aerial gaze; the camoufleurs were hence skilled in both the grounded and untethered views of the earth's surface. Geographers too have of late extended their field of research into the vertical, prompting increasing attention to aerial geographies and three-dimensional space. Vertical airspace has become a site shaping new conceptualisations of space, territory, sovereignty, militarism and power. MacDonald *et al* have argued that geopolitics and visual culture are relational, and have emerged co-constitutively, suggesting that this relation is due to 'the fear of a rival gaze'.¹⁹² Just as the

¹⁸⁹ Ibid p.26.

¹⁹⁰ Ibid p.36.

¹⁹¹ Ibid. Another concern that Gregory has with the 'cultural turn' is its relation to American society. He explains that it has been developed explicitly in public, through news media and websites. This openness is a carefully constructed and staged space of visibility, used to obscure other violent, kinetic spaces of conflict. The 'cultural turn' here has not superseded air strikes; the two methods are employed concurrently.

¹⁹² MacDonald, F, Hughes, R. & Dodds, K. (2010) *Observant States: Geopolitics and Visual Culture*, p.2.

butterfly evolved the ocellus as a means of protection,¹⁹³ as will be discussed in a later chapter, the rival gaze is a crucial feature to understand and undermine in both biological and human warfare. These visual considerations have particular resonance for studies into aerial spaces, offering new perspectives to research considering the nature of military airspace and the geographies of bombing.¹⁹⁴

Adey explores the early twentieth-century history of the aerial gaze, explaining that air-mindedness was born in the 1920s because the technology of the aeroplane offered a new vision for a better life of ‘freedom and unfettered movement’.¹⁹⁵ The aeroplane became worked into a moral geography of citizenship and nationhood, as air-mindedness was fostered in different places through different means. For example, in Germany air-mindedness was expressed as military grandeur, whilst in American it was emblematic of social progress; and in Britain it became enrolled in cultural militarism through incorporation into the Air Scouts.¹⁹⁶ As Adey explains, air-mindedness was used by nation-states to produce ‘a body readied for performance’,¹⁹⁷ becoming a practice and a visceral corporeal experience. Thus, the aerial, aeroplane and conflict were connected in and across military and civilian space. Adey *et al* explain, geographers should focus attention not only on the ‘technically-infused production of airspace’, but also on the ‘relations between these technologies and the social practices which animate them’¹⁹⁸ (such as the air traffic controllers, flight crew and passengers). Inflecting this approach with a military aspect could give insight into the embodied practice of military airspaces, but also allow the means of subversion to be explored and brought into wider narratives of violence and conflict.

Attending to the military is an important consideration as, increasingly across the twentieth century, war was waged predominately by the aeroplane: ‘aeromobilities provide both promise

¹⁹³ As Johnston describes ‘anyone who one who has met the fierce gaze of an owl might well believe it could – like the Gorgon – turn flesh to stone’. Johnston, D. (2009), *Creaturely and Other Essays*, p.98.

¹⁹⁴ Adey, P. (2010a) *Aerial Life: Spaces, Mobilities, Affect*; Adey, P. (2010b) ‘Ten thousand lads with shining eyes are dreaming and their dreams are wings’; affect, air-mindedness and the birth of the aerial subject, *Cultural Geographies* 18(1) pp.63-89; Graham, S. (2004) Vertical Geopolitics: Baghdad and After, *Antipode* 36, pp.12-23; Gregory, D. (2007a) op cit; Gregory, D. (2007b) ‘In another time-zone, the bombs fall unsafely...’ Targets, civilian and late modern war, *Arab World Geographer* 9.pp.88-112; Gregory, D. (2010b) The World as Target, conference paper at Ordnance, University College Cork; Gregory, D. (2011b) Lines of descent: From Bomber County to the borderlands, conference paper at the AAG 2011; Hewitt, K. (1983) Place of Annihilation: Area Bombing and the Fate of Urban Places, *Annals of the Association of American Geographers* 73(2) pp. 257-284; Kaplan, C. (2006a) Mobility and war: the cosmic view of US ‘air power’, *Environment and Planning A* 38(2)pp.395-407; Kaplan, C. (2006b) Precision Targets: GPS and the Militarization of Consumer Identity,” *American Quarterly* 58 pp. 693-713; Williams, A. (2011a) Reconceptualising spaces of the air: performing the multiple spatialities of UK military airspaces, *Transactions of the Institute of British Geographers* 36 (2) pp.253-267.

¹⁹⁵ Adey, P. (2006) Airports and Air-mindedness, *Social and Cultural Geographies* 7 (3) p.346.

¹⁹⁶ Ibid.

¹⁹⁷ Adey, P. (2010b) op cit. p.83.

¹⁹⁸ Adey, P. Budd, L. & Hubbard, P. (2007) Flying lessons: exploring the social and cultural geographies of global air travel, *Progress in Human Geography* 31 (6) p775.

and possibility, as well as dread, terror, destruction (both urban and environmental) and death'.¹⁹⁹ The aerial view often invites an epistemological engagement, Haraway's 'god trick'²⁰⁰ and the imagined projection of power from above. Adey's work has sought to push beyond imaginative visualisations of the earth from on high, moving away from representations of artistic, visual and imaginative representations of aerial geographies, such as film, paintings, tourism, and maps. Instead, it is concerned with 'the practised and performative dimensions'²⁰¹ of aerial lives, asking how they, produce and transform aerial spaces through the aeroplane. This focus on practice and performance as a means to describe aerial spaces is appealing, since it offers a means to account for the embodied experience of WWII camoufleurs working with and against the aeroplane, and allows for a rich understanding of military airspace.

Williams explains how military airspaces are not simple paths, trails or corridors of air through which aircraft pass, but rather distinct and important spaces of performance, operating as the projection of power.²⁰² In essence, since WWI the military's power has 'stretched' into the vertical.²⁰³ Williams recognises that by treating military aerial spaces as control over space and by identifying the multiplicity of their performances, such as surveillance, defence and operations, space can be more rigorously understood as 'a volume rather than a flat bound plane'.²⁰⁴ The projection of power therefore extends horizontally across and through space following the path of flight, but also moving vertically along and through trajectories of ordnance and surveillance.²⁰⁵ From this interpretation, military airspaces become dense spaces to research, thick with the politics of power, control, and also, in relation to studying the history of military camouflage, resistance and subversion.

Such discussions about the aerial and the military, not only complicate notions of airspace, they also become discussions about mobility. Technological innovations have increased the speed and agility of incursions in capturing and targeting 'other' sovereign space or battlefield positions. Kaplan states that mobility 'is at the heart of modern warfare'.²⁰⁶ The aeroplane, which is at the centre of this mobility, 'is a technology of war produced directly by the state

¹⁹⁹ Adey, P. (2008), *Aeromobilities: Geographies, Subjects and Vision*, *Geography Compass* 2(5)p.1320.

²⁰⁰ Haraway, D. (1991) op cit. p.581.

²⁰¹ Adey, P. (2010a) op cit. p.9.

²⁰² Williams, A. (2011a) op cit.

²⁰³ Williams, A. (2010), *Flying the Flag: Pan American Airways and the Projection of US Power Across the Interwar Pacific*. In MacDonald, F. Hughes, R. & Dodds, K. (eds.) *Observant States: Geopolitics and Visual Culture*, p.84.

²⁰⁴ Ibid p.256.

²⁰⁵ Ibid.

²⁰⁶ Kaplan, C. (2006a) op cit.

and can only articulate nationalism. Its mobility is always violently conceived and executed'.²⁰⁷ Therefore, mobility is an execution of power which works to aid the military and devastate the target. This attention to technology, airspace, power and mobility, also requires alertness to the effects on the ground where the impact is felt. Fluri has explored the consequences of aerial technology in conflict on a smaller, more visceral scale by examining the very individual and corporeal impacts of bombing on bodies, particularly bodies of civilians.²⁰⁸ She explains that in the twenty-first century civil unrest and political violence has grown globally, with the effect that there has been an increase in the militarisation of daily life, creating an erasure of boundaries between 'public battlefield and private home front'.²⁰⁹ As global geopolitics are played out across the macro-scale, the result has been a devastating effect on the vulnerable, with the killing of bodies as corporeal sites, minute battlegrounds 'onto which violence is orchestrated'.²¹⁰ However, from reading inquiries into the spectacle of technology and Fluri's interrogation of the corporeal impact, there appears to be a disjuncture between the experience on the ground and the seeming potentials in the air. Embodied considerations of the impact of conflict on bodies and lives are vital to work on military technology and conflict, raising questions of accountability and consequences. Yet, too often it seems that these corporeal and emotional experiences (whether of civilian or combatant), the small and personal outcomes of conflict, are missing geographies in the histories of military technologies. A history of military camouflage narrated through the camoufleurs who operated through space to produce a technology both to save and kill, offers a means to make room for both the experience of the spectacle *and* the consequences of a technology to be told.

This discussion highlights a limitation to the current work on aerial geographies: the supremacy afforded to the air view. The vertical position has been configured as the dynamic, active site of power, and thus has been figured as the predominant or sole viewpoint in many studies. The ground has been presented as vulnerable and inert, whilst the air is mobile and commanding. So far, then, aerial geographies have been a top-down affair, but Adey has suggested that aerial geography is the connection of 'space, in its vertical and horizontal planes'.²¹¹ This reciprocity between earth and sky in the battlespace has not been explored in detail, and arguably the ground has been silenced, only allowed to 'voice' the shock and awe of

²⁰⁷ Ibid, p.406.

²⁰⁸ Fluri, J. (2011) Bodies, bombs and barricades: geographies of conflict and civilian (in)security, *Transactions of the Institute of British Geographers* 36 (2) pp.280-296.

²⁰⁹ Ibid p. 281.

²¹⁰ Ibid p.291.

²¹¹ Adey, P. (2010a) op cit. p.5.

the civilian. But the military is present on the ground as well as in the heavens, and the military has continued to evolve means of subverting the aerial gaze as well as perfecting it, a competitive tension within its own structure. The battlespace may be captured precisely from surveillance technology by the aerial, but the earth, even before human attempts at camouflaging targets, is too tricky to be easily read; indeed, the ground has always resisted and fooled the aerial gaze. As aerial technologies and the technologies of battlefield visualisations have evolved, so too has the ground response. Critical military geographies that attend to aerial spaces must also be importantly, geographies of deception, and they require attention being paid 'looking upwards' and downwards.²¹²

This links to another intervention that research into military camouflage can make to the literature on aerial geographies. It appears that to date these studies lack an historical engagement, in that, whilst aerial geographies has extended spatially, it appears to have temporally contracted its field of vision. Geographical research into the visualisation of battlespaces has tended to focus in the main on contemporary military air power, such as the USA military, and the battlefields of Afghanistan and Iraq. Although Adey²¹³ and Gregory²¹⁴ have traced the role and impact of the aeroplane in warfare to WWII, geographers appear to position aerial space as a consideration in conflict only from the mid-twentieth century. However, Cosgrove has examined the emergence of the concept of landscape in early modern Europe, considering the discovery of perspective which led to a new, Renaissance approach to the geometry of vision and its practical applications for space.²¹⁵ This application included calculating the movement in and dominion over terrestrial distance, such as the trajectory of cannon fire, and of defensive fortifications against this weaponry. This particular example shows the close relationship between terrestrial space and an early, emerging understanding of movement, angles and arcs through airspace. The example also, importantly, demonstrates an early appreciation that vision, space and a mixture of science and art could be enrolled in more sinister worldly engagements, such as the art of warfare. This begins to disclose the long history and inherent hybrid nature of military knowledge and conceptions of aerial space. By building upon and extending these ideas, a more in-depth, history of aerial geography, in part attending to military camouflage, could provide insight and context for studies into contemporary conflicts.

²¹² MacDonald, F. (2010) Perpendicular Sublime: Regarding Rocketry and the Cold War. In MacDonald, F, Hughes, R. & Dodds, K. (eds.) *Observant States: Geopolitics and Visual Culture*, p.267.

²¹³ Adey, P. (2010a&b) op cit.

²¹⁴ Gregory, D. (2010b & 2011a) op cit.

²¹⁵ Cosgrove, D. (1985), Prospect, perspective and the evolution of the landscape idea, *Transactions of the Institute of British Geographers* 10 (1) pp.45-62.

Additionally, much of the work on military aerial spaces is mediated through the technological, and the minutia of embodied experience has not until late been addressed.²¹⁶ Martin considers the ‘connective potential of fog to deepen the relationship between vision, distance and embodied immersion in aerial space.’²¹⁷ This takes the aerial space as having a material presence within which bodies have relational experiences: as Martin explains, ‘air is an enveloping medium’ with political and military significance.²¹⁸ ‘Verticality, and weightlessness in particular, are the critical paradigms for this movement away from the bounded earthiness of thick matter’,²¹⁹ for the aerial offers ‘an ontological alternative to the solidity of the earth’.²²⁰ But, at times the aerial is required to be both weightless *and* cloyed in the ‘earthiness of thick matter’,²²¹ and for WWII camoufleurs this was necessarily the case: indeed, to develop effective camouflage they were required to work through aerial *and* grounded perspectives, both as conceptual exercise and embodied experience. Martin states the potential which aerial space holds in being ‘a space of shared belonging. Such a space is one of immersion, of the comingling of disparate actors’.²²² A narrative of military camouflage, can hence be a story of immersion in space, both aerial and earthly, through the mingling of diverse actors, human, nonhuman and technological. In conflict, the aerial, as narrated in the history of camouflage and by the experiences of the WWII camoufleurs, is not only a political and military space, it also contributed to the collective identity of particular practitioners (bombers, intelligence gathers and camoufleurs), experienced as a space of tension, exhilaration, terror and coalesced efforts, knowledges and skills. The aerial is clearly still an embodied space, with the potential to be mapped in interesting and creative ways. Matless speaks of a ‘sky-situated knowledge’, where the ‘strange planar realism of the map’ corresponds to the experience of space.²²³ Here, mapping is enfolded with attention to the experiential dimension of life, together with the hybridity of space, knowledges, practices and skills. Camouflage begins to map out the complexities of military aerial engagements, exploring the entanglement of science, art, the technical and the corporeal in producing these engagements.

²¹⁶ See Williams, A. (2011b) Enabling persistent presence? Performing the embodied geopolitics of the Unmanned Aerial Vehicle assemblage, *Political Geography* 30 (7) pp.381-390.

²¹⁷ Martin, C. (2011) Fog-bound: aerial space and the elemental entanglements of body-with-world, *Environment and Planning D: Society and Space* 29 (3) p.454.

²¹⁸ Ibid p.457.

²¹⁹ Ibid.

²²⁰ Ibid p.458.

²²¹ Ibid.

²²² Ibid p.466.

²²³ Matless, D. (1999) The Uses of Cartographic Literacy: Mapping, Surveying and Citizenship in Twentieth Century Britain. In Cosgrove, D. (ed.) *Mappings*, p.212.

CAREFULLY OBSERVING CAMOUFLAGE IN NATURE AND IN WAR

In summary, camouflage, both biological and military, has been understood through a relationship between carefully staged visibility and methodical observation. Therefore, it is useful to begin to draw out links between the military, visibility, the art of observation and natural history. Woodward has examined the visibility of the military in the natural environment, for example through the military's use of protected landscapes, the contamination of sites from previous military uses and the increased use of training sites closer to home.²²⁴ The visibility of the military's land use has recently led to increased public scrutiny regarding the military's impact upon the environment. Woodward explains how this concern has shaped military environmental discourses, which 'give meaning to the natural environment and the activities of the military upon it'.²²⁵ This connection between military land ownership and their management of the environment has also been revealed by Helen Macdonald who has explored the entangled and embodied relationship of birdwatching and aircraft spotting in mid-twentieth century Britain. She suggests that during this period particular versions of ecological, national and social identity were conveyed through the practice of observation.²²⁶ The observer's body, MacDonald explains, was keenly trained, their eyes sharpened to recognise and identify, and it was a practice that produced change. The body of the bird was reconstructed through the interpretation made by the human eye and specific observation practices, which in turn reconstructed the body of the observer. Macdonald argues that amateur strategies of scientific observation, employing critical and scientific discriminatory faculties, were part-constitutive of particular versions of national and social identity. She draws a comparison between the new birdwatcher and aircraft observers, both of whom spatially and temporally tracked their subjects, passing on their collected data to professional bodies such as both the British Trust of Ornithology and the RAF, to be incorporated into national maps of bird or aircraft movements. The closeness of this strategic relationship was also revealed by the MoD during WWII, allowing birdwatchers access to restricted areas of the coast to carry out mass observations, the military was literally and figuratively naturalising its position as landowner and its use of the natural environment. Hence, during the 1940s, and in the midst of war, the activities of the birdwatcher and the aircraft observer seemed to connect various texts and technologies. Aircrafts also provoked feelings of national identity; aircraft were named after birds and the language of birdwatching

²²⁴ Woodward, R. (2001) Khaki Conservation: An Examination of Military Environmentalist Discourses in the British Army, *Journal of Rural Studies* 17 (2) pp.204-205.

²²⁵ Ibid p.214.

²²⁶ Macdonald, H. (2002) 'What makes you a scientist is the way you look at things': ornithology and the observer 1930-1955, *Studies in History and Philosophy of Biological and Biomedical Sciences* 33 pp.53-77.

field books made use of the visual language of aircraft recognition. The mechanical and the natural were becoming blurred, existing concurrently in the national space and in the national imagination, and mediated by the military's ownership of land and control over land use. The observer, whether of bird or plane, possessed a knowledgeable gaze, a visualisation of ecology that had authority, which influenced and was influenced by militarism.

Fraser MacDonald has also considered observation as a more-than-representational practice in his study of the British and American nuclear missile, the 'Corporal', seeking to fashion a more 'lively enquiry into the geopolitical'.²²⁷ MacDonald explores how observant practice is an embodied practice, which can complicate the 'ocularcentrism' of geopolitical discourse. This work not only connects with Helen MacDonald's, which similarly explores the links between militarism, observation and culture, and Woodward's work on the visibility of the military's presence close to home, but it also speaks to both Martin's embodied appreciation of space and work on the impact of successive technological innovations which inform military practice. MacDonald explains that:

Looking in military terms has become performative: to have a target in sight is to have already changed the relation between subject and object. The technology of optics, from the earliest field telescope to modern systems of radar and optoelectronic surveillance, can arguably be reduced to the triumph of speed and the defeat of proximity'.²²⁸

By considering the life history of 'Corporal', MacDonald suggests that there needs to be work exploring the relationship between geopolitics and visual culture which not only attends to objects of representation, such as images or texts, but which also attempts to question the character of observant practice. Camouflage technology can also be considered as a form of 'visual curiosity'²²⁹ that explores visual culture and observant practices. Camouflage also prompts a scholarly response that synthesises varied and diverse literature to examine the spatialities of how camouflage 'mangles' scientific, artistic and military knowledges and practices, as well as the sites of technological innovation.

Therefore, by tracing the roots and routes of military camouflage from the surfaces of animal skin, fur and feathers in the natural environment, through the porous boundaries of science revealed by engagements in field science, into the technological developments witnessed in battlespaces (earth and air) of twentieth-century conflicts, this chapter has attempted to gather a range of literature in an effort to configure a conceptual framework for a lively history of

²²⁷ MacDonald, F. (2006) Geopolitics and 'the vision thing': regarding Britain and America's first nuclear missile, *Transactions of the Institute of British Geographers* 31 (1) p.54.

²²⁸ Ibid p.57.

²²⁹ Ibid p.68.

military camouflage with a particularly spatial inflection. A critical military geography, entwined with the historical geography of science, human-animal relations and aerial geographies, utilising ANT and Pickering's 'mangle', has the potential to knot together the threads of this heterogeneous history of modern military camouflage. The hope is thereby to narrate a textured biography of a technology and aesthetic, and also to explore its lasting consequences for the militarism of knowledge. By focusing on social and spatial relations in the invention of modern military camouflage, and by considering the material and visual properties of camouflage, it is possible to explore the militarism of violence, technology, knowledge and space, heeding Woodward's call to link the military with its impacts upon civilian space. Importantly, a cultural geography of military camouflage can account for the many and conflicting selves (human and nonhuman) that contribute to the biography of camouflage. By exposing the concealed violence of camouflage, there is still space to acknowledge the surreal, amusing and extraordinary potentials that characterised military camouflage through its enrolment of artists, scientists and magicians in the military. Overall, this is a multi-biographical project attempting to hold a military technology to account, whilst reconciling the violence of conflict with the creative and personal endeavours of technological and intellectual innovation.

THE ABC OF CAMOUFLAGE: D-F

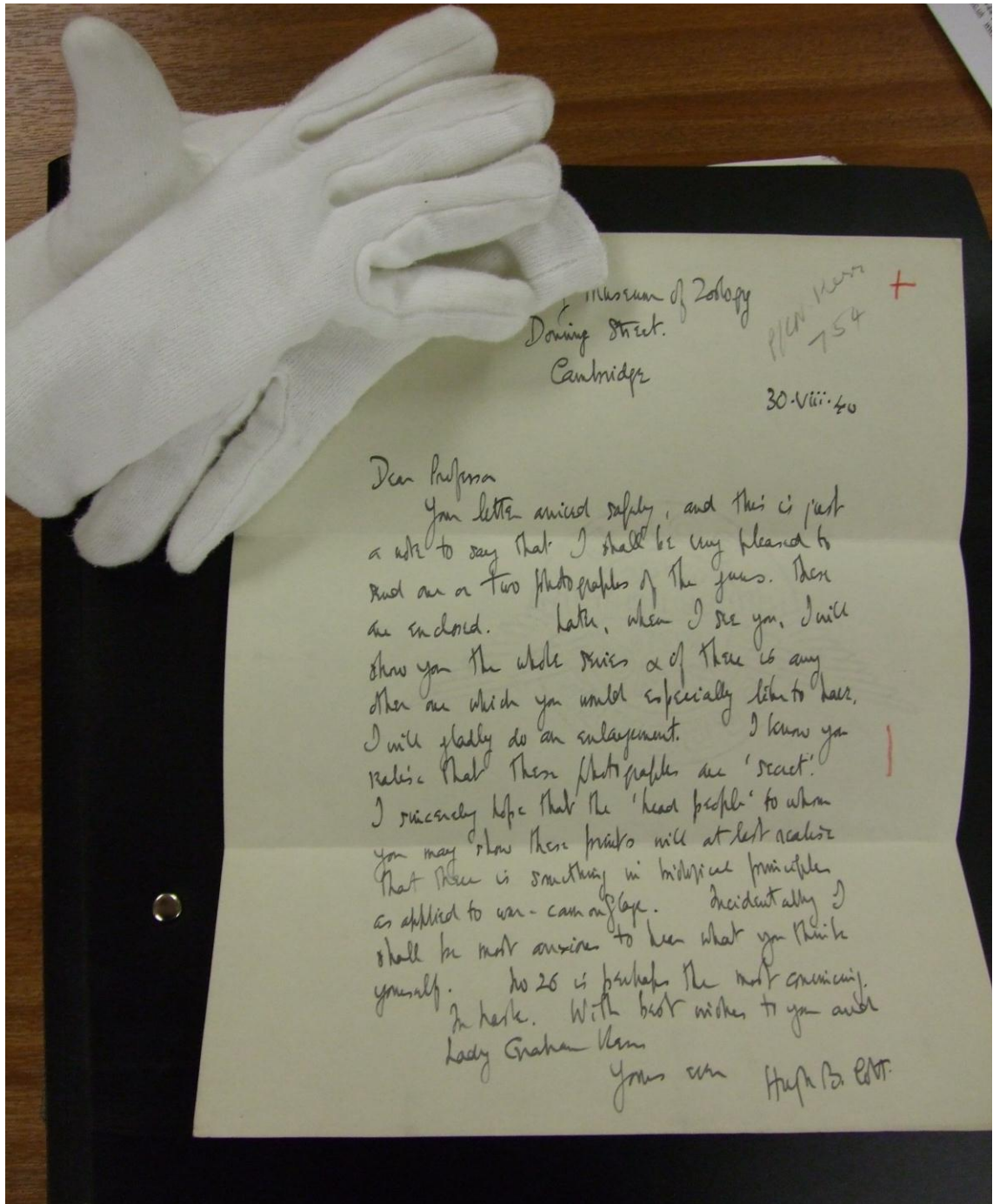
D is Deception, which plainly implies that you've got to tell Jerry some credible lies.

E is the Enemy: keep him in doubt when you must make a mess, what the mess is about

F is False Work, which will serve to distract the enemy's eye from the genuine fact

Chapter 3.

Abundance, Fragments and Scrap: Biographies of a Dispersed Archive



INTRODUCTION

This chapter sets out the particular design, form and structure of this study on a cultural-historical geography of camouflage, generally recognised as methodological concerns. Initially, the three forms of biography employed in this thesis will be explained. First, *scientific biography* is used to introduce the figure of Dr Hugh Cott, whose persona is pivotal to this narrative of WWII British military camouflage. Consideration will be given to how a biography attending to Cott's spaces and sites of camouflage offers a means to draw closer to describing and accounting more fully for the life of a military technology and aesthetic. It will demonstrate that a geographically structured biography, exploring the life of a military technology through a predominately human subject-centred approach (the spaces of individual's lives and their 'small stories'²³⁰), can allow for dynamic accounts of military knowledges and practices to be told, and the mutually transformative effect of technological innovation on diverse actors, skills and knowledges revealed.

Second, in order to compensate for the many inevitable absences in the archive of one person's life, and to allow for augmenting perspectives on the development of military camouflage, Cott's biography is cross-cut by other *fragmentary-mobile biographies*,²³¹ concerning artists, film makers, scientists, magicians and soldiers, all of whom became enrolled in the innovations of camouflage. Relative to Cott, their presences are fleeting, darting in and out of the narrative. Third, through these two forms of biography and by drawing on the work of Hägerstrand's time-space geography and Ingold's dwelling, the aim is to observe one evolving flow within camouflage's overall *life-path*.

This exploration into the methodological tool of biography is in parallel with interest in how geographical storytelling can be pieced together through a simultaneously fragmentary and abundant, dispersed and at times scrappy archive. Therefore, this chapter will also consider recent historical geography research which seeks to reveal, or to extend the creative practice of archival research. It will address what this work can offer to research in a 'military archive'; especially as a means of getting at the embodied aspects of military experience in order to write of lively military lives, human and nonhuman. It is also hoped that something of the

²³⁰ Lorimer, H. (2003b) Telling Small Stories: Spaces of Knowledge and the Practice of Geography, *Transactions of the Institute of British Geographers* 28 (2) pp. 197-217.

²³¹ Lorimer, H. (2003a) The Geographical Field Course as Active Archive, *Cultural Geographies* 10 (3) p. 283. Lorimer uses the term 'mobile' to describe his use of biographies focusing on the various sites that constitute different and diverse moments of a whole life. This enabled him to circumnavigate a linear narrative through time, and to focus on particular spaces and places in a life which continue to resonate.

experience of war – including its bloodiness, violence, ingenuity and imagination – will be retrieved and retold in order to deepen the story of military camouflage and the militarism of knowledge.

GEOGRAPHY, BIOGRAPHY AND COTT

The trivial proposition that biography enunciates a life history, thus ‘scientific biography’ offers the history of science, neatly locates itself with the views of the history of science as a progressive enterprise dedicated to the revelation of human genius rather than the stupidities of politics and war.²³²

Biography has the potential for resurrecting in new forms past lives and narratives; it is a means to mediate between memory and history, and to allow different perspectives on these narratives to be explored.²³³ Rose explains how biography entwines three lives: the person at the centre of the work; the researcher who works from traces that are left, to reshape and recreate the first life for the third; and the reader who interprets this final work. The aim is to ‘inscribe into our research practices some absences and fallibilities while recognizing that the significance of this does not rest entirely in our own hands’.²³⁴ It seemed for this study that biography could be a way of producing a cultural-historical geography of camouflage that allowed for such openness and fallibility. Dr Hugh Cott (1900-1987) had from the outset been at the centre of my research into camouflage, since he clearly provides a means of accessing the diverse facets that made up the character of British military camouflage. Most importantly, he was an expert in biological camouflage, and author of what is still regarded as a standard text on the subject. His scientific expertise could address an absence in much of the camouflage literature and allow an exploration of the more-than-human nature of scientific practice in the study of camouflage. Cott was also a gifted artist, his black and white pen drawings demonstrating an artistic appreciation of the nature of camouflage and the need to understand its visual techniques of eluding exposure. Finally, Cott was a WWII camoufleur who participated in official camouflage committees, military camouflage training and served in the army as a Camouflage Officer throughout the war, thus allowing the micro-politics and lived experience of camouflage in war and battle to be investigated.

²³² Chilvers, C.A.J. (2007) The Tragedy of Comrade Hessen: Biography as Historical Discourse. In Soderqvist, T. (ed.) *The History and Poetics of Scientific Biography; Science, Technology and Culture, 1700-1945* p.105.

²³³ Bensaude-Vincent, B. (2007) Biographies as Mediators between Memory and History in Science. In Soderqvist, T. (ed) *The History and Poetics of Scientific Biography; Science, Technology and Culture, 1700-1945*, pp.173-184.

²³⁴ Rose, G. (1997) Situating knowledges: positionality, reflexivities and other tactics, *Progress in Human Geography* 21 (3) pp.305-320.

It is nonetheless evident that to study camouflage through the optic of Cott alone would require a departure from traditional approaches to biography. Classic biography can be described as writing of a life, often of ‘great men’,²³⁵ traced and retold chronologically through a linear structure. This traditional approach is characterised by the view of an individual as the creator of meaning, which the biographer can access through ‘an empirical, material basis’, thus, writing stories that ‘reflect a lived experience’.²³⁶ The focus in a classic biography is to know and understand the life of the person at the centre of the study. However, since the cultural turn biography has been influenced by post-modernism and the focus has increasingly been placed on plurality, previously unheard voices and the biography’s ‘performance’ or ‘collaboration’ with and between the individual at the centre of the biography and the biographer.²³⁷ Contributing to this shift in biography, geographers have identified the potential of framing biographies not through the temporal, by simple chronology, but through the various spatialities of a life. Lorimer has suggested that we need not narrate subjects’ entire life histories as ‘a fixed arc that begins, happens and ends’, but instead construct ‘more mobile biographies told through different episodes or moments happening within the longer context of a life’.²³⁸ This study on camouflage draws attention to moments, places, sites, networks and spacings of Cott’s life, not in an effort to close in around the individual and know him fully, but rather, as a means to extend the breadth and to cast greater clarity on the history of military camouflage. Thus, it is a geographical biography of camouflage through Cott.

Daniels and Nash explain why geographers are well placed to engage with biography, precisely because the arts of geography and biography are aligned by ‘overlapping domains of self and place, positionality and identity, spatiality and subjectivity’.²³⁹ Lately in historical geography, there has been a growing number of studies which take individual lives at their centre, whereby the emphasis has been shifted to smaller spaces, scales,²⁴⁰ stories and lives,²⁴¹ as well as attending to how these aspects still feed into wider relations and larger networks. Short and Godfrey, in a study of the Edwardian land campaign, use a ‘micro-history’ to examine how ‘small events or little lives’ can elucidate broader social, political and cultural forces. They state that ‘a micro-historical approach can enhance our understanding of the interactions

²³⁵ Rhiel, M. & Suchoff, D. (1996) *The Seductions of Biography*, p.3.

²³⁶ Roberts, B. (2002) *Biographical Research*, p.6.

²³⁷ Rhiel, M. B. & Suchoff, D. (1996) op cit.

²³⁸ Lorimer, H. (2003a) op cit. p.283.

²³⁹ Daniels, S. & Nash, C. (2004) Lifepaths: geography and biography, *Journal of Historical Geography* 31 (1) p.450.

²⁴⁰ Naylor, S. (2008) Historical geography: geographies and historiographies, *Progress in Human Geography* 32 (2) p.265.

²⁴¹ Lorimer, H. (2003b) op cit.

between people and place at a variety of scales'.²⁴² This notion has interesting potentials for the studying the lives of scientific practioners and the knowledges which they strive to produce.

A focus on the individual raises the importance of the detailed sites of scientific practice, knowledge production and dissemination. The spaces and places of science matter and the narrative of a life is intrinsically spatially-shaped, as well as temporally, and therefore a geographical lens can be an insightful method through which to study both the development of science and the lives contributing to its production. As Livingstone explains, '[t]he strategy is that of subversion, to take the seemingly transcendent [science] and locate it in the all-too-mundane realm of the historically contingent'.²⁴³ By focusing on the personal, there is also the possibility to tackle scientific discoveries and developments through an individual's social political and cultural networks. Such a focus can include the complexities of scientific lives, with room to acknowledge the mundane elements of scientific practice. It also suggests that the history of a science and a technology can be translated through biography to a diversity of nonhuman lives as well, perhaps altering notions around the conceptual boundaries that define 'life'.

Soderqvist has critiqued some scientific biographies for mirroring the discourse of metascientific methodologies by focusing on 'dead white males', with the consequence of omitting the science of seemingly less important or less exciting scientists (and perhaps also less traditionally visible scientists) who have been largely ignored.²⁴⁴ In an attempt to counteract this point, Polanyi advises that attention instead be diverted to the ordinary workers in the scientific community, those who contribute in often unnoticed and widely unheralded ways, so to capture something of the ordinary complexities of scientific discovery. Polanyi argues that, '[t]here has been too much talk about the flash of discovery and this has tended to obscure that discoveries, however great, can only give effect to some intrinsic potentiality of the intellectual situation in which scientists find themselves'.²⁴⁵ As the subject of a scientific biography, Cott may appear on first inspection to fall into Soderqvist's category of 'dead white male'. Here he might qualify on all three counts: raised in the comforts of the British middle class, the son of a rector of Ashby Magna, Leicestershire, educated at Rugby

²⁴² Short, B. & Godfrey, J. (2007) 'The Outhwaite controversy': a micro-history of the Edwardian land campaign, *Journal of Historical Geography* 33 (1) p.71.

²⁴³ Livingstone, D. (1995) Geographical Traditions, *Transactions of the Institute of British Geographers* 20 (4) p.421.

²⁴⁴ Soderqvist, T. (2007) op cit. pp.1-13.

²⁴⁵ Polanyi, M. cited in Nye, M. (2006) Scientific Biography: History of Science by Another Means? *Isis* 97 p.323.

then Sandhurst before attending Cambridge University, and now deceased.²⁴⁶ Although the chief focus in scientific biographies to date has indeed been on ‘dead white males’, assigning many others the status of silent subalterns, fitting the categories of white and male should not lead to the presumption of there being an homogenous scientific practice. Science, like other disciplines, has fashions and phases, and those practitioners who do not fit can be forgotten and their contributions overlooked. Cott’s obituaries reveal that at the end of his career he was actually *not widely* celebrated and seemingly no longer figured or fitted within the main current and contemporary biological research. Although mentioned within some histories of biological camouflage and military camouflage, as yet no study has taken Cott, nor his science, as its main focal point,²⁴⁷ even if *Adaptive Coloration in Animals* is still an authoritative text drawn upon today.²⁴⁸

Therefore, on closer scrutiny, Cott does not sit comfortably within Soderqvist’s narrow limits. Instead, Cott appears to be more aligned with Polanyi’s call to account for the ordinary scientist and their practices. Porter develops this appeal by explaining that ‘the culture of science shapes and is shaped by the people who practice it and ... the scientist, as a human type, has a history that matters’.²⁴⁹ Furthermore, he suggests that scientific biographies should give an account of the particular habits and behaviours of the scientist that are shaped by their external relationships, circumstances and other aspects of their character. As a result, ‘a more inclusive biographical study can provide materials for a history of the scientist, a vital dimension of the history of reason in the world’.²⁵⁰ Cott’s scientific life, so far, has been largely overlooked, and with the incorporation of artistic and military elements, is ready for consideration, particularly at a moment when there is increasing interdisciplinary interest in critical militarism and the hybrid human/nonhuman assemblages of modern technologies.

A scientific biography, is hence a tool whereby the entwined lives of Cott and camouflage can disclose the mutual transformation of scientific and military knowledges in mid-twentieth century geopolitics. The critical methodological approach of exploring the spatial and temporal characteristics of Cott’s scientific career works to position this biography of military camouflage within a specific lifeworld which, through its particular attention to timings and spacings, can attend to wider political, scientific, artistic, social, cultural and military concerns.

²⁴⁶ Obituary *The Times*, 25th April 1987, pasted into Cott, H. (1940), *Adaptive Coloration in Animals* - CZM- Box 2 Cott copies of publications.

²⁴⁷ Behrens, R. (2002)op cit; Forbes, R. (2009)op cit; Rankin, N. (2008)op cit. These books give account in varying degrees of Cott’s scientific and military contribution to camouflage, but Cott is not the primary focus.

²⁴⁸ See 2009 special edition *Philosophical Transactions of the Royal Society B*, 364.

²⁴⁹Porter, R. (2006) Is the Life of the Scientist a Scientific Unit? *Isis* 97 p.314.

²⁵⁰ Ibid p.321.

Cott offers a familiar point of return so to explore the seams and tears between different narratives in the history of modern military camouflage.

Biography can, nonetheless, be a troublesome method. Historical studies which take lives at their centre continually grapple with a subject who forever evade firm grasp. Terrall explains that biography, 'in some manner brings back to life someone from the past, known to the present only through material traces left behind'.²⁵¹ The tangible remnants of a life provide a connection with the past, but this is a connection only allowing partial access, and inevitably there will always be 'something missing'.²⁵² Therefore, one problem is that the person presented in the written biography is not in fact revived but created. Perhaps biography is the practice of a life reborn to be a monstrous being; tacked, sewn, and glued: a composite body created by a few of the many multiple selves that once constituted a lively individual. Another difficulty is that the visceral and somatic elements of the biographical life become muted through text. Thrift eloquently summarises this problem when reflecting on how to commemorate his father:

I now think that putting his life in order through text, in order to rescue him from the enormous condescension of posterity, may, in certain senses, be just another form of condescension. I am not sure, in other words, that he needs writing down, or, put in another way, we need a form of writing that can disclose and value his legacy – the somatic currency of the body stances he passed on, the small sayings and large generousities, and, in general, his stance on the world.²⁵³

Perhaps Thrift is correct that in remembrance there is no need to find a way of writing about the 'somatic currency of the body'. If, however, the attempt is not to remember, but instead, to record a life, one which is spatially and temporally disconnected from the biographer and where the only means to generate that life is to write, how can a visceral communication be fashioned in order to allow a person to be brought to life on the page?

Ken, a colleague of Cott's, smiled and chuckled as he recalled a command that Cott often barked at him:

Well, why haven't you done it then?²⁵⁴

For a moment Cott's voice is close, and then Ken also remembers that on his death Cott gave many slides of his photographs to:

²⁵¹ Terrall, M. (2006) *Biography as Cultural History of Science*, *Isis* 97 p.306.

²⁵² *Ibid* p.307.

²⁵³ Thrift, N. (2000) *Afterwords*, *Environment and Planning D* 18 (2) p.213.

²⁵⁴ Conversation with Ken Joysey 6th June 2008.

Lucy Hudson, the G.P.'s daughter in Dorset where Cott lived in a flat, which had been converted from an old workhouse.²⁵⁵

This piece of information is rounded off with:

That was the kind of man he was.²⁵⁶

These remarks do not necessarily conjure Cott, and in some respects only serve to make him seem remote and entirely unknowable. Ken moved on in his trail of remembrance as we walked through the Cambridge Zoology Museum, stalking Cott's memory: the moment had passed to ask; 'what kind of man was he?', and clarify which part of this memory to Ken revealed the man and how it might elucidate the man and his science. It was someone else's memory, a mystery, forever untranslatable to the frustrated distant biographer.

But there are means to negotiate the limitations of this one-sided exercise. In his study of Francis Younghusband, Matless suggests utilising humour in biography: 'a key device of genealogical amplification was a degree of humour', allowing us 'to recognize the presence and power of the comic as a driving force within the events of history'.²⁵⁷ It is proposed that such a stylistic tactic in historical writing can allow for distance and empathy to be articulated, and also enriching detail included. Omitting or footnoting humorous elements can serve to re-establish the boundary between serious and non-serious inquiry, the worthy elements of a character from the unworthy, although Matless warns that care needs to be taken so as not to reduce people and history to mere jokes.²⁵⁸ By considering some of Cott's areas of scientific research and practice, his science can indeed appear at times rather comic. There are glimpses in his author's copy of *Adaptive Coloration in Animals*, where appear scribbled possible amendments for a second edition. Proposed wry additions include Col R. Meinentzhagen's advice always to carry an umbrella on fieldwork:

I know of two cases where an umbrella has been used with success against dangerous game.²⁵⁹

Apparently, this technique had been effectively employed to repel tigers and rhinoceros.²⁶⁰

Another possible amendment was to draw a comparison between mimicry in nature and the world of post-war fashion:

²⁵⁵ Ibid.

²⁵⁶ Ibid.

²⁵⁷ Matless, D. (1995) Effects of history, *Transactions of the Institute of British Geographers* 20 (4) p.407.

²⁵⁸ Ibid.

²⁵⁹ Cott, H. (1940) *Adaptive coloration in Animals*, author's copy - extended to two volumes, with interleaving sheets, containing copious scientific notes and additions to text p.306 - CZM- Box 2 Cott copies of publications.

²⁶⁰ Ibid.

Other examples from clothing in which resemblances only affect visible characters:-

iii) mimetic stockings. The *Saturday Evening Post* in an article on wartime shortages, has an illustration of a sham stocking painted on the leg, and states: 'In warm weather legs may be painted with liquid face-powder in stocking tints, a seam of eyebrow pencil or mascara neatly applied down the back'.²⁶¹

Although at times comical, Cott demonstrates a creative scientific mind and reveals that creative techniques and deductions were consistently employed alongside more prosaic and established scientific practices in natural history. The inclusion of these more humorous elements of Cott's science ought not to undermine his work, instead reveal the complex, at times jarring, disparate qualities of his character. By employing Matless' suggestion of self-aware humour, Cott's narrative will be incorporated into a broader biography tracing camouflage as an innovative science and technology continually being made and remade, itself often regarded as somehow comedic (a broader theme revisited at moments in what follows).

A further technique in biography which can address the problem of partiality is to acknowledge, utilise and perhaps exploit the absences and fragments of the life under study. All too often, Lee suggests, 'biographers try to make a coherent narrative out of missing documents as well as existing ones; a whole figure out of body parts'.²⁶² This process to smooth over cracks can result in a flat narrative. Rose suggests that in historical work, researchers should 'articulate boundaries, distinctions, and disjunctures instead of erasing them'.²⁶³ Applying this approach, the disjointed contents of an archive can result in a disjointed narrative, a stitched, folded, occasionally embroidered or sometimes thread-bare biography. Through this process, a life's material traces become 'somewhat like a cubist picture',²⁶⁴ in that absences and presences jostle for attention and form may be viewed where there is discontinuity and discontinuity may mask smooth surfaces. But this cubist vision can be embraced: Cott will have always proved unknowable in life, so focusing on the spatialities of a life, where interest alights more on abutting 'surfaces' than on chronological continuities, may disrupt and complicate the narrative, emphasising its ultimate unknowability, but this can only add insight to the account of camouflage's development.

Mennel suggests another method for circumnavigating absences, arguing for 'geographic fiction', and explaining how his substantially fictional depiction of Robert Moses allowed him

²⁶¹ Ibid p.407.

²⁶² Lee, H. (2005) *Body Parts: essays in life-writing*, p.8.

²⁶³ Rose, G. (1995) Tradition and Paternity: same difference, *Transactions of the Institute of British Geographers* 20 (4) p. 416.

²⁶⁴ Richards, J. (2006) Introduction: Fragmented Lives, *Isis* 97 p.302.

to contrast modes of perception, include overlapping understandings of the world, and avoid drawing clear chains of causality: 'Novelistic language alludes, echoes and defers closure'.²⁶⁵ This offers the biographer an intriguing means to give shape to the life and events under observation. For example, Cott's long-running and copious correspondence with his mentor and friend Kerr after arrival in Egypt in WWII appears to end quite suddenly, or at least it has not been preserved. Thus, there is no means directly to get at Cott's experiences of the Desert War, or of him actively using camouflage in conflict. However, from studying the accounts of soldiers who undertook camouflage training at the Middle East Camouflage School, the School's War Diary - setting out the daily routines, lectures and instructors - and reading memoirs of fellow camoufleurs who knew and wrote their impressions of Cott, I can begin to decipher Cott's camouflage duties, role and habits. Moreover, I fashion a feel for Cott's Desert War experiences. Reading *Zoological Photography in Practice* (1956), Cott begins to describe the trying conditions of zoological study in the desert, with 'extremes of heat and cold, and violent wind storms',²⁶⁶ and in the plates at the back of the book there are photographs of desert snakes and grasshoppers and aerial views of the Libyan desert. Although Cott's own narrative of his experience in the Desert War is absent, inferred impressions can be shaped by bringing these diverse sources into correspondence. Not only can Cott's embodied experience of the desert be surmised, but so too can his actions and other's reactions to him as tutor, colleague, scientist and soldier, and so, I gain multiple perspectives on Cott and camouflage. The role of the biographer can hence be to allow room for these multiple perspective and voices to be included in both Cott's biography and camouflage's narrative.

As such, the moments or scenes of camouflage and Cott in the desert presented in this biography are a composite of remaining shards, revealing the jarring and conflicting selves of human and technological life. Memory, history, geography and storytelling are marshalled to make Cott's biography, and are less an attempt to rescue *him* from the archives or history, more a will to retrace and recount parts of his life and something of his selves. This biography works to reveal that 'to tell a story, then, is to *relate*, in narrative, the occurrences of the past, retracing a path through the world that others, recursively picking up the threads of past lives, can follow in the process of spinning out their own'.²⁶⁷ The subsequent narrative will be openly incomplete and forever mutable and transforming. It will trace Cott and

²⁶⁵ Menel, T. (2011) Monument of Myth: finding Robert Moses through geographic fiction. In Dear, M. Ketchum, J. Luria, S. & Richardson, D. (eds.) *GeoHumanities: Art, history, text at the edge of place*, p.86.

²⁶⁶ Cott, H. (1956) *Zoological Photography in Practice: A contribution to the technique and art of wild animal portraiture*, p.190.

²⁶⁷ Ingold, T. (2007) *Lines: A brief History* p.90.

camouflage through a geographical lens and focus on the spaces and connecting trails of their intersections by examining variously: Cott's practice in the field; the production of his scientific knowledge on camouflage through text; and the dissemination of his particular perspective of camouflage into the military. Most importantly, Cott's biography is a tool to interpret a more complex life, a means to explore some of the spaces and spacings of the development of military camouflage technology.

GEOGRAPHY, BIOGRAPHY AND CAMOUFLAGE

Appadurai has argued that 'commodities, like persons have social lives',²⁶⁸ so a biography of objects can reveal that, like people, they too are subject to transformation. Camouflage, as a technology and aesthetic, has a biography, but it is a very difficult life to pin down and explain. Its beginnings are embedded in nature, its multiple selves are intricate and conflicting, residing in nature and in war - on skin, fur, scales; on wings, fabrics and metals - protective and predatory. Therefore, to cover such a complex series of lives is a daunting prospect. Pile and Thrift explain that '[t]here is the difficulty of mapping something that cannot be counted as singular but only as a mass of different and sometimes conflicting subject positions'.²⁶⁹ They suggest that life can be accounted for in a more fluid conception of wayfinding, navigating between mapping and tracing,²⁷⁰ explaining how:

As bodies move they trace out a path from one location to another. These paths constantly intersect with those of others in a complex web of biographies. These others are not just human bodies but also all other objects that can be described as trajectories in time-space; animals, machines, trees, dwellings and so on.²⁷¹

Camouflage, thus can be viewed as a military technology with a life history which traces multiple and diverse trajectories, a technology shaped through intricate relationships between, and set in networks of, people and nonhumans, politics, science and art. Hoskins states that 'objects are both real and historical'; they may be inanimate, but their relations are animated within and by human lives.²⁷² To drive this idea further, a biography of camouflage could reveal objects animated by human lives that in turn animate human lives, influencing the embodied and visceral experiences of battle.

²⁶⁸ Appadurai, A. (1986) *The Social Life of Things: Commodities in Cultural Perspective* p.3.

²⁶⁹ Pile, S. & Thrift, N. (1995) *Mapping the Subject: Geographies of Cultural Transformation* p.1.

²⁷⁰ Ibid.

²⁷¹ Pile, S. & Thrift, N. op cit. p.26.

²⁷² Hoskins, J. (2006) Agency, Biography and Object. In Tilley, C. Keane, W. Kuchler, S. Rowlands, M. & Spyer, P. (eds.) *Handbook of Material Culture*, pp.81-82.

A question then arises of how to design a biography of camouflage, scrutinised through its practitioners. Throughout this study, the sites of convergence between Cott's life and camouflage's biography will be explored, and this spatially mobile structure will be used in order to gain insight into the nature of the development of military camouflage. However, this may not be enough to provide a rich account of even one trajectory of camouflage. Therefore smaller, even more fragmented biographies of other camouflage practitioners from WWI and WWII will be shot through this camouflage story. Some lives, such as the surrealist artist Julian Trevelyan (1910-1988), film maker Geoffery Barkas (1896-1979) and stage magician Jasper Maskelyne (1902-1973), will dart in and out; others, such as the zoologist Sir John Graham Kerr (1869-1957) and artist Solomon J Solomon (1860-1927), will be lingered upon longer; some, such as marine artist Norman Wilkinson (1878-1971), will only be glimpsed or alighted upon briefly. These human-centred biographies, as research practice, narrative technique and structural design, are employed to draw a series of trails that entwine and diverge, which collectively will *flesh out* the biography of camouflage. This is hence far from a conventional biography, and is perhaps more akin to studying a life-path defined by temporal and spatial limits, which occasionally will leak and bleed. This employment of biography conceptually draws upon Ingold's dwelling theory exploring human immersion in the world through life's activity,²⁷³ and also from the foundations of Hägerstrand's time space geography.

Hägerstrand's time-space concept offers a model whereby the spatialities and temporal influences of an individual's life paths are linked. Through time-space geography, Hägerstrand revealed that lives 'become captured within a net of constraints, some of which are imposed by physiological necessities and some imposed by private and common decisions', the latter being imposed by society, possibly against the will of the individual.²⁷⁴ By mapping peoples' spatial-temporal environments, Hägerstrand's life-path prisms expose that life is 'an astronomically large series of small events, most of which are routine and some of which represent very critical gates'.²⁷⁵ This attention to the series of small moments, which can be mundane but also at times critical, validates a focus on the 'small stories' of camouflage. Often the lives included within this study, although remarkable in their own way, were in the main ordinary, yet these individuals were pooled and thrown together in series of

²⁷³ Johnston, C. (2008) Beyond the clearing: towards a dwelt animal geography, *Progress in Human Geography* 32 (5) p.635.

²⁷⁴ Hägerstrand, T. (1970) What about People in Regional Science? *Papers of the Regional Science Association* 24 p.11.

²⁷⁵ *Ibid* p.14.

extraordinary circumstances in a global war. This allows not quite a bottom-up aspect, but an oblique consideration of the spatialities that influenced camouflage innovation.

Time-space geography also offers another legitimation of these multiple mobile biographies. Hägerstrand conceived that time-space models map a 'flow of life-paths' which he explained, 'should, in principle, be applicable to all aspects of biology, from plants to animals to men [sic]'.²⁷⁶ Camouflage moves between all these categories and extends into technology, which raises issues of materiality and agency. Ingold explains that to bring things to life 'is a matter not of adding to them a sprinkle of agency but of restoring them to the generative fluxes of the world of materials in which they came into being and continue to subsist'.²⁷⁷ This, therefore, is history narrated through geographical storytelling which aims not only to describe, but also to give an account of the consequences flowing from the militarisation of space and knowledge as produced through camouflage's life-paths.

Ingold further articulates the momentum and motion of life, describing how it 'will not be contained, but rather threads its way through the world along the myriad lines of its relations'.²⁷⁸ Movement, Ingold adds, is pivotal to our understanding of life but should be conceived of as movement *along* rather than *across* space. This consideration of movement *along* focuses attention upon the immersion of life within the world, allowing the possibility of exploring the mutually influencing production of life and space; in this respect, life is not a sealed entity but rather extending beyond the physical form, dwelling along the multiple lines traced, having no beginning and no end.²⁷⁹ Therefore, considering how the lives 'generally extend along not one but multiple trails, branching out from a source',²⁸⁰ Ingold suggests that the life of an organism extends across the multiple lines or paths of their involvement in the world. This is an appealing means to consider the life-path of camouflage. It can allow me to zoom in on one of camouflage's trails, following Cott and camouflage's entwined flow. I can zoom out as well, exploring how this thread is entangled with others, or I can veer across to take another's path with camouflage for a while, but navigating once again to re-join Cott's life. The reason for adopting this approach is summarised by Hägerstrand, who explains that all 'actions leave traces in the physical world', furthermore venturing that 'most actions – possibly all – have consequences which were not taken into account in the moment of

²⁷⁶ Ibid p.20.

²⁷⁷ Ingold, T. (2007b) Materials against materiality, *Archaeological Dialogues* 14 (1) p12.

²⁷⁸ Ingold, T. (2007a) op cit. p.103.

²⁷⁹ Ibid p.81.

²⁸⁰ Ingold, T. (2006), Rethinking the Animate, Re-Animating Thought, *Ethnos* 71 (1) p.13.

action'.²⁸¹ Through the trackings of a telescopic lens across camouflage's history, it is possible to focus on the mutual sites, spaces and spacings of camouflage, and also on those who helped to develop and innovate it. This offers a means to make life - human and nonhuman - accountable as the consequences and implications of technological innovation and the militarism of knowledge begin to be discerned. This approach to biography and the history of military camouflage, as a composite of diverse lives and practices, required consideration of what would constitute (and how to engage with) an archive of military camouflage.

A LIVELY MILITARY ARCHIVE

[T]he archive is a place for reading things that were not written for your eyes. This means that there is never quite enough.²⁸²

Steedman describes the archive as a place empty of the past; indeed, it contains the past's material fragments, but the past does not 'in fact live in the record office, but is rather, *gone*'.²⁸³ Thus archives are often depicted as being inhabited by disjointed presences and haunted by absence: 'The work of the historical geographer is therefore that of a constructor – a worker of fragmented shards'.²⁸⁴ However, although archival practice can be an exercise in piecing together the fragmented, it can equally be a task of sifting through an over-abundance of material presences from the past. The archive, whether characterised by fragments, excess, dispersal, concentration, thoroughness or scrappiness, deserves attention as a place for making history.

That history is created within the archive, not found, is a sentiment recognised by Osborne, who states; '[t]he archive is there to serve memory, to be useful, but its *ultimate* ends are necessarily indeterminate. It is deposited for many purposes; but one of potentialities is that it awaits a constituency or public whose limits are of necessity unknown'.²⁸⁵ The archive becomes less a site for retaining the past, more a space for creative potential in the telling of the past. But furthermore, the archive and all those who keep, construct, contribute to, preserve and utilise it are in a continual process of making history. The archive enacts a temporal collectivism (and of course also at times a collective eradication) upon each object

²⁸¹ Hägerstrand, T. (1995) Action in the Physical Everyday World. In Cliff, A.D. Gould, P.R. Hoare, A.G. & Thrift, N.J. (eds.) *Diffusing Geography: Essays for Peter Haggett*, p.35.

²⁸² Ogborn, M. (2011) Archive. In Agnew, J. & Livingstone, D. (eds.) *The Sage Handbook of Geographical Knowledge*, p.93.

²⁸³ Steedman, C. (1998) The Space of Memory: in an Archive, *History of the Human Sciences* 11 (4) p.77.

²⁸⁴ McGeachan, C. et al (in draft) Certain Subjects? Working with Fragments in the Archive p.1.

²⁸⁵ Osborne, T. (1999) The ordinariness of the archive, *History of the Human Sciences* 12 (2) p.55.

held in its possession. And so, where once the archive was viewed by scholars as little more than a 'storage space',²⁸⁶ Mayhew has reminded historical geographers that 'evidence itself is constructed at a certain time and place'.²⁸⁷ Accordingly, historical geographers have begun to focus on the *doing* of research and the dynamism of the archive. In the specific context of the museum, Alberti argues that, 'the biography of an object did not halt when it reached a museum, and nor was its meaning frozen – rather, it was subject to considerable work while in the collection'.²⁸⁸ This dictum could be applied equally to objects within the archive, which, after deposition in some archives, are continually worked upon, by ordering and preservation²⁸⁹ in active afterlives. Even if lying dormant, their potential to shape and add to stories spanning time and lives is only one pencil-filled request form away.

However, as well as being a place for potential stories and storytelling, the archive is also a place that condenses the power inherent in inclusion and exclusion. Withers explains that the archive can be a site 'of authority and meaning',²⁹⁰ compiled of 'selected and consciously chosen documentation from the past',²⁹¹ as it is populated with the carefully selected, edited and censored, and void of the intentionally omitted. But, he also warns not to oversimplify the archive as being a straightforward expression of power because, along with the consciously preserved and carefully catalogued, there also resides the haphazard remnants²⁹² whose presence and purpose remain an indefinite mystery. The archive can be ordered and systematic, yet it can also be ambiguous: its contents revealing, enigmatic, even at times cryptic, requiring the researcher's close scrutiny, disclosing the objects and their own desired intentions for those objects. For example, Rose's study of Lady Hawarden's Victorian photograph collection reveals the archive to be a site for exploring historical ways of seeing, and for the visual articulation of ideologies where complex and overlapping geographies of gender and social difference are spatially displayed. Furthermore, as archival work progresses, the archive becomes a place that requires attentiveness to 'the effects of the archive on both them [the photographs] and on ... a researcher'.²⁹³ For Rose, the archive positions sources out of context, and inscribes them with reworked meanings through the position (carefully

²⁸⁶ Lorimer, H. (2009) Caught in the Nick of Time: Archives and Fieldwork. In DeLyster, D. Herbert, S. Aitken, S. Crang, M. & McDowell, L. (eds.) *The Sage Handbook of Qualitative Geography* p.252.

²⁸⁷ Mayhew, R. (2007) Denaturalising print, historicising text: historical geography and the history of the book. In Gagen, E. Lorimer, H. & Vasudevan, A.(eds.) *Practising the Archive: Reflections on Method and Practice in Historical Geography* p.24.

²⁸⁸ Alberti, S. (2009) *Nature and culture: Objects, disciplines and the Manchester Museum* p.143.

²⁸⁹ Ogborn, M. (2004) Archives. In Pile, S. & Thrift N. (eds.) *Patterned Ground* pp.240-242.

²⁹⁰ Withers, C. (2002) Constructing 'the geographical archive', *Area* 34 (3) p.303.

²⁹¹ Steedman, C. (1998) The space of memory: in an archive, *History of the Human Sciences* 11 (4) p.75.

²⁹² Ibid.

²⁹³ Rose, G. (2000) Practising photography: an archive, a study, some photographs and a researcher, *Journal of Historical Geography* 26 (4) p.555.

systematised or ‘haphazard’) of the materials within the archive. The instructed behaviour for the researcher within the controlled space prescribes specific ways of seeing, which then mesh with, the theoretical lenses brought to each object scrutinised from the catalogue. The archive, from this reflexive consideration, is a complex environment, a place of partial, situated material and knowledge-gathering and knowledge-making processes. Just as the materials are worked upon, so too is the researcher, their biographies for a time entwined in a process of becoming in the archive.

This close attention to the archive and its materiality, Lorimer explains, is linked to a ‘new cultural geography’ which emerged from post-structuralism and post-modernism. This development generated a more theoretically sensitive appraisal of archival research and also invigorated what constituted archival practices and sources: ‘without terrific fanfare the limits of the geographers’ archive were unbound’.²⁹⁴ Alongside the thorough analysis and thoughtful interpretation of textual documents such as letters, diaries, court records and reports, there has emerged a creative and dynamic more-than-textual expansion of what counts as an archive and what objects it includes, so that images, scents, sounds, textures and feelings are now also quarry for the historical geographer.²⁹⁵ This extension of historical sources and new sites that constitute ‘the archive’ offers a means effectively to navigate the absences in historical research, giving alternative means and new ways actively to enrol gaps and disjunctures.²⁹⁶ This piecemeal gathering or ‘make-do methodology’²⁹⁷ has led to research which experiments with innovative storytelling, aiming to capture the diverse and myriad lived experiences in history more fully and viscerally.

Such experimentations with ‘make-do methodology’²⁹⁸ have produced engaging research. For example, Lorimer has focused on the entanglement of the lives of humans and nonhuman animals in his ethological studies into the lives of reindeers and seals,²⁹⁹ enfolding human and nonhuman to explore the past through embodied action in the present, drawing history closer

²⁹⁴ Ibid p.253.

²⁹⁵ Although in historical geography the map, which is both text and object, has long been an important archival source. The more-than-textual turn should not, therefore, be over stated in historical geography, as even textual sources are still material objects, which through their fabric can tell stories with and beyond text; and ‘old’ geography did pay attention to the physical form of the written document, for example those working on Medieval sources.

²⁹⁶ It should be acknowledged however, that imaginative ‘storying’ of the archive has been done by historical geographers prior to post-modernism and post-structuralism: for example Brown, R. (1938) Materials Bearing upon the Geography of the Atlantic Seaboard, 1790 to 1810, *Annals of the Association of American Geographers* 28 (3) pp.201-231 & Harris, C. (1991) Power, Modernity, and Historical Geography, *Annals of the Association of American Geographers* 81 (4) pp.671-683.

²⁹⁷ Lorimer, H. (2006) op cit. p.515.

²⁹⁸ Ibid.

²⁹⁹ Lorimer, H. (2010) Forces of Nature, Forms of Life: Calibrating Ethology and Phenomenology. In Anderson, B. & Harrison, P. (eds.) *Taking-Place: Non-Representational Theories and Geography* Ashgate pp. 55-78.

to be understood differently. DeSilvey has employed performative methodologies through creative engagements with the materiality of the archive in order to ‘recuperate stories, sensations, and sensibilities un- or under-represented in the archive’,³⁰⁰ during research on a semi-derelict homestead in Western Montana. The salvaging and recycling of old, disregarded or kept materials in an effort to bring the homestead back in to active production saw material culture enrolled into producing a living history of the homestead, a ‘recycling mode of remembrance’.³⁰¹ Patchett brings together Lorimer’s attention to the lives of nonhumans and DeSilvey’s utilisation of material culture when inquiring into the afterlives of taxidermy mounts of the Leiden Blue Antelope and the Hopetoun House tigers. She outlines a “geobiographical” approach to museum curation and trophy display, where wider stories of collection, practice and display can be told *through* the objects.³⁰² The absence of conventional documentary sources is supplemented by creative research with material encounters in order to attempt to recover ‘the embodied practice and places of their making’.³⁰³ The common thread connecting these diverse studies is the resourceful use of more-than-textual objects and an extension of the lives that can be explored in historical geographical research. This is appealing for a study focusing on the life of a camoufleur and a military technology, which is narrated through a dispersed and varyingly abundant and scrappy archive of texts, images, sounds and senses.

Importantly, though, creative experimental methods can be placed alongside, to good effect, more traditional archival sources. Lorimer and Philo’s study of the history of the University of Glasgow’s Geography Department neatly demonstrates how to engage with both orderly and more disorderly sources. They pool orderly archival records, such as the Court and Senate Minutes and old exam papers, which are then supplemented by other scrappier archival foraging in the department, divulging old issues of the student magazine *Drumlin* and field trip photograph albums which give a sense of *what* and *how* geography was previously taught, studied and practised. This effort to consider a history of the department through the ‘small archives based upon a multiplicity of scraps culled from diverse sources and sites’, and also from ‘the examinations papers and other banal, administrative and unprepossessing

³⁰⁰ DeSilvey, C. (2007) Practical Remembrance: material and method in a recycled archive. In Gagen, E. Lorimer, H. Vasudevan, A. (eds.) *Practising the Archive: Reflections on Method and Practice in Historical Geography* p.37.

³⁰¹ Ibid p.44.

³⁰² Patchett, M. (2007) Animal as Object: taxidermy and the charting of afterlives unpublished web-essay www.blueantelope.info.

³⁰³ Patchett, M. (2008) Tracking Tigers: Recovering the Embodied Practices of Taxidermy *Historical Geography*, 36 p.18.

sources',³⁰⁴ encompasses and integrates top-down and bottom-up views of the discipline. The result is to relate the history of the department through varying registers, and also to describe diverse experiences of doing geography.

Such methodologically innovative research acknowledges the archive as dynamic, fluid and rich. However, an effort to pair such creative archival inquiry with the setting of military sources initially posed a problem. If, as Osborne states, 'archives have beginnings but not origins, they are both controlled by gatekeepers and worked upon, are never innocent',³⁰⁵ then military archival sources have in the process of production almost certainly already undergone a particularly fierce round of editing and checking. Official military documents are informative in content, pared in delivery and commonly sealed from prying interpretation, until their period of confidentiality has expired. They may be rich in detail (recording precisely the "wheres", "whens" and "hows" of battle plans, fields and operations), yet for documents that record so much action and bloodletting they are often dry in tone. While soldier's actions are accounted for, the embodied experience in these sources is left to linger uncommented. Thus, the challenge is how to get under the clipped language, to consider the experiences as well as the strategic impacts and effects. Some geographers have managed successfully to negotiate these issues by looking elsewhere for viable sources. Woodward, Winter and Jenkins have used soldiers' photographs taken during tours of duty in recent conflicts to tell stories about the role of the soldier in active military spaces and territories.³⁰⁶ They have also explored the image of the soldier in contemporary print media,³⁰⁷ and Woodward and Jenkins have considered the role of the military memoir to the social production of the contemporary British military.³⁰⁸ These studies employ diverse military sources to tell an embodied account of the military experience, and they suggest to the historical geographer the possible means to draw on creative and lively military archives. In an effort to account for corporeal experience of WWII camoufleurs, I extended the reach of my military camouflage archive beyond the National Archives, the Imperial War Museum and the Royal Engineers Library and Museum, and beyond official reports and documentation. Researching the military through the archive

³⁰⁴ Lorimer, H. & Philo, C. (2009) Disorderly archives and orderly accounts: reflections on the occasion of Glasgow's Geographical Centenary *Scottish Geographical Journal* 125 (3-4) pp.227-255.

³⁰⁵ Osborne, T. (1999) op cit. p.56.

³⁰⁶ Woodward, R. Winter, T & Jenkins, N. (2010) 'I Used to Keep a Camera in My Top Left-Hand Pocket': The photographic Practices of British Soldiers. In MacDonald, F. Hughes, R. & Dodds, K. (eds.) *Observant States: Geopolitics and Visual Culture* pp.143-165.

³⁰⁷ Woodward R, Winter T, & Jenkins N. (2009) Heroic anxieties: the figure of the British soldier in contemporary print media, *Journal of War and Culture Studies* 2(2) pp. 211-223.

³⁰⁸ Woodward R & Jenkins N. (2011) Reconstructing the Colonial Present in British Soldiers' Accounts of the Afghanistan Conflict. In Kirsch, S. & Flint, C. (ed.) *Reconstructing Conflict: Integrating War and Post-War Geographies*, pp.115-131; Woodward R, Jenkins N. (2011) Military Identities in the Situated Accounts of British Military Personnel, *Sociology* 45(2) pp. 252-268.

became an exercise in channelling ‘creative energies’,³⁰⁹ piecing together diverse, distributed and discrete remnants in order to illuminate the complexities of military knowledge, practice and technology.

Throughout my research, each archive visited was consulted in the same fashion; every folder, box, album, film, interview or gallery that had a focus on WWII camouflage or the Desert War was studied in detail. My initial round of archival visits focused on Cott, his study of adaptive coloration and his role in developing WWII camouflage. The most abundant archive was the Graham Kerr holdings of the University of Glasgow archive. One section was dedicated to Kerr’s correspondence with Cott and over fifty letters, as well as numerous photographs and articles, traced their efforts to encourage the military to adopt the biological principles of camouflage. This material was read in conjuncture with Kerr’s camouflage experiences from WWI until late the end of WWII, which comprised hundreds of letters that gave a longer and more detailed history to the role of science in British military camouflage.

Cambridge was also a key site to study Cott, since he spent the majority of his academic career at the university’s Zoology Department. This far scrappier and diverse archive comprised the Zoology Museum, the Zoology Department archives, Selwyn College archives and interviews with former colleges and students of Cott. The Zoology Museum formed a more-than-textual archive of Cott, as it contained many of his photographs and drawings, and even three of his coastal dioramas. However, any evidence of Cott’s science was confined to one cardboard box of small green hardback folders detailing his unusual research into the edibility and palatability of birds’ eggs and flesh; a mystery to all in the department. Greater fortune was had when a former colleague of Cott’s, Ken Joyce, gave me a guided tour of the museum whilst reminiscing about Cott. He was certain that there was a box full of all of Cott’s publications in the department. This box proved most elusive, but was eventually found where Ken had left it more than ten years previously, in a cupboard, never having made its intended journey into the archive.

The National Archives held the most abundant source of information on British military camouflage. In particular, I traced Cott to the Camouflage Advisory Panel (CAP) and found the military perspective on enrolling such outside professionals. The administrative history of the CAP was thorough, with detailed information on the setting up the CAP (involving memos and letters), minutes of the meetings, an Interim Report, letters of resignation and internal correspondence. I also studied the setting up, structure and aims of the Camouflage

³⁰⁹ McGeachan, C, et al. (in draft) op cit. p.1.

Development and Training Centre (CD&TC) where Cott trained as a Camouflage Officer. Then, following Cott to the Desert War, I spent time learning the precise details of the battles and the role of camouflage, including the time, labour and methods of camouflage schemes in the Middle East in WWII. There was also the Middle East Camouflage School Diary, of which Cott was chief instructor, reports on camouflage training and development in the Middle East, details of particular camouflage schemes and its use in battles. In addition to this military perspective on WWII, the Royal Engineers Library and Museum provided summaries of camouflage efforts in WWII and the lessons learned. Many of these sources revealed the diversity of camouflage practitioners in the British military, including not just scientists, but artists, architects and engineers. These other knowledges and experiences clearly deserved attention.

The search then led to the Dean Gallery Edinburgh, which in 2006 had held an exhibition on artists in camouflage in WWII, and this seemed a suitable place to seek the camouflage experience of artists. In particular, the archive of James McIntosh Patrick, a Scottish landscape painter, proved rich in mapping the history of WWII camouflage. McIntosh Patrick had been a lecturer at the CD&TC (where Cott had undergone military training in camouflage) and, alongside military booklets, pamphlets and posters, were McIntosh's handwritten lectures, speeches, small water colour paintings and photographs of camouflage in nature and in war. This was an abundant archive that revealed much about both life at the CD&TC and, more broadly, camouflage instruction in WWII, including the skills required of WWII camoufleurs, particularly aerial literacy. I had to become proficient in understanding the skills that the artist, magician, scientist, aerial interpreter and ground soldier contributed to camouflage's development. A visit to the national collection of aerial photography at the Royal Commission on the Ancient and Historical Monuments of Scotland helped me learn to read and decipher the means of making the military invisible in war.

This process of re-skilling myself to read and understand camouflage could at times make the archive a tricky and disorientating place. An extract from my archival field diary records a visit to the aerial reconnaissance archives at the Royal Commission:

17th May 2010

I spent time looking through vast albums of aerial photographs that were meant to show, or to be more precise, not show the topography of Scotland through attempts at camouflaging factories and buildings that could be targets or guides to German bombers. Armed with a magnifying glass and limited information, attempting to block the modern sounds of the photocopier, printer and quick taps on the keyboard, I was excited at the prospect of getting to play at being a photographic interpreter for the

day. After a couple hours of getting to grips with the aerial view, developing my visual literacy of the earth's surface from on high and training my eye for tell-tale signs of camouflage, I realised how mundane and boring such a vital wartime job had been. The photographs may have been taken with the roar of an aeroplane engine whilst speeding over the earth at high altitude in a game of cat and mouse with the enemy (or in competition with other sections of the military). But aerial interpretation required patience, methodical study and close comparison in the confines of the terrestrial bound office desk. Over ten minutes were wasted studying a camouflaged factory on the West Coast of Scotland before I read on the back of the photograph that what I had presumed was a factory camouflaged as terraced housing was indeed terraced housing. The (well it seems) camouflaged factory was north and west of my close scrutiny. Aerial photography boring maybe, but skilled yes!

Surrealist artist, Julian Trevelyan was another artist and WWII camoufleur studied because his biography in WWII intersected at points with Cott's. His archive, although slim, yielded fruitful information on desert camouflage in the form of an unpublished journal of his trip to investigate desert camouflage. Both McIntosh Patrick and Trevelyan added the artist's perspective to the narrative of military camouflage, contributing more insights into the embodied experience of camouflage practitioners training and at war, and further positioning Cott in the history of WWII camouflage.

The Imperial War Museum allowed me a soldier's eye of view of camouflage, for it has numerous large boxes filled of soldiers' experiences in WWII; three in particular caught my attention. Two boxes contained the remnants of the experiences of soldiers who had trained in camouflage in the desert and the other held a Camouflage Officer's training material. Each box gave a sense of life in the desert for the British soldier and insight into camouflage training. These archival foragings were complemented by watching camouflage training films at the Imperial War Museum, listening to an interview with Trevelyan reflecting on his camouflage experiences, reading numerous memoirs of other desert camoufleurs and studying all of Cott's scientific publications for glimpses of his experiences of scientific and military practice. eBay bidding secured me Desert War memorabilia in the form of *The Battle of Egypt: The Official Record in Pictures and Map*³¹⁰ and an anonymous photograph album depicting life in the desert for the British soldier. My camouflage archive therefore comprised a mixture of the textual and the visual, the carefully collected and preserved, the randomly accumulated, the left over and the lost and found. From these efforts, the seeming dryness of military reports has duly been supplemented by photographs, sketches, water colours, scientific illustrations, zoological field reports, scientific books, lectures, personal correspondence, dioramas, diaries and memoirs, most of which are spatially and temporally scattered and scrappy.

³¹⁰ Ministry of Information (1943) *The Battle of Egypt: The Official Record in Pictures and Map*.

This dispersed archival foraying gathered a plurality of voices and perspectives, each adding more flesh and blood to the bones of military camouflage. Being experimental with archival sources had extended historical research beyond the human, to entwine with nonhuman animals and nonhuman technologies, giving insight into the technology's development and glimpses of the inner lives of those who were involved in or relied upon camouflage:

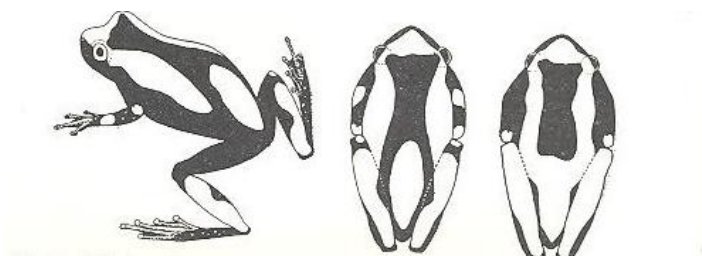


Figure 1. Coincident patterning - H.B. Cott

The word "camouflage" must be taken to mean all aspects of visual deception by specialist means.³¹¹

Blackboard. I'm afraid I use it to such an extent that by the end of the day I look like a snowman. I think it is a terrific help.³¹²

Figure 2. British Soldiers in the Desert War



Don't bother about the bloody army if you don't feel like it and can't stand the sight of scores of soldiers. It's very easy not be able to stand them.³¹³

Figure 3. Desert grave

So much importance is attached to visual training that scientific investigation into methods of improving the soldier's powers of observation has been carried out. It has become clear that the chief fault lies in the assumption that the use of the eyes is natural and does not need teaching.³¹⁴



³¹¹ Memorandum to General Director of Staff Duties 3rd November 1943 , Camouflage and Visual Misdirection Policy Section II Implementation – NA WO 219/2211.

³¹² Army Camouflage School Programme – DG GMA A64/1/16/7/2.

³¹³ Letter from Colonel Buckley to Julian Trevelyan 24th March 1942 – WL JOT 27/17.

³¹⁴ Letter from Director of Military Training 8th September 1945 - NA WO 32/11043.

Having accumulated a vast volume of camouflage material, I left the archive and began reordering the orderly and disorderly to tell a story of the historical geography of military camouflage. Indeed:

At some point you have to return the item, pack up your notes and your pencil, shut your laptop, and leave the archive to tell your stories.³¹⁵

CONCLUSION

In brief, to clarify the uses of biography throughout this thesis: a geographical biography of Dr Hugh Cott, tracing the intersecting sites of his scientific research and camouflage's development, forms the central structure of the study. This geo-biography is shot through with the shards of fragmentary mobile biographies, telling something of the lives of others' who were also involved in the history of military camouflage, and who encountered Cott during the war. It is thereby intended to allow for multiple perspectives to be articulated, thus not only more fully accounting for the history and life of camouflage, but affording something of a many-sided narrative to a design aesthetic (camouflage) that has some of its artistic roots in Cubism, broken up, analysed and reassembled. Finally, it is through these uses of geographical biography and fragmented mobile biographies that the wider project is realised, one section of the vast and ever-altering life-path of camouflage is explored and narrated through its enrolment in the British military from the invention of "dazzle" in WWI through to WWII and a move to aggressive visual warfare in the desert. It is hoped that this engagement with biography as a methodological tool allows the more-than-human nature of the technology and its knowledge production to be highlighted, and also for the visceral complexities of life – human and nonhuman – to be depicted through critical yet considerate storytelling, such an approach, embracing a narrative with war at its heart, can also begin to articulate the jarring of mundane ordinariness alongside the extremes of despair and hope that soldiers experienced.

Chilvers has argued that in the production of biography, the result should be 'replete with the spots of blood that will not wash away'.³¹⁶ This attention to the tragic, it is suggested, not only allows the biographer to account more fully for the complexity of a character and their relation to their social environment, but it can meet another pressing issue: "Tragedy requires historical allegory as the forum for the development of social consciousness. It demands an

³¹⁵ Ogborn, M. (2011) op cit. p.93.

³¹⁶ Chilvers, C. (2007) op cit. p.106.

agitated audience seeking to comprehend and question the limits of their historical role'.³¹⁷ Including tragedy in an historical narrative of war and the development of military technology may seem an obvious component in storytelling, but to date the tragedy of camouflage has often been overlooked. Yet tragedy - the loss of life in order to save and to be victorious - was at the heart of camouflage's story. It was a technology, by WWII, designed to stem and accelerate the flow of violence, and thus its biography is indeed 'replete with spots of blood' that should not be washed away by the historian or biographer. This study, structured through interweaving biographies, aims to give a face and humanity to the technological innovation and conflict. It does not intend to excuse or defend violence, but to expose how, on the edges of destruction, and occasionally in its midst, ordinary relatable lives are present and striving to get on. This may complicate engagements with the dense networks of relations that enable military violence, but can allow for closer scrutiny of those networks, encompassing the cultural, as well as the political, and so delving deeper into the roots of militarism. Virilio states that 'history progresses at the speed of its weapon systems',³¹⁸ and it is hoped that this study of one particular military technology, attending to the spaces and movement of camouflage's life-path, can reveal how, similarly to history, geography too progresses at the speed of weapons systems. In turn, geography helps to produce weapon systems, sometimes in unexpected and novel ways.

³¹⁷ Ibid p.107.

³¹⁸ Virilio, P. (2006) *Speed and Politics: An Essay on Dromology* p.90.

THE ABC OF CAMOUFLAGE: G-J

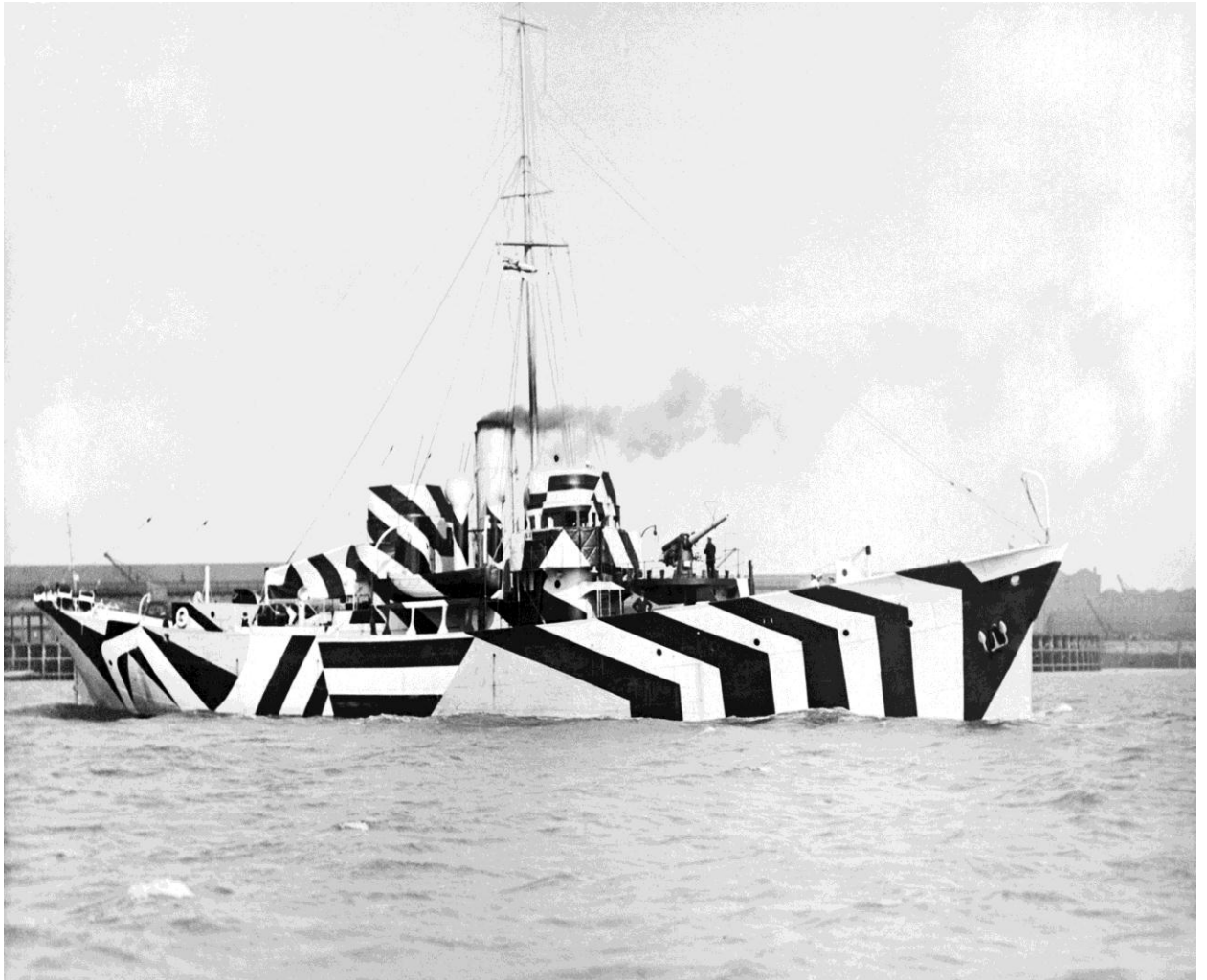
G is for Garnishing, this should be wound to copy the texture and tone of the ground.

H is for Hiding, so please keep it dark, and remember to go in the shade when you park

J is the Job which has got to be done: the Camoufleur knows it, and so does the Hun.

Chapter 4.

Dazzling and Disrupting Conflict: Place, Environment and Site in WWI Camouflage



TRACING ORIGINS

In the author's view the most comprehensive title yet coined for this field of action is "visual warfare". The word "camouflage" is quite inadequate. A bad fault is its passive and defensive implication.³¹⁹

At the end of WWII there began a process of reflection aimed at assessing the events and consequences of six years of total war. During this period investigations were initiated into the impacts of the military technologies employed and developed throughout WWII, and one such was concerned with camouflage. The initial statement from the report, which appears above, on the impact and effectiveness of camouflage in warfare reveals that within the British military there was great dissatisfaction surrounding the word used to describe methods of 'visual warfare'. Unease with this label was shared by many who had undertaken development in camouflage throughout the war. The term seemed to capture something of the ambiguous nature of this military technology:

The word Camouflage has come today to mean something different to almost every member of the community. To the soldier it is the ubiquitous net with a few pieces of scrim tied into the corner which he is supposed to throw over his truck when parking; to the architect it is the lozenges of green and brown paint that obliterate the features and symmetry of his buildings. To the ordinary citizen it is something between a sort of magic cloak of invisibility and a bad joke in *Punch*.³²⁰

I think you will now have realised that the curious work of "Camouflage" covers a wide field of military activity. There is a voodoo quality about the word.³²¹

'Camouflage' seemed an abstruse name. In the public view and for some in the military too, it conjured a sense of the surreal and magical for a military technology, instead of a skill and practice honed through dedicated research and experimentation. But, however frustrated the camoufleurs might have felt with the label for their craft and subsequent related technological innovations, the etymology of the word lends insight into the particular nature of this mysterious tactic of warfare.

In WWI, 'camouflage' appeared as the name to describe the relatively new practice of attempting to conceal the military's presence and plans from enemy observation. The term arrived in Britain after crossing the sea from France, and its official appearance in print can be traced to its publication in 1917 in the *London Daily News*.³²² From its origin point the word followed an intriguing and tangled route through French history, theatre, and warfare.

³¹⁹ Wiseman, D.J.C. (1953) *The Second World War 1939-1945 Army Special Weapons and types of warfare Vol. III* p.148 REML 623.77 940.42.

³²⁰ Trevelyan, J. (1944) Camouflage, *Architectural Review* -TWL JOT 54/4 (142).

³²¹ McIntosh Patrick, J. Course notes *Tactical Deception* - DG A64/1/16/4/3.

³²² Blechman, H. (2004) Camouflage. In Newman, A. & Blechman, H. (eds.) *Disruptive Pattern Material: An Encyclopedia of Camouflage* p.25.

Blechman suggests that its beginnings can be observed in the sixteenth-century French term '*camouflet*', a nasty practical joke where a hollow paper cone is lit, then held under the nose of an unsuspecting sleeper, who is awakened by the shock and fright of inhaling smoke. Or perhaps, Blechman proposes, camouflage derived from the nineteenth-century word '*camouflet*', the name of a small yet powerful explosive device used by the military to trap, bury and suffocate tunnelling enemy troops. Or maybe, he muses, it derived from the more innocuous term '*camoufleur*', a theatrical verb to 'get made up', referring to the performers' transformation through costume and make up,³²³ the practice of shape shifting. The character of camouflage emerged through an irregular and disjointed history, following routes of deception, disguise and danger, traversing worlds of black comedy, flamboyant theatre and deadly weaponry. The word suggests that camouflage plays the fool and makes the fool, hinting at military functions to disrupt and alter conflict.

However, the attempt to trace the emergence of military camouflage as a technology and practice is more problematic. Camouflage does not appear to have been born in one particular or defining moment. As Steedman describes: "The search for the historian's nostalgia for origins and original referents cannot be performed, because there is actually *nothing there*: she is not looking for anything: only silence, the space shaped by what once was; and now is no more".³²⁴ Indeed, camouflage's life-path has a stretched historical trajectory with an exceptionally long non-human history, before the human record of the use of camouflage even began to be written. The writings of Abbott, H. Thayer, Hugh Cott, and Lieutenant Colonel Chesney³²⁵ - important figures in the development of modern military camouflage - locate the beginnings of camouflage in the early materialisation of life, and the subsequent continual struggle for survival across and between species. Concealment, distraction and deception are skills developed through an intimate connection to the environment, with a key awareness and perception of ground pattern,³²⁶ the background to life. An engagement with nature has also been important in human history, which has been studied in indigenous tribes in the tropical jungle of South America,³²⁷ to the Aboriginal people of Australia,³²⁸ whereby effective strategies for concealment when hunting pay close attention to techniques and colours found in the natural surroundings. However, by the

³²³ Ibid.

³²⁴ Steedman, C. (2001) *Dust (Encounters)*.

³²⁵ Thayer, G. (1909) *Concealing-coloration in the animal kingdom; An exposition of the laws of disguise through color and pattern: being a summary of Abbott H. Thayer's discoveries*; Cott, H. (1940) *Adaptive Coloration in Animals*; Chesney, C.H.R. (1941) *The Art of Camouflage*.

³²⁶ Booklet: "Backgrounds" Spring 1942 – GMA A64/1/16/2/2.

³²⁷ Kerr, J.G. (1950) *A Naturalist in the Gran Chaco*.

³²⁸ Blechman, H. (2004) op cit. p.92.

twentieth century this skill for blending into, or engaging with, the natural environment had been lost to most of human society:

It was once an instinct. But that instinct has been largely lost by civilised man ... Primitive man, savages, Red Indians, and even children, all share the same instincts for hiding, sleuthing, and a sort of unconscious capacity for becoming part of their background.³²⁹

However, by WWI this loss in instinct had, it was realised, potentially dangerous consequences:

Today under the stresses of war we have had to re-acquire this lost instinct.³³⁰

Innovations in weaponry had led to war becoming increasingly deadly for ever-larger populations, including non-combatants. Blechman states that 'the human use of camouflage for military purposes is intrinsically linked with the evolution of combat technology'.³³¹ Hartcup explains that in the mid-nineteenth century technology and science began to transform the character of warfare.³³² In particular, developments in firearms, led to weapons becoming more accurate and with the capacity to operate over longer ranges. Therefore, it became a necessity to conceal soldiers, in order to reduce casualties.³³³ Rankin suggests that it was the Indian Mutiny in 1857 and the South African War 1899-1902 which convinced the British Army that 'bright pillar-box red was best kept for the parade ground. Muddy field-manoevres needed dingier or dungier battledress'.³³⁴ Therefore, prior to 1914, camouflage had begun to undergo tentative and limited experimentation, restricted to concealing the small and swiftly mobile body of the soldier. But it was during WWI, when the scale of war was grossly multiplied, that research into camouflage began in earnest, and modern military camouflage became an integral element of military practice, not only for the soldier, but also for the concealing of weapons, vehicles and artillery.

There are multiple narratives and many individual biographies by which camouflage could be traced and different routes through the technology' development which could be narrated. Yet, WWI camouflage history has in the main focused on the connection between early military camouflage and the Cubist art movement. Cubist art disrupts homogenous space

³²⁹ Trevelyan, J. (1944) op cit. p. 7.

³³⁰ Ibid.

³³¹ Ibid.

³³² Hartcup, G. (1988) op cit. p.120.

³³³ Borsarello, J.F. (2004) Military. In Newman, A. & Blechman, H. (eds.) *Disruptive Pattern Material; An Encyclopedia of Camouflage* p.121

³³⁴ Rankin, N. (2008) op cit. p.47.

through a language of abstract form and overlapping planes.³³⁵ Comparisons to camouflage can be drawn, as it too works at fragmenting space through distortion, angles and planes. The techniques that the Cubists used to stimulate objects, camoufleurs would use to obliterate them, and one anecdote is routinely retold in the technology's history. While strolling down the streets of Paris in 1915, Pablo Picasso and Gertrude Stein witnessed a convoy of guns, painted with zig-zag stripes, trundling past. Surprised to see that Cubist distortion and disruption of form had penetrated the military, Picasso turned to his companion and exclaimed, 'We invented that'.³³⁶

This connection between art and military technology had been deliberately forged, and the artist Guirand de Scevola, who was in charge of French camouflage during WWI, acknowledged that Cubism informed his pioneering camouflage designs:

In order to totally deform objects, I employed the means Cubists used to represent them.³³⁷

This intertwining of art movement and military technology is intriguing as it begins to expose the links between militarism and culture, but a predominant focus on Cubism and Picasso does little to explore the particular places and moments of camouflage's emergence. To question further the entangled nature of knowledge and technological production through the emergence of specific military practices, such as camouflage, it requires detailed consideration of those who worked with and for the military.

Thus, partial biographies of three men - Abbott Thayer, John Graham Kerr, and Solomon J Solomon, key contributors to British military camouflage in WWI - will be critically charted. I intend to explore the intersection between their lifeworlds and the development of camouflage in WWI in order to mark the beginnings of a biography of military camouflage. The interplay of fragmentary-mobile biographies of those involved, explored for different temporal lengths, will consider how the geographical frameworks (and also important factors in camouflage schemes) of place, environment and site help to reveal military camouflage emerging through the correspondence between art, science, nature and military knowledges. Therefore, the networks, connections and relations between humans and nonhumans, as well as between scientists, artists and the military during the pressures of warfare, will all be documented. In particular, this threefold biography aspires to mark itself as distinct from other narratives on military camouflage in WWI, by drawing attention not only to the eccentric outsiders brought

³³⁵ Karmel, P. (2003) *PICASSO and the Invention of Cubism*, pp.1-44.

³³⁶ Behrens, R. (1978) On Visual Art and Camouflage, *Leonardo* 11 (3) p.204.

³³⁷ Kerns, S. (1983) op cit. p.303.

in to aid the military, but to consider their impacts on the character and organisation of the military; which is itself considered as an active agent within this process. This chapter will tackle how military knowledge was shaped by the blurring of seemingly distinct spaces of culture, science and the military with lasting consequences, laying foundations for further camouflage innovations and developments in WWII.

ABBOTT H. THAYER (1849- 1921) – PLACE

While man has gone on wrestling from Nature one deep-buried secret after another, the whole field of protective coloration has lain unconcealed, inviting recognition, resplendent with wonderful and beautiful phenomena.³³⁸

To read the 2009 theme issue, ‘Animal camouflage: current issues and new perspectives’, in the journal of *Philosophical Transactions of the Royal Institute B*, one finds a name recurs throughout the majority of the articles and is present in nearly all the reference lists, Abbott H. Thayer. Throughout the theme issue, which assesses potentials for further research into camouflage in nature, Thayer is raised up as *the* pioneer in research on natural camouflage, in particular his work on the principle of countershading, which enables animals to conceal themselves from visual detection or surveillance.³³⁹ As Rowland explains, ‘Thayer (1896) is generally accepted to be the first person to hypothesize this function’,³⁴⁰ and as such he is the ‘father of camouflage’.³⁴¹ It is perhaps surprising, then, to discover that Thayer was not a professional scientist; instead, he was an American artist specialising in portrait and landscape paintings. Importantly, though, Thayer was also an avid naturalist with a keen eye, thus a sharp observer of nature. These two interests, art and nature, had been fostered since a childhood spent in rural New Hampshire. Ardent fascination with birds turned his childhood landscape into a field site ripe for ornithological pursuits. Days were devoted to hunting, trapping and taxidermy, and also to painting watercolours of creatures encountered in fieldwork.³⁴² These beginnings offer hints as to why Thayer was particularly well placed - both geographically and figuratively - to make a cardinal contribution to zoology.

³³⁸ Thayer, G. (1909) op cit. p.3.

³³⁹ Tankus, A. & Yeshurun, Y. (2009) Computer Vision, Camouflage Breaking and Countershading, *Philosophical Transactions of the Royal Institute B* 364 p.529.

³⁴⁰ Rowland, H. (2009) From Abbott Thayer to the Present Day: What have we Learned about the Function of Countershading?, *Philosophical Transactions of the Royal Society B* 364 p.519.

³⁴¹ Behrens, R. (1988) The Theories of Abbott H. Thayer: Father of Camouflage, *Leonardo* 21(3) pp.291-296.

³⁴² Behrens, R. (2002) op cit. p.38.

Firstly, even as a child Thayer's interest in and interaction with his natural surroundings appear to have bonded his adeptness for the artistic with scientific enquiry. The 'two cultures'³⁴³ for him perhaps never had distinct boundaries. Consequently, Thayer's contribution to science was born from the blurring of artistic impression and scientific observation and investigation. Secondly, the New Hampshire landscape and Thayer's attachment to it endured throughout his life, and he was continually embedded within this environment. The situatedness of his work in a familiar and familial landscape meant that the spaces of Thayer's naturalist pursuits, artistic endeavour and scientific research were places in which he was rooted. Landscape and place shaped Thayer's science and art and in turn they would strongly influence Thayer's interaction with natural surroundings. Just as the patterns of migratory birds trace their biological biographies, so Thayer's life leads back to the forests of New Hampshire.

It was here that Thayer retreated after his successful, high profile career in the New York art world was irrevocably altered by a series of family tragedies, including the sudden death of two children and that of his first wife.³⁴⁴ The return to New Hampshire saw Thayer and his family living an isolated existence in Dublin House, in the woods where Thayer had been raised. Here, he was largely detached from modern society and his character began to take on colourful and eccentric habits. Thayer's devoted family indulged his desire to sleep outdoors in all seasons and only in the bitterest of conditions to allow the windows of the house to be closed.³⁴⁵ Home and the wild were encouraged to mingle in the Thayer household, and it was a space that defied conventional notions of the place of nature, whereby 'particular human societies wish to exclude certain types of animals from their homes and neighbourhoods (because they are regarded as "wild", "unclean", "unhygienic")'.³⁴⁶ But, in Dublin House the domesticity of the maid and housekeeper co-inhabited with the wild of the intruding owl and weasel. Conventional boundaries between human and nonhuman, and between usually included and excluded nonhuman in the domestic space, were not only blurred but actively disregarded.

³⁴³ Snow, C.P. (1959) *The Two Cultures and the Scientific Revolution*. Snow suggested that within modern society the sciences and humanities, specifically referring to literary scholars, had 'almost ceased to communicate at all', styling themselves as two distinct cultures.

³⁴⁴ Behrens, R. (2002) *op cit.* p.39.

³⁴⁵ *Ibid* p.40. It is rumoured that Thayer began each winter with a new pair of long woollen underwear, which he would snip shorter and shorter as the months progressed so when summer arrived he was left with a suitable pair of shorts. Also, wild animals were free to enter and roam the family home, whilst pets such as spider monkeys would often escape the confine of their cages, and stuffed animals were the dominant ornamentation in each room.

³⁴⁶ Philo, C. & Wolch, J. (1998) Through the Geographical Looking Glass: Space, Place, and Society-Animal Relations, *Society and Animal* 6 (2) p.108.

In New Hampshire Thayer revisited boyhood experience as, once again he again began to spend hours in ‘communion with nature’.³⁴⁷ It was through this correspondence with nature, a dwelling in and with the natural environment that led Thayer closely to observe and study protective colouration in animals. Livingstone has explained how presence, closeness and movement through spaces of scientific investigation can lend credence to claims of scientific fact.³⁴⁸ Thayer’s research was centred on his presence and closeness to his natural surroundings, his field site, and it was his embeddedness in place rather than movement through space - his particular situatedness and emotional connection to his field site - that allowed him the opportunity to engage in depth with ideas on protective colouration; to a greater degree than biologists and zoologists had achieved so far. Thayer had allowed nature and wild non-humans to permeate his surroundings, so that this lively landscape was not the backdrop but the fabric of his work. Hinchliffe explains that ‘inhabiting human and non-human landscapes will produce changes to all parties (albeit to varying levels and to different degrees)’.³⁴⁹ Thayer’s particular notion of inhabitation with nonhumans produced studies on nature that would give him a particular attitude through which he approached the study of nature.

During this period Thayer’s artistic and scientific eye focused increasingly on animal colouration. He began to investigate the possible functions of similar colourings and patterns, which he had noticed reoccurring across prey species. He scrutinised uses of colours and patterns in relation to natural surroundings, discovering a dialogue between the two; his interest piqued, Thayer became an earnest observer of nature. Macdonald, with specific reference to ornithology, explains the distinctive activity of observing, as ‘Bird *observing* was not bird *watching*: it implied a specific, investigative telos. The observer was actively investigating - identifying, recognising, recording’.³⁵⁰ Similar to Hinchliffe’s suggestion that through the inhabitation of lively human and nonhuman landscapes, changes occur in all parties, Macdonald also suggests that relationships with the world are altered through the process of observation, describing it as ‘self-construction through visual practice’.³⁵¹ Thayer’s closely and ‘actively investigated’ observations made in the woods of New Hampshire would have far-reaching consequences for both the natural and human world, including for scientific enquiry and the militarism of knowledge. Recently, Lorimer has posed the question: ‘What can we humans discover of ourselves amid the lives of other creatures? How do other

³⁴⁷ Behrens, R. (2002) op cit. p.40.

³⁴⁸ Livingstone, D. (2003) op cit. p.41.

³⁴⁹ Hinchliffe, S. (2002) op cit. p.207.

³⁵⁰ Macdonald, H. (2002) op cit. p.61.

³⁵¹ Ibid.

creatures inform our sense of what it is to be alive'.³⁵² Consideration of Thayer's study of nature offers insight into how for one man, lived amid other creatures was integral to his sense of being alive. But, it also hints at how these personal encounters and engagements with nonhumans can contribute to and influence wider knowledges, such as military and scientific knowledges, and experiences, such as warfare.

This engagement with nature and nonhuman animals led to one of Thayer's most important observations that:

Animals are painted by Nature, darkest on those parts which tend to be most lightened by the sky's light, and vice versa.³⁵³

Figure 4. Flamingos by lake - A. Thayer

The effect of this colouring is that the animals become harder to detect, as the graduating tones from dark back to white belly flattens the three dimensional form of the animal's body. This observation became the principle of 'countershading' and was Thayer's most significant contribution to scientific understandings of animal camouflage. Thayer first published his findings and interpretations in 1896



in *The Auk*, the American Journal of Ornithology. The principle of countershading grabbed the attentions of the scientific community, steering studies of animal colouration and pattern perception into a new phase of intense research.³⁵⁴ Thayer also began to develop ideas on mimicry and disruptive shading, all of which were published in academic journals and later compiled in a seminal text, *Concealing Coloration in the Animal Kingdom*, in 1909. This influential book combined Thayer's scientific work and, also importantly, his artistic impressions of nature's techniques of camouflage. Thayer had been perceptive in realising that although the principle of concealing colouration was a subject of scientific enquiry, it was also an area that would benefit from artistic interpretation. After all, Thayer had discovered the function of

³⁵² Lorimer, H. (2010) op cit. p.56.

³⁵³ Thayer, A. (1896) The Law Which Underlies Protective Coloration, *The Auk* 13 pp.318-320.

³⁵⁴ This included further study into the use of colours and patterns to aid in disruptive patterning, the breaking up of the structural form of animal bodies, mimicry, and warning colours. This research was undertaken by Thayer and also British biologists and zoologists such as Edward Poulton (1890) and Alfred Wallace (1889), and later Hugh Cott (1940).

countershading colourations, while observing his natural surroundings both as an artist and as a naturalist. In the book he set out to emphasise and demonstrate that camouflage was not only a science, but necessitated an artistic appreciation; thus, camouflage was indeed an entanglement of two disciplines, and therefore the book, for Thayer, was both scientific and artistic.

Concealing Coloration in the Animal Kingdom, like many scientific texts, is peppered throughout with illustrations and photographs, placed to demonstrate and authenticate Thayer's claims. Illustrations are luxuriously separated from the body of text and photographs by a fine leaf of tissue paper. When gently turned, the tissue reveals Thayer's passion for the beauty of nature, and also some of the more fanciful notions of his theory. Thayer was not a trained scientist and at times scientific prose is juxtaposed with romantic images of nature. For example, the pink of the flamingos by the lake, necks bent in the shallows of the water, blend into the sunset, nearly indistinct (figure 4). These images and ideas are beautifully illustrated and described, but they fall short as pieces of serious scientific investigation into camouflage. As Shell explains, 'even if animals didn't always appear to disappear in the real world, they could do so very well in [Thayer's] assembled version of that world'.³⁵⁵ Tricks of the eye were not confined to nature, therefore, but were also employed by Thayer to (re)present nature in an attempt to explain its techniques. On occasions he also used mixed methods to set out his perception of techniques of concealment in nature, and at times the art of painting mingles with the scientific technology of the camera within the same image in order to show what Thayer had not observed himself, but was convinced was scientific fact. As a result the book is infused with a strange quality, where the boundaries between the eye and the imagination blur, while real and surreal blend as hypothesis and researched fact become conflated. from their dusky surroundings.

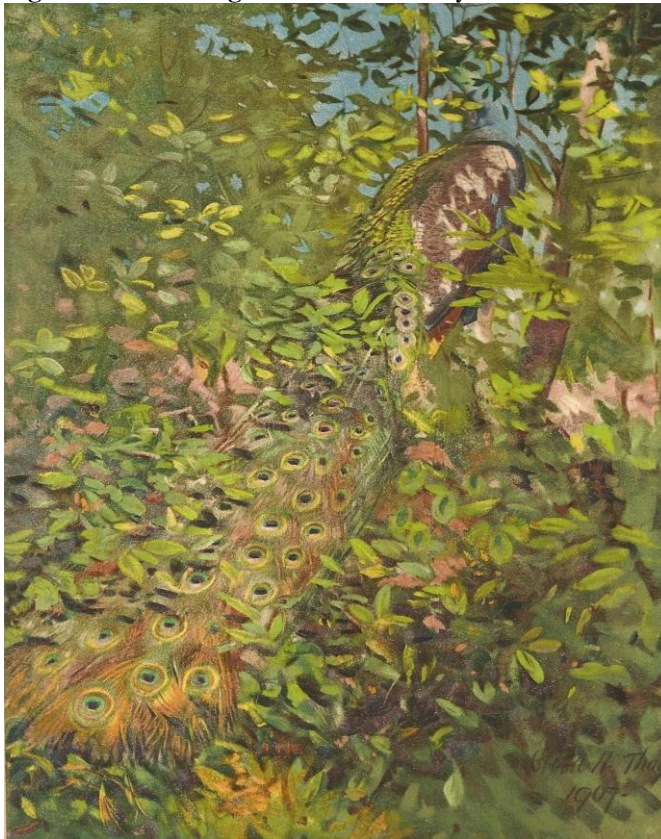
Thayer had come to believe that *all* animal colourations and patterns were to function as cryptic concealment, and he claimed that even the vibrancy of the peacock was a design not of sexual display, but an aid to help the bird melt into the myriad colours of the forest (figure 5):

The peacock's splendour is the effect of a marvellous combination of 'obliterative' designs in forest-colors and patterns. From the golden-green of the forest's sunlight, through all its tints of violet-glossed leaves in shadow, and its coppery glimpses of sunlit bark or earth, all

³⁵⁵ Shell, H.R. (2009) op cit p.54.

imaginable forest-tones are to be found in this bird's costume; and they 'melt' him into the scene to a degree past all human analysis.³⁵⁶

Figure 5. Camouflage Peacock - A. Thayer



Such 'examples of concealing coloration' as the peacock laid out in his book led to some high profile criticism. Theodore Roosevelt, a keen big game hunter and naturalist, embodying the masculine traditions of the pursuit, publicly scorned Thayer's ideas. He challenged Thayer's theory of camouflage because, from his own experiences of observing zebras and giraffes on safari, he found that these animals could be seen from miles away. Roosevelt wrote to Thayer:

If you ... sincerely desire to get at the truth you would realize that your position is literally nonsensical.³⁵⁷

This critique of Thayer's work continues to this day, as Forbes, in his recent study on the applications of biological and artistic knowledge to military camouflage, suggests that the lack of rigour in Thayer's claims about the extent of cryptic coloration³⁵⁸ in nature arouse precisely because his science was compromised; 'Thayer was not a scientist; he had nothing of the scientist's temperament. He was an artist whose idealistic fervour, edged by deep insecurity,

³⁵⁶ Thayer, G. (1909) op cit.

³⁵⁷ Merryman, R. (1999) A Painter of Angels became the Father of Camouflage, *Smithsonian Magazine* p.2.

³⁵⁸ The term cryptic coloration refers to colours that aid in the concealment or disguise an animal's shape and form.

led him to regard his findings less as discovery than as revelation'.³⁵⁹ Forbes, himself a scientist *and* poet, attributes Thayer's inaccuracies and failings to the entanglement of artistic temperament and scientific endeavour, in effect re-establishing the distinction and distance between the scientist and the artist. Thayer may have made an important contribution to science, but for some he does not possess the traditional characteristics of the objective and disciplined scientist. With the artist and naturalist in Thayer, we witness a 'breach between embodied life and disembodied knowledge',³⁶⁰ used to justify failings in his science.

Thayer did not perceive his artistic sensibilities as a hinderance to his science; instead, he used it as a means to justify his particular position as an expert. He stated that the study and understanding of animal colouration and concealment can be most effectively grasped by the artist:

The entire matter has been in the hands of the wrong custodians. Appertaining solely to animals, it has naturally been considered part of the zoologists' province. But it properly belongs to the realm of *pictorial art*, and can be interpreted only by painters. For it deals wholly in optical illusion, and this is the very gist of a painter's life.³⁶¹

The artist's eye, Thayer maintained, was skilled and trained in understanding methods of vision and colour, and therefore also, the design of concealment in nature. The skill of the artist lay in how painters visualise, perceive and translate the world into their art. Importantly for Thayer, though, it was art which revealed to him scientific fact; in the entanglement of art and science in biological camouflage, art was the catalyst to understanding the mysteries of nature and science.

Despite critique, Thayer's work also attracted praise, from the scientific community, specifically via its application in museum models demonstrating countershading. The first model Thayer designed was for the American Museum of Natural History and demonstrated the effectiveness of countershading. Four ducks were painted in a colour to match their background surroundings. Two were painted in the uniform tone of their background. Two were painted in the same colour, but with the gradation from dark to light tones according to patterns that Thayer had observed in nature.³⁶² The model's effect was thought successful enough at revealing the countershading principle that replica models were designed for use in several natural history museums across Europe. Thayer described their design:

³⁵⁹ Forbes, P. (2009) op cit. p.74.

³⁶⁰ Livingstone, D. (2002) op cit. p.77.

³⁶¹ Ibid.

³⁶² Behrens, R. (2002) op cit. p.44.

they are on an axis with a crank and the visible one is painted all over with the same paint as the background and the other so well graded that the delighted zoologists can't see it at all at five or six yards.³⁶³

Behrens considers the impact that viewing these models would likely have had: 'It may not be undue to say that Thayer's demonstrations really were 'almost magical', in the sense that to observe them was probably the equivalent to witnessing sleight of hand magic at close range: standing by in disbelief as tangible, physical things vanish into thin air'.³⁶⁴ In Britain, Thayer drew the attention of Edward Poulton, an eminent professor of zoology at Oxford, whose own research interests lay in the colours, markings and protective behaviour of caterpillars.³⁶⁵ Rowland explains that although Thayer is generally attributed as the first person to hypothesise countershading, Poulton had noted in his scientific studies that the roundness of some butterfly chrysalises were diminished by white markings.³⁶⁶ It seems that Thayer had encapsulated and extended some of the ideas coursing through British zoology after Darwin's theory of evolution.³⁶⁷ Another British zoologist who was impressed by Thayer's research, in particular the model demonstrating countershading at the Natural History Museum in London, was John Graham Kerr, a zoologist at Cambridge. Kerr encouraged Thayer to produce another of his duck models for the Cambridge Zoology Museum, and the men began a scholarly correspondence. Kerr greatly respected Thayer's research and their relationship, born in the museum and forged through a mutual interest in biological camouflage, led to an allied approach from both men to liaison with the military in WWI.

JOHN GRAHAM KERR (1869-1957) – ENVIRONMENT

One need not to go into the ways of the Admiralty Officials. Unless you belong to the Admiralty, you of course, are of no account.³⁶⁸

John Graham Kerr had initially studied mathematics and philosophy at the University of Edinburgh, but having transferred to the medical faculty, was still not settled. Restless, he interrupted his studies to join an expedition (1889-91) to survey the Pilcomayo River from the Parana to the frontiers of Bolivia. It was on this fieldtrip, with his efforts particularly focused

³⁶³ White, N. (1951) op cit. p.87.

³⁶⁴ Behrens R. (2009) op cit. p.498.

³⁶⁵ Carpenter, G. (2004) Poulton, Sir Edward Bagnall, *Dictionary of National Biography*.

³⁶⁶ Rowland, H. (2009) op cit. p.519.

³⁶⁷ Poulton, E.B. (1890) *The Colours of Animals: Their Meaning and use, especially considered in the case of insects* & Poulton, E.B. (1896) Natural Selection the Cause of Mimetic Resemblance and Common Warning Colours. In Wallace, A.R..(ed.) *The Problem of Utility: Are specific characters always of general use* pp.10-19.

³⁶⁸ Letter from JR Brown to Kerr, 6th April 1920 - GUA DC6/276.

on ornithology, that Kerr's interest in nature's methods of coloration for concealment began.³⁶⁹ On this expedition Kerr was immersed in a new environment:

Nearly three years in the Gran Chaco of South America living among races of Indians spending time hunting and observing wild animals, studying in actual wild nature the various devices by which natural selection has succeeded in diminishing conspicuous animals in their natural surroundings.³⁷⁰

Kerr found that his close understanding of the workings of natural camouflage had been developed and nurtured through:

very intimate contact with the subject both as a biologist and as one depending on his food on his success as hunter.³⁷¹

The zoologist in Kerr had been roused by this research undertaken in South America, and on his return home he switched his studies one last time from medicine in Edinburgh to natural history in Cambridge, where throughout degree studies and further research in an academic career Kerr applied himself to questions of cryptic coloration:

I have for many years been especially interested in the means whereby wild animals are made inconspicuous and have during my expeditions to South America [1889-1891 and 1896-7] paid special attention to this question.³⁷²

It was on a trip to Germany in 1895, when witnessing the opening of the Kiel Canal (figure 6), that Kerr realised the possible application of the biological principles of cryptic coloration in nature to the scientific sphere and in particular its use for military purposes. Indeed:

At the opening of the Canal at Kiel in 1895 - which many recognised at the time as the first obvious move in a great game against England - I was struck by the uniform protective colouring which the Germans (and French) had adopted for their warships and which formed a striking - aesthetically unpleasant - contrast to the beautiful colourings of our own vessels.³⁷³

Kerr noticed that the uniform grey hues of the French and German ships functioned as an obliterative colour, reminiscent of the background blending of some animals, while the 'Later Victorian' style of the British ships with their black hulls, white upper works and yellow funnels, rendered them, in contrast, quite conspicuous.³⁷⁴ As the prospect of war increased, Kerr turned attention to possible applications of the scientific principle of concealment to military hardware, specifically ships. Accumulated experience led him to realise that the

³⁶⁹ Hindle, E. (2004) Kerr, Sir (John) Graham, *Dictionary of National Biography*.

³⁷⁰ Letter from Kerr to Mr Balfour, 5th December 1915 - GUA DC6/258.

³⁷¹ Kerr, J. G. (1941) Camouflage in Warfare, *Nature*, 147 p.758.

³⁷² Letter from Kerr to Churchill, 24th September 1914 - GUA DC6/246.

³⁷³ Letter from Kerr to Mr Balfour, 5th December 1915, op cit.

³⁷⁴ Letter from Mr Prendergast to the of *The Navy*, 17th November 1931 - GUA DC6/433.

blending grey colours represented only the beginning of what could potentially be achieved in diminishing the visibility of ships at sea:



Figure 6. Ships at the opening of the Kiel Canal

It was this experience at Kiel, superimposed on the earlier experiences in South America, that led to my taking up seriously the subject of war camouflage.³⁷⁵

The ships at Kiel may have been striking in their subtle uniformity, but Kerr recognised that natural designs to reduce visibility were more detailed and developed in regards to specific local environments, and therefore much more effective:

The extent to which man in his war camouflage falls short of what is attained by Nature in the animal kingdom. The effect of the grey coloration was obviously interfered with by differences in light and shade, which detracted from the obliterative effect not merely of the ship as a whole but still more so in the case of those details which on one hand betray the character of the ship and on the other hand, through their perspective, play an important part in showing how the ship is heading. No attempt had been made to counteract those disturbing effects by the application of countershading; nor any attempt to obscure the form of the ships or of their details by destroying the obvious continuity of their surface and outlines.³⁷⁶

Kerr's initial study of military camouflage demonstrates that knowledge acquisition regarding natural concealment and military camouflage were already interwoven. His work, from then on, began to inhabit the spheres of both scientific investigation and developments in military technique and hardware, and he envisaged a clear transfer of scientific knowledge to the military realm and from the nonhuman kingdom to human use. Yet, in the early twentieth century, as an area of scientific enquiry, cryptic colouration was still only an embryonic field of

³⁷⁵ Kerr, J.G. (1941) op cit. p.759.

³⁷⁶ Ibid.

enquiry. Therefore, as Kerr set his mind to consider the applications of natural camouflage to the military, he increasingly studied animal colouration, its functions and techniques, through scientific *and* military lenses, anticipating the potential of ‘attending to the interface between social and natural worlds’.³⁷⁷ Kerr’s willingness to transfer biological knowledge and rework it for application to the military reveals the hybrid nature of the development of military camouflage, appreciating that techniques for survival in nature could be usefully employed to enhance the human battlefield. As Whatmore explains;

...wild animals have been, and continue to be, routinely imagined and organised within multiple social orderings in different times and places. Their myriad (re)positionings within these networks have been complicating animal geographies long before the possibilities of genetic engineering startled our commonsense coordinates of the place of the wild.³⁷⁸

When turning to the problem of how to disguise or reduce the visibility of ships at sea in an efficient manner, Kerr duly began to disrupt human relationships with wild animals and to (re)position them within our human structures of knowledge and technological advancement.

Kerr hypothesised that what was required for ships at sea was *not* an attempt to blend into the background, as he had observed with the ships at Kiel. He recognised the impossibility of concealing ships, because the seascape is an environment of perpetual motion, with the changing effects of light on the sky and water. Instead, the aim should shift from merging to distracting and confusing the eye of the observer to the shape and direction of the vessel. Kerr’s studies of the starkly contrasting colours and stark patterns of the zebra, leopard and giraffe were instructive, effectively confusing the eye to the form, direction and movement of these animals.³⁷⁹ Therefore, reduced visibility for ships could be achieved by obliterating the distinguishing details used by range finders to identify a vessel, such as their structural outline. This scheme, drawn from nature, was known as ‘parti-colouring’.

In July 1914, Kerr - now occupying a chair in zoology at the University of Glasgow - wrote to Churchill, First Lord of the Admiralty, setting out recommendations for the painting of naval ships in order to render them less visible.³⁸⁰ This memorandum was to be the first of many communications from Kerr sent to Churchill, and the Admiralty. It appears from Kerr’s archive that he received no feedback from Churchill regarding the Admiralty’s enthusiasm for, or the usefulness of, his ideas. However, in December 1914 Kerr heard from a former student, now in the Navy, confirming that trials in parti-colouring were underway:

³⁷⁷ Whatmore, S. (2002) *op cit.* p.2.

³⁷⁸ *Ibid* p.14.

³⁷⁹ Kerr, J.G. (1929) *An Introduction to Zoology* & Kerr, J.G. (1950) *A Naturalist in Gran Chaco*

³⁸⁰ Letter from Kerr to Churchill, 24th September 1914, *op cit.*

The Admiralty have sent a copy of your letter on the visibility of ships at a distance. This has been issued as a confidential circular and has aroused much interest ... I thought perhaps you would like to know what impression you had made upon the body of officers as a whole. The fact of its being circulated as a Secret Circular embodied in the Interim Confidential Orders is a clear enough indication of its favourable reception at the HQ.³⁸¹

However, by the summer of 1915 Kerr registered disappointment at attempts to implement his suggestions. He was most concerned that recommendations were not being followed correctly, and that the resulting efforts to diminish visibility were failing to fulfil their potential:³⁸²

I saw occasionally ships in which crude attempts had been made to carry into practice the general principles involved but they had obviously been made by unskilled persons, under no scientific guidance and were equally obviously foredoomed to failure.³⁸³

Again, Kerr approached Churchill offering his services, but with a new tactic to ensure that his proposed camouflage scheme would be effectively executed and therefore officially adopted by the Admiralty. He offered his professional skills as an aid in advising on and inspecting 'parti-colouring' of ships:

My reason for doing so is that I notice from time to time attempts to carry out the plan which could be made very much more effective with a little advice and guidance. Even a crude attempt is little compared with what can be obtained.³⁸⁴

This offer was not taken up, and by the end of the summer Kerr was informed by the Admiralty, that after numerous trials, his method of 'parti-colouring' had not been found sufficiently effective:

As a result of these trials it was found that the strong variations of light and surrounding that are liable to be experienced at sea, and the impossibility of restricting the movements of H.M. Ships in the ordinary course of service to particular conditions of light and surroundings, rendered it necessary to modify considerably any theory based upon the analogy of animals.³⁸⁵

This rejection, Kerr felt, was due to the misinterpretation of the intent of his design, since parti-colouring did not endeavour to make a ship blend into the background, but instead to distort the viewer's perception of the environment around them. Kerr also blamed a lack of

³⁸¹ Letter from a former student of Kerr's from 1912-1913 who was now in the Admiralty, no name is on the copy of the letter to Kerr, 11th December 1914 - GUA DC6/249.

³⁸² Letter from Kerr to Churchill, 14th June 1915 - GUA DC6/253.

³⁸³ Letter from Kerr to Churchill, 6th June 1916 - GUA DC6/260.

³⁸⁴ Ibid.

³⁸⁵ Letter from WW Baddeley on behalf of the Admiralty to Kerr, 9th July 1915 - GUA DC6/256.

knowledge about the biological principles of concealment in nature, which had led to his scheme becoming ‘foozled’ by unskilled application.³⁸⁶

The method which I suggested to the Admiralty aims at rendering the ship not so much invisible but as unrecognisable.³⁸⁷

By the end of 1915, it seemed that despite Kerr’s efforts and the Admiralty’s experimentation, attempts at camouflaging British Naval ships had foundered.

However, by 1917 British merchant and naval ships were coming under heavy and damaging assault from a new threat, the German submarine. Fears increased that under such sustained attack Britain could collapse, as essential supplies were destroyed.³⁸⁸ The time seemed ripe for resurrecting attempts to camouflage ships, to Kerr’s dismay, it was not his scheme of parti-colouring that the Admiralty adopted; instead, they sought the advice of printmaker, poster designer and professional marine artist Norman Wilkinson,³⁸⁹ who from 1915 had been a volunteer in the Royal Naval Volunteer Reserve, and his scheme known as ‘dazzle’ (figure 7). Livid at this development, Kerr was offended by the mere name of the scheme:

As regards to the word “dazzle” I have always tried to avoid its use. It has nothing to do with the common English meaning of the word. It is an Americanism, based possibly on the slang expression razzle dazzle, and it was coined not during the war as we have been told to believe but in pre-war days. Anyone who cares to look up Thayer’s well known book ‘Concealing Colouration in the Animal Kingdom’ published five years before the war began, will find it used as an expression for the distractive markings on the skins of animals. The whole principle of dazzle lies in its distractive function.³⁹⁰

In particular, though, Kerr was most sickened by the similarities between his own rejected proposal and Wilkinson’s successful scheme.³⁹¹ This matter consumed Kerr’s energies, and he was determined to prove dazzle was simply parti-colouring by another name, but without scientific rigour:

WILKINSON

Dazzle painting is a method to produce an effect (by paint) in such a way that all accepted forms of a ship are broken up by masses of strongly contrasting colours

³⁸⁶ Letter from Kerr to Mr Balfour, 5th December 1915 - GUA DC6/259.

³⁸⁷ Letter from Kerr to WW Baddeley, 18th July 1915 - GUA DC6/257.

³⁸⁸ Robertson, F. (2002) Dazzle Painting: The Art of Deceit in War, *Journal of the Scottish Society for Art History* 7 p.8.

³⁸⁹ Rankin, N. (2008) op cit. p.187. Wilkinson had been encouraged to pursue a career in commercial art by Arthur Conan Doyle and his painting of Plymouth Harbour was hung over the mantelpiece in the smoking-room on the fated Titanic.

³⁹⁰ Letter from Graham Kerr to *The Times*, 14th September 1939 - GUA DC6/293.

³⁹¹ Robertson, F.(2002) op cit. Robertson has suggested that Wilkinson’s camouflage scheme was chosen over Kerr’s because Wilkinson was more accustomed with the Admiralty’s way of operating and thus understood the demands of materials, labour and time, and so tailored his scheme and approach to fit with the Admiralty’s way of doing things.

KERR

It is essential it break up the regular continuity of the outline and this can easily be affected by strongly contrasting shades.

WILKINSON

For a time in the early stage of the scheme I hesitated to use white paint for various reasons, but after considerable experience it was found to be the "best" colour for those parts of the ship intended to be invisible.

KERR

The sides of the ship should also be broken up by large patches of white.³⁹²

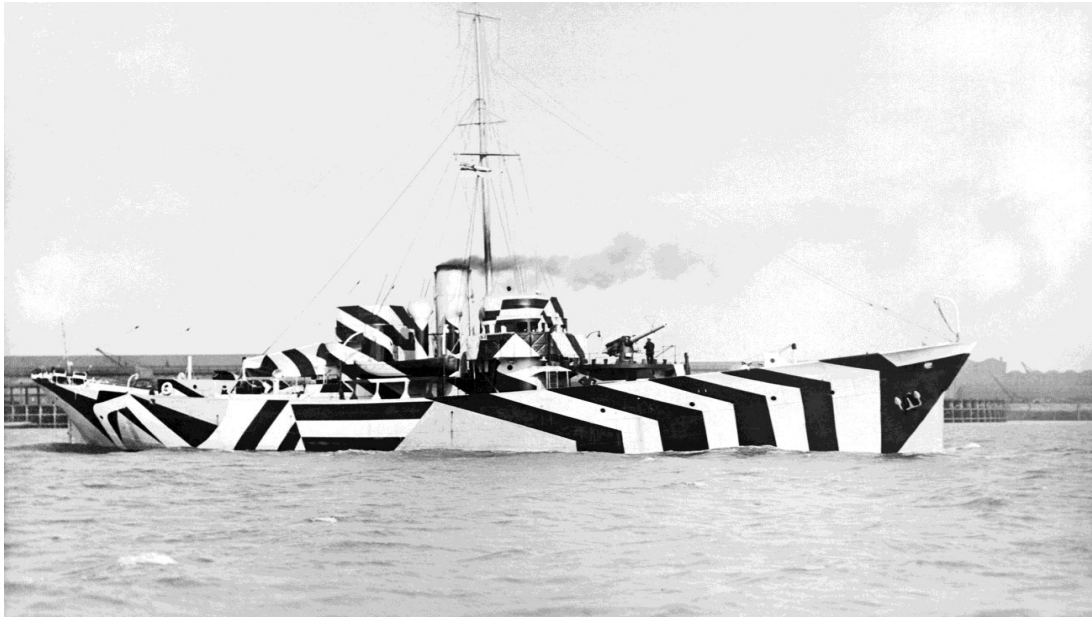


Figure 7. WWI British Gunboat HMS KILDAGAN demonstrating "dazzle"

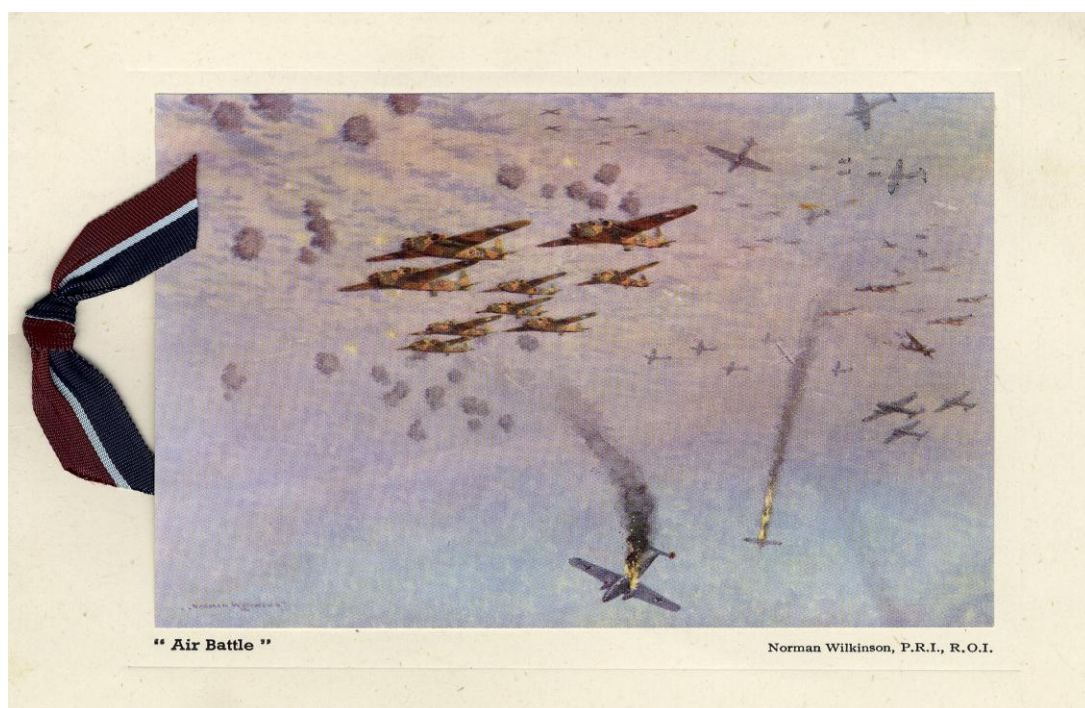
Kerr's increasingly embittered correspondence with Churchill and the Admiralty and the silence that he met with also suggests that Kerr had not anticipated how different the environment of the military was to that of the academy. During the war, Churchill was most likely little concerned with issues of intellectual property rights (IPR). Kerr was well-trained in understanding the different environmental conditions that influenced the characteristics of biological camouflage, but his reading and approach to the socio-political environment of influencing military camouflage during conflict appears to have lacked insight.

Kerr's archive gives a tangible sense of the anger and betrayal felt over the disputed claim of invention. Amongst the many letters on the subject between Kerr and his allies and Kerr and the Admiralty, perhaps the most telling is a WWII Christmas card (figure 8). The design on the front of this card is of scene from an air battle by Wilkinson. The card does not reveal

³⁹² Comparison between a 1919 published interview with Wilkinson on the subject of dazzle and Kerr's 1914 letter to the Admiralty, n.d. – GUA DC6/621.

itself to be a festive correspondence; there is no greeting of the season from a friend, and inside it is blank, empty but for a printed festive greeting of the season. Never sent and never received, it seems a despondent object exposing the torment of possessing a perceived injustice. This card is arguably an indication of the vice-like grip that possessed Kerr over the issue of the invention of dazzle, and indicates the importance that the issue held for him personally throughout the remainder of the war and over the next couple of decades. Kerr's experience reveals that the entanglement of art, science and the military could be a tense affair, where some forms of knowledge were favoured over others, for practical, personal and professional reasons. Kerr had appreciated the entangled relations of science and militarism in the development of camouflage, but the military had found that, for the sea environment, art proved more valuable than science for the effective execution of camouflage.

Figure 8. Illustration "Air Battle" Norman Wilkinson



SOLOMON J SOLOMON (1860-1927) - SITE

When a man would commit a crime in a room overlooked from another the first thing he does is to pull down the blind; and if he is using a light, he closes the shutters too.

War is a crime, and this war was, and henceforth every other war will be overlooked, and the first thing the participants need to do is devise and prepare their blinds.

The Germans did not neglect this precaution.³⁹³

³⁹³ Solomon, S.J. (1920) *Strategic Camouflage* p.1.

The Admiralty was not alone in seeking the advice of artists in developing camouflage schemes and technology, since independently the Army too had begun to explore camouflage and in so doing had also employed artists. Many artists found themselves working in newly formed camouflage workshops, and in the British military the most well-known artist and senior camouflage practitioner was Solomon J Solomon. Solomon was a respected portraitist and painter of biblical and mythological scenes, his 'technical virtuosity' most notably demonstrated in his painting of allegorical and biblical nudes.³⁹⁴ He considered himself a skilled craftsman, often experimenting with the unusual effects of light,³⁹⁵ and it was this experimentation that drew him to camouflage and the military.

Solomon was on holiday with his family in St Albans when war was declared in 1914, and immediately his mind turned to methods of protection and concealment. Thus, Solomon began to conduct experiments into the means of concealing and screening trenches from enemy surveillance. He had the insight to recognise the important role that concealing the sites of military activity from enemy surveillance would play in WWI. On the day war was declared Solomon wrote in his diary:

I was scouring that town for all the butter muslin, dyes, and bamboo canes I could afford.³⁹⁶

In particular he had realised that warfare was going to change due to the evolution of the aeroplane as a weapon of aerial observation.³⁹⁷ After his initial experiments, Solomon approached the War Office with his ideas for trench concealment, and he also suggested alterations to soldiers' uniforms to reduce their visibility, such as the darkening of the soldier's cap and the lightening of his trousers.³⁹⁸ It is clear from these recommendations that Solomon was familiar with Thayer's work on concealment, which had influenced his own research into military camouflage. Impressed by Solomon's initial ideas, in 1915 the War Office arranged for him to travel to France to set up a British military camouflage unit. By then it was known that the French had established a camouflage unit, nicknamed '*le barbouillers*' or scribblers,³⁹⁹ under the supervision of the Parisian portrait painter Lucien-Victor Guirand de Scevola. The British military arranged for Solomon to meet with de Scevola's unit and to assess the French experiments in camouflage.

³⁹⁴ Grimsditch, H.B. (2004), Solomon, Solomon Joseph (1860-1927), *Oxford Dictionary of National Biography*.

³⁹⁵ Ibid.

³⁹⁶ Phillips, O. (1933) *Solomon J. Solomon: A memoir of Peace and War* p.117.

³⁹⁷ Wright, P. (2005) *Cubist Slugs* *London Review of Books* 27 (12) pp.16-20.

³⁹⁸ Rankin, N. (2008) *op cit.* p.44.

³⁹⁹ Blechman, H. (2004) *op cit.* p.274.

Solomon's diary reveals that the visit to the French unit impressed him greatly and influenced his perspective on how the British should set up their own camouflage works. Solomon was particularly taken that the French camouflage unit was not under military control.⁴⁰⁰ For Solomon, this arrangement was not to be replicated in the British Camouflage section. Although Solomon oversaw and advised on technical issues, and headed up the site of army camouflage experimentation, the unit remained under official military leadership and the commandment of Lieutenant Colonel Wyatt.⁴⁰¹ Solomon took the direction allowed to him and surrounded himself with hand-picked, like-minded artists such as Harry Paget, Roland Harker and Lyndsay Symington.⁴⁰² The site of the camouflage unit was set up not far from the front line in France⁴⁰³ and concealed in name as well as conduct by the label 'Special Works Park'.⁴⁰⁴

For the soldiers who encountered Solomon during the Great War, he was the face of camouflage innovation, cutting a rather eccentric figure and often addressed as 'Mr Artist'.⁴⁰⁵ Whilst working on the camouflaging of tanks, one soldier recalled that Solomon's gentle artistic technique was even applied to the most robust military hardware:

I can see him now standing away from the tank with one eye closed and holding his brush at arm's length between the delicate touches that he painted on to her.⁴⁰⁶

The British camoufleurs, operating under Solomon began to explore the potentials for camouflage technology. Being so close to the site of action allowed the camoufleurs to work directly with the environment and conditions within and against which the British military needed to be concealed. The most successful experimentations were in camouflage netting for artillery and trenches, observation posts disguised as willow trees, and paint camouflage designs for the tank.⁴⁰⁷ These schemes were developed effectively and would reappear in WWII, as the camoufleur Julian Trevelyan explained:

The Army, one of the principal users of Camouflage, inherited a considerable tradition from the last war. In particular the overhead cover in the form of the scrimmed net supported on posts concealing artillery position, was well advanced. So also was a technique developed in the more or less static phases of trench warfare, for building

⁴⁰⁰ Phillips, O. S. (1933) op cit. p.121.

⁴⁰¹ Borsarello, J.F. (2004) op cit. p.132.

⁴⁰² Rankin, N. (2008) op cit. p.275.

⁴⁰³ Phillips, O.S. (1933) op cit. p.121.

⁴⁰⁴ Blechman, H. (2004) op cit. p.132.

⁴⁰⁵ Ibid.

⁴⁰⁶ Wright, P. (2000) *Tank: The Progress of a Monstrous War Machine* p,31.

⁴⁰⁷ Trevelyan, J. (1944) op cit

elaborate false works out of plaster such as dead trees for snipers to hide in.⁴⁰⁸

The 'Special Works Park', although not far from the front, was a world away from the trenches, as places of mud and slaughter. The camouflage workshops made for unusual military installations, being the site for the manufacture of theatrical magic tricks rather than typical military technologies designed for the offensive. One journalist recalled the surreal experience of visiting the British Camouflage Workshop in 1917:

It is a bewildering place- a land on the other side of the looking-glass, where bushes are men and things dissolve when you look at them and the earth collapses, where visions are about and you walk among snares and pitfalls and lose all faith in your dearest friend. It is the grown-up home of make believe.⁴⁰⁹

The journalist's account reveals that camouflage workshops were unnerving places, sites where the character of the military seemed sneaky and underhand (maybe even cowardly), where distinct categories of human, machine and nature blurred. The workshops were producing hollow trees and nets that allowed men and military hardware to melt into the backdrop where they became temporarily part of the landscape. These were 'factories' of sorts creating 'worlds ambiguously natural and crafted',⁴¹⁰ where nature and machine were fused and military camouflage became a hybrid technology, whereby 'nothing remains unaltered'⁴¹¹. The technologies and designs experimented with and produced in camouflage workshops not only altered a vision of war for WWI, but also helped to inform the future vision and character of warfare. Solomon, his camouflage team and their work generated intrigue and wonder.

Not everyone within the military thought that Solomon was the right man to head the camouflage unit. As an artist, rather than a fully trained military man, Solomon came under some severe and belittling criticism, Solomon noted in his diary on an encounter with an invalided staff secretary:

"What!" said the secretary, with a sneer, "you were painting portraits at the Cadogans and now you are painting tanks!"⁴¹²

Increasingly, Solomon found the military procedure and hierarchies difficult, as it further encroached on the camouflage site of experimentation that he had set up with similar minded artists. Rankin suggests that he was out of his depth when working alongside military

⁴⁰⁸ Ibid.

⁴⁰⁹ Special correspondent (1917) *The Times*, cited Wright, P. (2007) *Iron Curtain* p.131.

⁴¹⁰ Haraway, D. (1991) op cit. p.150.

⁴¹¹ Hinchliffe, S. (2007) op cit. p.51.

⁴¹² Phillips, O.S. (1933) op cit. p.172.

personnel, his artistic temperament not suited to the military's demand for order and conformity;⁴¹³ and similarly some elements of the military found it difficult to work alongside someone seemingly at odds with the formalities and structures of military life.⁴¹⁴ By incorporating outside specialist skills, the military not only drew in new skills and knowledge, they also brought in outside attitudes and characteristics to the workings of military practices. These at times could lead to the re-entrenchment of seemingly distinct characteristics and temperaments.

An example of this tension between Solomon and some elements of the military is demonstrated by one of Solomon's harshest critics, Lieutenant Colonel Chesney, who, alongside Wyatt, took over command of Solomon's camouflage unit in France in 1916 when Solomon returned to England.⁴¹⁵ In Chesney's book on the *Art of Camouflage* (1941), which was published as a guide for soldiers in WWII, he took the opportunity to undermine and then dismiss Solomon's methods and experiments in camouflage:

The first British name that is connected with the subject [camouflage] is Solomon J. Solomon. Having conceived certain ideas at a very early date and having the necessary status, this famous artist was able to propound these ideas to the higher authorities in the army. They were, however, somewhat nebulous and even entrenched upon the field of strategy, so it is hardly to be wondered at, at a time when no tangible accomplishment had yet been achieved, their author should be regarded rather as a visionary and impractical.⁴¹⁶

From Chesney's review of the period in which Solomon was at the helm of innovation in British military camouflage, it was the latter's status as an artist which gained him this position, but which also worked to undermine his authority. Chesney critiques Solomon as a visionary whose ideas in practice were unworkable for the military. Perhaps like Kerr's experience with the Admiralty, this episode highlights how the working practices of the military during conflict - including restricted timescales for invention and production, and also the limited availability of resources of labour and finance - placed at times difficult demands on enlisted specialists to modify and alter their own working methods.

It seems that Solomon found it difficult to adapt to military life. At the beginning of the war, he had been situated as the central figure in British camouflage, yet within a year of having set up the camouflage unit problems were emerging between the artist and the military authorities. By 1916, Solomon felt pushed out, as he was channelled to assume more of an

⁴¹³ Rankin, N. (2008) op cit. p.113.

⁴¹⁴ Chesney, C.H.R. (1941) *The Art of Camouflage*.

⁴¹⁵ Ibid p.132 & Grimsditch, H.B. (2004) op cit.

⁴¹⁶ Chesney, C.H.R. (1941) op cit. p.65

advisory role, rather than being involved with the practical experiments, camouflage training and partaking in reconnaissance.⁴¹⁷ Although enthusiastic and passionate in developing camouflage, his methods of organising and executing camouflage initiatives could be at odds with military practices and, tellingly, he ruffled feathers by not adhering to the chain of command.⁴¹⁸ Thus, he decided to return to Britain and set up his own independent camouflage school at Kensington Gardens in London, where he felt increasingly isolated from, and ignored by, the military authorities. But Solomon persisted in investigating camouflage's potentials which led him to one particular site behind enemy lines and to make an uncomfortable discovery about German camouflage initiatives.

CAMOUFLAGE FEVER – NETWORKS OF KNOWLEDGE

The three fragmentary biographies of Thayer, Kerr and Solomon, sketched here and shaped through place, environment and site, chart the highly mobile emergence of WWI camouflage and reveal men enthralled by the flux of artistic, scientific and military elements in camouflage. In WWI, all approached the military in an attempt to have their knowledge and skills on the matter incorporated into this new military technology. Hartcup has suggested that the technological developments of WWI saw the character of warfare change utterly and irreversibly,⁴¹⁹ and that these changes were due to the collaboration of an array of scientists, engineers and the military. By examining the life-path of military camouflage in WWI through three personal trajectories, this idea can be further extended by including the influence and collaborations of art as well as science in the development of modern military technology. It can be summarised that:

During the War of 1914/18, the Army used camouflage in the field. It was largely static in concept and directed to countering direct observation by concealment of artillery, O.P.s and snipers, and positions within gun range. The officers were recruited mainly from artists and architects and placed under the Chief Engineer.⁴²⁰

Furthermore, considering the geographies and histories of British military camouflage and the diverse practitioners enrolled in its inception requires critical examination of the entanglement of all actors and knowledges involved, as well as appreciating the lasting consequences for the militarism of knowledge. By returning to the narratives of Thayer, Kerr and Solomon, these issues can begin to be unpicked:

⁴¹⁷ Ibid.

⁴¹⁸ Rankin, N. (2008) op cit. p.126.

⁴¹⁹ Hartcup, G. (1988) op cit.

⁴²⁰ Wiseman, D.J.C. (1953) op cit. p.140.

When the history of the present war is really written one of the most curious chapters will be the marvellous manner in which almost every field of science has come to the aid of executive ignorance.⁴²¹

Kerr felt frustrated by the military's attitude towards science. Kerr's tactic, therefore, was to exploit his influential scientific *and* artistic connections to persuade the military of his ideas on camouflage. Thayer too had noticed the links between the concealment of animals in nature and the need to conceal soldiers and equipment in war. He had also approached the British military in 1914 with ideas for developing camouflage and had become exasperated at the muted response. Nonetheless, he was not discouraged in trying to persuade the British military to adopt concealing colouration, throughout 1915 'bombarding the War Office with attempted instructions for improving concealing-colouration of the ships and soldiers'.⁴²² He then turned to the zoologists who he had met during his previous visit to Britain (in the 1890s when he had set up the museum models), asking them to send strong recommendations urging the military to use his specialist expertise. Kerr seized the opportunity to use Thayer's visit to Britain once again to promote the use of camouflage to the Admiralty, within:

I have just learnt that Mr Abbott, H. Thayer - a well known American artist and I may say the discoverer of the principle of graduated shading in the colouring of animals - is now in the country and desires placing his services at the disposal of the Government. He has been informed by the War Office that they were much interested in his work and I gather that a practical demonstration is in the process of being arranged ... If the navy has been able to really put these principles of obliterative colouring into efficient practical working there is nothing more to be done but if not it seems to me it might be well worthwhile for those at Mr Thayer's demonstration.⁴²³

Thayer's visit to Britain was not a success. Behrens describes how during a meeting at the War Office, Thayer became overcome by the 'Abbott Pendulum' (the term he used to describe his polar emotional states of 'all-wellity' and 'sick disgust') and became paralysed with anxiety at the anticipated rejection.⁴²⁴ Gripped by what Thayer described as a 'fright-fit' - most probably a panic attack induced by a feeling of little support or interest from the British military, possibly exacerbated by the separation from his New Hampshire home - Thayer, in tears, missed the meeting as he was boarding the ship back to New York.⁴²⁵

Kerr's interpretation of this sudden departure was somewhat different. He believed that Thayer had left in disgust, due to the military's attitude towards his theories and extensive knowledge on camouflage. Kerr wrote to *The Times* in the aftermath of the war to criticise the

⁴²¹ Karl Pearson cited in Hartcup, G. (1988) op cit. p.vi.

⁴²² Letter from Thayer to Kerr, 3rd December 1915, - GUA DC6/369.

⁴²³ Letter from Kerr to Mr Balfour, 5th December 1915 op cit.

⁴²⁴ Behrens, R. (2002) op cit. p.41.

⁴²⁵ Ibid p.55

military's approach to establishing effective camouflage, drawing upon Thayer's failed attempt to assist the British military and placing himself firmly at the centre of this narrative of British camouflage:

Mr Thayer came to see me during the war. He had observed on the other side some of the atrocities resulting from the bungling of my early suggestions and actually went to the length of taking a passage for Europe in order to see our Government officials on the subject. He couldn't get anywhere near the higher placed officials. As he put it to me, he found himself up against "a net of courtesy" which appeared to yield as he pressed against it but interposed more and more resistance as he got further and further in - so that he never got near the sanctum of the high officials. Before returning to America in disgust he came up to see me and I was able to comfort him to the extent of assuring him that his name and his "law of protective colouring" had been duly impressed upon the Admiralty. Unfortunately, the whole thing was bungled in the carrying out.⁴²⁶

The treatment of Thayer and Kerr's own failed attempts appear to have left a bitter taste. Kerr continued after the war to be determined to rectify the matter of who had invented the successful scheme for reducing the visibility of ships for the Admiralty, and the initial step of establishing the invention as his own was once more to contact Churchill:

I wrote to you at that time (1914) urging the application to ships of the principle of particolouring or as it is now more commonly called "Dazzle". You took the matter up but owing to muddling somewhere the principle was never given a fair trial on the necessary scale until 1917 when its correctness and value was at once demonstrated as regards anti-submarine warfare. Since the armistice was signed there has been much advertising of "Dazzle" in various periodicals by those who were latterly employed by the Admiralty to carry it into effect and the claim is repeatedly made that "Dazzle" is a discovery of their own and something quite different in principle from the "particolouring" which you took up at my suggestion in 1914. I am consequently placed in a rather awkward position and am open to the suspicions on the part of those unacquainted with the facts (as to the leading principle of "Dazzle" being simply my suggested particolouring under a new name) or on the other hand of appropriating myself an idea which really came to the Admiralty from someone else. It is obvious that my official and scientific position calls for steps being taken to clear away the possibility of suspicions and, as it was to yourself that my earliest communication (In 1914 of which was circulated to the fleet) it is to you that I venture to appeal for advice what I should do.

The simplest and most effective manner of disposing of the matter would be to publish a statement illustrated by parallel column quotation like the enclosed or on the other hand, I might get one of my friends in parliament to take the matter up. I am free to take the responsibility of either step but I have strong objections of doing so and it is the hope that my difficulty may be got over by some less distasteful method.⁴²⁷

⁴²⁶ Letter from Kerr to Allan McLean, 12th May 1919 op cit.

⁴²⁷ Letter from Kerr to Churchill, 20th August 1919 - GUA DC6/271.

Kerr wanted official and public recognition that his contribution to military camouflage devised from the biological principles of concealment made him the originator of 'dazzle'. However, the priorities of the Admiralty, and the military as a whole, did not lie in smoothing disputes of invention or 'IPR'. The noise of Kerr's numerous letters chatter loudly and insistently in the archive, and Churchill's silence speaks volumes about his attitude and opinion of the man and his intent. Churchill would have been operating in a different environment from academic science, so the politics of invention would seem of little importance: indeed, such acrimonious complaints must have seemed trivial to the military authorities. Desperate and increasingly vitriolic, Kerr took his disagreement with the Admiralty to the press. In many letters to *The Times* which spanned from the armistice into and throughout the WWII, Kerr maintained his position as the inventor of 'dazzle'. Although a vehement feud between Kerr and Wilkinson became established and played out in letters to *The Times* and other publications including *Nature* and *Nautical Magazine*, Kerr felt most bitter towards the Admiralty and the military as a whole:

The problem of Camouflage is essentially a biological one. It would never occur to the man on the street, or to the artist, seeing for the first time a zebra, a jaguar or a panda in a museum that such creatures motionless in its natural environment would be less easy to pick out within the eye than if it had a uniform colour the same as its background, but so it is, as nature has discovered by the process of trial and error continued through the ages.

Commander Norman Wilkinson on the other hand deserves every credit for the way he organised and carried out the application of the dazzle principle from 1917 to the end of the war. He showed himself not only to be an accomplished artist whose work we all admire but a 'man of push and go' and an excellent organiser, and it would be unfair to blame him for ships occasional by his lack of familiarity with the biological principles involved.⁴²⁸

Ultimately, Kerr strived and failed to be acknowledged as the inventor of 'dazzle', and in 1920 The Board of Invention and Research dismissed Kerr's claims to have been the inventor of camouflage for ships.⁴²⁹ Yet, he never gave up his claim as the inventor of dazzle, and never again trusted the military. In the event, Kerr had made himself into a problem for the military,

⁴²⁸ Letter from Kerr to *The Times*, 14th September 1939 - GUA DC6/293. The last sentence of the letter has a word missing but Kerr's sentiment is clear: if dazzle on ships did not work, it was due to a lack of knowledge of the biological principles of scientific camouflage.

⁴²⁹ Letter from Royal Commissions on awards to inventors to Kerr n.d. In regards to claim 1499 entitled APPLICATION OF PROFESSOR J GRAHAM KERR IN RESPECT OF DAZZLE PAINTING FOR SHIPS, 'The Commission having enquired into the circumstances of the case are not prepared to recommend to the Lords Commissioners of His Majesty's Treasury that any remuneration should be allowed and Professor J Graham Kerr in respect of the matters mentioned in his claim dated 22/11/20 - GUA DC6/403.

as he persisted in bombarding the War Office with his suggestions on military camouflage even into WWII, and he was openly acknowledged as ‘a nuisance’.⁴³⁰

It seems that both Thayer and Kerr had been stung in their attempts to approach the British military to offer advice on and knowledge about camouflage. Kerr became a man consumed with anger and betrayal, while Thayer left broken by nerves and doubt. Solomon’s experience had initially posed a different and more positive relationship between the military and the incorporation of outside specialists; but over time Solomon too become increasingly unhappy as he felt marginalised from the site of camouflage action and his role became less involved in the practical innovation of the technology. Nonetheless, Solomon continued throughout the war to study camouflage techniques; just as Kerr had become consumed by biological camouflage, Solomon developed a different yet equally consuming obsession. Indeed, Solomon began to experience the same camouflage fever that had gripped Kerr.

Figure 9. Aerial photograph of an area near Bruges – S.J. Solomon

Solomon focused his attention on aerial reconnaissance photographs, the sites of enemy territory; working to decipher to what extent the enemy had developed their own camouflage devices. To aid in the task of exploring the potentials of aerial observation, Solomon bought a radiographer, a machine which projected images on to a screen and, when used alongside mirrors and lights, could be employed to study aerial photographs to a very precise level of detail.⁴³¹ This concern for the aerial view was indeed crucial - prefiguring perhaps *the*



⁴³⁰ Letter to Mr Bracken in regards to Kerr’s letters to Churchill and speeches in the House of Commons, 19th October 1940 - NA PREM 4/97/3/10.

central preoccupation of WWII camouflage - and obviously this will be addressed in later chapters.

In particular, three photographs of one site of German occupied territory began to trouble Solomon (figure 9). He noticed peculiarities and inconsistencies within them, since the shadows cast by ground objects did not appear to fall in relation to the sun's rays. A chilling thought struck Solomon: the Germans were designing large swathes of the landscape in order to deceive the eye of the camera. This was camouflage on a grand scale unlike anything attempted by the British military. He approached the military with his findings but each time he was brushed aside, regarded as little more than an artist in possession of an over-ripe imagination, a delusional shadow chaser. The military felt justified in disregarding Solomon's notions because after the war, when the British Army examined the once German occupied land, they found no indication of large camouflage structures. Yet, Solomon was convinced that he had read the landscape correctly and published his theories on enemy camouflage in his 1920 book *Strategic Camouflage*. Reviews, though, were not favourable; one newspaper even declared 'Camouflage Gone Mad'.⁴³²

Despite the disputes and disillusionment, Solomon's earlier camouflage experience in WWI, alongside the employment of Wilkinson and many other artists during the war, reveals that artists had effectively transferred and altered their skills to develop innovative military technology. The developments and inventions in camouflage to which they contributed arguably then channelled the direction of camouflage through to and during WWII. Although difficult relations were ongoing with the military, artists had made their mark on the technology of camouflage. Similarly to Kerr, though, sometimes the practices and attitudes of the artist as incorporated specialist were at odds with military methods. The military response to this seems to have been to ignore perceived troublemakers, and to look elsewhere for the skills necessary in developing camouflage technologies, for the pressure of war demanded quick, efficient and uncomplicated (non-egotistical) response. It seems that many of the experts who became involved with the British military during the war were altered in response to their experiences, and the military too had gained new knowledges and skills which had altered some aspects of their prosecution of warfare.

⁴³¹ Rankin (2008) op cit. p.232.

⁴³² Ibid p.249.

BEGINNINGS

War creates a surrealistic sense of history that comes from confrontation with the grotesque newness of everything.⁴³³

With disputes being played out in the media, strange striped ships at sea and British soldiers being encouraged to hide and creep, camouflage in the public perception must have been teetering on the 'mad'; it would indeed seem more theatre or magic trick than modern military technology. Camouflage's character cannot have been helped when its innovation appeared to be connected to public disputes between scientists, artists and the military: it must have seemed like a military joke. Charlie Chaplin's 1918 film *Shoulder Arms* effectively captures the added view of camouflage in WWI, as well as more generally lampooning something of the wasteful and grotesque character of war. In a surreal sequence the silent clown, our hapless hero camouflaged as a tree on a set designed to recollect the hell of 'no mans' land', runs amok, knocking out German soldiers with his branched arms. Through film and comedy, Chaplin exposes camouflage to be mysterious, magical, and frankly absurd, merging the comedic and the dangerous. This portrayal of camouflage arguably embodied the public view, and something of the military's perspective too, as an ambiguous, even amusing military technology.

To return to the word 'camouflage': although it would come to frustrate the camouflage practitioners in WWII, it seems that the etymology of the word captures something of its character. Camouflage appeared to subvert notions of the purpose and techniques of warfare. It was a studied and researched theatrical deception, and it was tinged with the surreal and grotesque. In WWI a new monstrous type of warfare came into being, one dominated by technological invention and carnage on a previously inconceivable scale, and camouflage was part of this monster. Imagine the horror of a battlefield and the revulsion of a landscape where death lurked and permeated the very earth, where trees could transform into men and the ground seemingly gape open to reveal advancing soldiers and artillery. Military camouflage made the battlefield a tricky and uncanny place, as well as deadly one; it blurred distinctions of human, animal, technology and landscape. Thrift has suggested that seemingly different forms of sentience - animal, human and thing - are increasingly becoming more closely aligned and connected through 'a suite of 'understated' technologies which enable environments to become both extended and active'.⁴³⁴ Military camouflage in WWI provides an early insight into the emergence of such 'understated' technologies. By tracing the

⁴³³ Kerns, S. (1983) op cit. p.291.

⁴³⁴ Thrift, N. (2005) op cit. p.464.

beginnings of military camouflage through Thayer, Kerr and Solomon, the seemingly discrete boundaries between the knowledges and practices of science, art and militarism become blurred. But camouflage's potential as military technology and its capacity mutually to transform knowledge, actors and landscapes had not, by the end of WWI, been fully realised. Chaplin's *Shoulder Arms* made a joke of a technology that embodied the destructive yet absurd nature of new and modern warfare, but within two decades the violence and theatre of war and camouflage would converge again and re-enter the public imagination and the battlefield. In WWII artists scientists and the military would once more co-mingle, with lasting consequences for the prosecution of warfare and the militarism of knowledge.

THE ABC OF CAMOUFLAGE: K-M

K is the Knowledge of how to combine
doing the job with leaving no sign

L is the Lay-out: the way that you face
is of vital importance, so choose the right place.

M is for Maintenance: grass is an aid
to garnish a net, but unchanged it will fade

Chapter 5.
Hiding in Plain Sight:
Locating the Man, Locating his Science



A TALE OF COTT FROM THE FIELD

I remember one time he told me how he had spent hours watching from a hide an empty partridge nest.⁴³⁵

Cott waited. His body motionless, poised, ever alert for a movement, the rustling of grass, a disturbance of leaves. Hours must have passed by now, shadows had shifted as the sun trailed its arc overhead. But he did not mind waiting, he was used to it. Waiting, and watching; for they were his science, to observe, note and collect, his patience for his quarry almost boundless. Countless field hours had disclosed to him the complexity of form, pattern and adaptive coloration in nature. He was a student of nature's concealment, deception and surfaces. He noted how the smooth cylindrical body of the snake was flattened and blended to the earth by its colouring and the ringed plover was scattered to the ground by use of its patterned feathers⁴³⁶. But today it seemed his waiting was in vain. The partridge nest amongst the grass and leaves, tucked in tight under the hedgerow was empty. Had she abandoned it, or had she sensed his presence, and was waiting and watching nearby for his departure? With a final few clicks of his camera, Cott, stopped waiting, stopped watching, and rose to leave the hide.

Figure 10. Partridge - H.B.Cott

He eventually took some photographs of the empty nest and went home.⁴³⁷

But later, she did reveal herself to him, the partridge he had been waiting for all those observant hours. In the dark room she began slowly to take form, feather by feather (figure 10). There she sat, body motionless, poised and ever alert. Squat and still, her body in the nest became the nest, by the hedgerow and as the hedgerow. She was a shadow-land of interweaving



⁴³⁵ Conversation with Ray Symonds, June 2008.

⁴³⁶ Cott, H. (1940) *Adaptive Coloration in Animals*, p. 60 & pp.338-330.

⁴³⁷ Conversation with Ray Symonds, op cit.

and interpenetrating patterns, colour and forms an entwining of ecological relations. Since he was the student, she had provided him with a master class in concealment, deception and surfaces:

He realised when he developed the photographs later that the bird had been there all the time; she had been too well camouflaged for him to see her. I thought this was very funny, but he didn't tell this as a joke he was perfectly serious.⁴³⁸

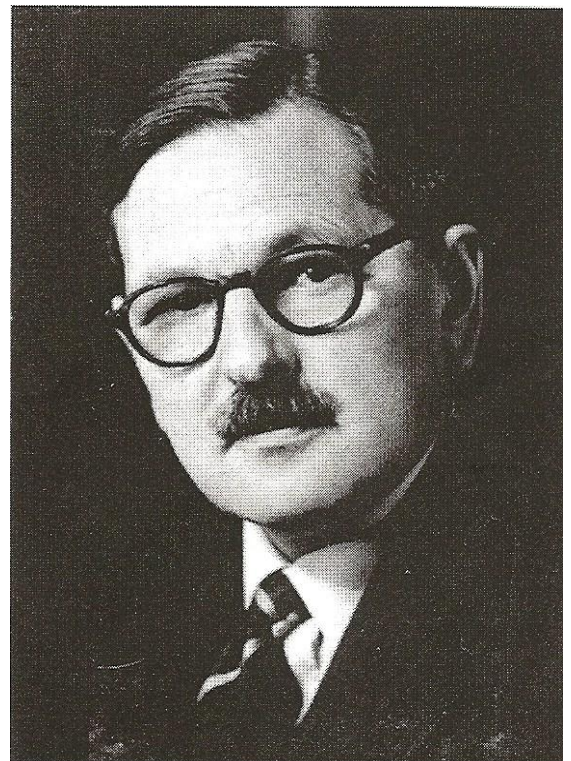
Cott's keen interest and understanding of nature's near perfection in the skill of deception led him to appreciate an importance beyond the scientific. Scientific and military knowledges, Cott realised at a time when it was evident that war clouds were gathering over Europe, needed to be interwoven to develop, like the partridge with her background. Thus:

While man-made contrivances have been invented, natural adaptations have been evolved. Nevertheless both are intimately related to the pressing need for survival in this transitory life - whether those needs involve the capture of prey or the capture of markets; the frustration of a predatory animal or an aggressive power.⁴³⁹

Figure 11. Hugh Bamford Cott

INTRODUCING COTT

After WWI developments in camouflage technology halted and interest in the subject waned,⁴⁴⁰ except in one field; biological science. In particular for one man - Dr Hugh Cott (figure 11) - camouflage, biological and military, took on an ever-growing importance in the interwar period. This chapter will be an attempt to marry geographical biography, scientific biography, and history of science. It will introduce Dr Hugh Cott (1900-1987), a Cambridge zoologist whose scientific expertise lay in the field of animal coloration, pattern perception, form and behaviour; leading him to some rather unusual areas of research, to some dangerous places and to becoming a leading



Hugh B. Cott.

⁴³⁸ Ibid.

⁴³⁹ Cott, H. (1940) op cit. p.438.

⁴⁴⁰ Wiseman, D.C.J. (1953) op cit. p.39.

specialist in both biological and military camouflage.

Cott's most authoritative work, *Adaptive Coloration in Animals* (1940), is recognised as a seminal contribution to biological camouflage.⁴⁴¹ Cott's former colleagues and students recall a man with a formal exterior, revered as a 'chip off the old empire',⁴⁴² but underneath this upright military bearing there lay capacity for great warmth and sensitivity. Cott referred to people by their surname alone, no title and never by Christian name, and only the closest of his acquaintances would be greeted with his term of endearment, 'old thing'.⁴⁴³ Stephen Tomkins, a student of Cott's in the early 1960s, recalls that his was lecturer always appeared attired in a three piece suit, with a bristly toothbrush moustache:

of a kind chaps had in the Second World War, he was probably a pipe smoker too ... His lectures were disciplined, structured anecdotes about animal form, coloration, behaviour, and biodiversity.⁴⁴⁴

Stephen was under Cott's tutelage when Cott was not far from his retirement in 1967. By this time Cott was viewed as a 'stocky old codger',⁴⁴⁵ and it was felt that he and his field-based science were 'past their sell by date'.⁴⁴⁶ The landscape of British biology had undergone great change since Cott had begun academic study in the early 1920s, and after WWII biology was on the cusp between two very different types of scientific theory and methodological practice. On the one hand was the old Darwinian tradition, grounded in fieldwork and observation, in which Cott was firmly rooted and becoming a dying breed; on the other, the newly emerging 'whizz kids'⁴⁴⁷ of biochemistry, favouring statistical analysis and large datasets who began to dominate the discipline. Alberti explains that 'the 'evolutionary synthesis' of the early 1940s and the establishment of the structure of DNA in 1953 were manifestations of profound changes in the life sciences',⁴⁴⁸ and this shift - alongside new developments in techniques and technologies - meant that the laboratory became privileged over the field as the site for scientific knowledge production. As a result, by the 1960s there was tension in the Cambridge Zoology Department between these differing schools of scientific approach and the two generations of scientist.⁴⁴⁹ Cott, by the end of his career, was positioned on the edges of

⁴⁴¹ Stevens, M. & Merilaita, S. (2009) Defining disruptive coloration and distinguishing its functions, *Philosophical Transactions of the Royal Society B*, 364, pp.481-488.

⁴⁴² Conversation with Stephen Tomkins, op cit.

⁴⁴³ Revd. Crook Memorial Service for Dr Cott, Selwyn College, 1987.

⁴⁴⁴ Conversation with Stephen Tomkins, op cit.

⁴⁴⁵ Ibid.

⁴⁴⁶ Ibid.

⁴⁴⁷ Ibid.

⁴⁴⁸ Alberti, S. (2009) op cit. p.43.

⁴⁴⁹ Conversation with Stephen Tomkins, op cit.

departmental and disciplinary boundaries, in the minority in his scientific method of embedded fieldwork. After his death, obituaries recorded Cott and his science as:

a scholar who scorned fashions, and was often out of step with the scientific establishment of the day.⁴⁵⁰

His scientific achievements hardly received the recognition he deserved ... his work as a field naturalist in the Darwin tradition was considered at the time to be out of fashion with the experimental tradition in Cambridge.⁴⁵¹

Cott was very much a classical zoologist. It is not often realised nowadays how far ahead of his time he was at the height of his career.⁴⁵²

But when researching Cott and his career, it must be realised that he was more than the sum of his science. As Chilvers explains, by studying a scientific life, ‘the life in question often exhibits complexities and dynamics beyond the immediate scientific or intellectual context’.⁴⁵³

As well as being an accomplished zoologist, Cott was also a proficient wildlife photographer, gifted graphic illustrator, and expert WWII camoufleur; and these other aspects of his character were strongly influenced by and entwined with his science, which in turn, had been moulded by these different elements of his life.

In studying the evolution of British military camouflage, it is the multifaceted nature of Cott’s character which makes his an especially intriguing biographical subject to pursue. Predominantly, it was Cott’s scientific self, his position as *the* acknowledged biological camouflage expert, which established him as a specialist to be utilised by the military in WWII camouflage. It was also Cott as a scientist that, in a sense, set him apart from the majority of the other specialist camoufleurs incorporated by the military, who in the main were artists⁴⁵⁴ (perhaps, by the time of post-war disciplinary shifts, Cott had hence become accustomed to being viewed as a man ‘out of step’ with those around him). By navigating Cott’s life, in particular its intersection with, and influence on, the development of British military camouflage, the rigour of his science will be revealed to mesh with the artist’s visual appreciation and graphic skill, and also with the military’s man formal attitude. It is through the prism of Cott’s scientific self, in particular his scientific career, that the evolution of WWII military camouflage and its life-path will be explored.

⁴⁵⁰ St Joseph (1987) Obituaries, Selwyn College Calendar.

⁴⁵¹ Daily Telegraph Obituary 25th April 1987, pasted into Cott, H. (1940) *Adaptive Coloration in Animals* - CZM-Box 2 Cott copies of publications.

⁴⁵² The Times, Obituary 25th April 1987, pasted into Cott, H. (1940) *Adaptive Coloration in Animals* - CZM- Box 2 Cott copies of publications.

⁴⁵³ Chilvers, C.A.J. (2007) op cit. p.117.

⁴⁵⁴ Goodden, H. (2007) op cit.

COTT AND THE FIELD

So accustomed are we to reject what the eye sees in nature, so dull and dead have we become as a result.⁴⁵⁵

It is perhaps unsurprising that Cott's observations of nature led him to contemplate the potentials of camouflage in warfare. Since childhood he had nursed a passion for natural history, but as a young man, this passion coincided with a military posting. From 1919 to 1921, Cott served in the Leicestershire Regiment in Ireland.⁴⁵⁶ Born in 1900, he had been too young to fight in WWI, but by the armistice he was undertaking military training at Sandhurst. Cott's adolescent years were set against a background of conflict, and dominated by the shadow of a technologically new and socially engulfing form of warfare. When Cott served in Ireland, it was in the wake of the loss of nearly three-quarters of a million British servicemen, and a further one and three-quarter million returning home wounded.⁴⁵⁷ It is difficult to determine the influence of war, on Cott, but he - along with others of his generation - was perhaps left with a distinct evaluation of the relationship between militarism in culture, politics, and society. This can be traced to his formative years in the military and at university.

During three years in Ireland with the military, Cott found time to pursue his interest in natural history. In particular, a posting to the Victoria Barracks in Athlone, and a few days leave on the Isle of Inishbofin in the summer of 1920 proved most fruitful for Cott's ornithological study. Activities such as ornithology had historically been encouraged by the British military, and Greer has examined the intersection between military culture and the practices and ideas of ornithology during British colonialism, noting how ornithology was seen to be a healthy pastime for British military officers.⁴⁵⁸ She illustrates some of the ways in which imperial expansion provided opportunities for military men to map avian, moral and racial geographies, allowing her to interrogate certain consequences of territoriality, identity formation and diverse national-imperial networks.⁴⁵⁹ It is therefore not unusual that, whilst serving in the military Cott began to carve out an identity as an authority in ornithology, and also began to absorb a military precision in his fieldwork practices. It was during this period that Cott first published some of his natural history observations, with articles appearing during the early 1920s in *British Birds* and *The Irish Naturalist*, covering a range of the bird

⁴⁵⁵ Ibid p2.

⁴⁵⁶ Papers of Hugh Bamford Cott (1900-1987) Zoologist – SCA |G|BR/0276/HC.

⁴⁵⁷ Nicolson, J. (2009) *The Great Silence; 1918-1920 Living in the Shadow of the Great War* p.31.

⁴⁵⁸ Greer, K. (2009) Ornithology on “the Rock”: territory, fieldwork, and the body in the Straits of Gibraltar in the mid nineteenth century, *Historical Geography* 37 pp.26-52.

⁴⁵⁹ Ibid.

species that he had been studying in Ireland, from Manx Shearwater to the unusual nesting sites of the tawny owl and sparrowhawk.⁴⁶⁰

Livingstone explains that space is an important consideration in scientific knowledge production; it is not ‘an inert container’ but instead is ‘an active force that pervades and shapes’.⁴⁶¹ From his military experience in Ireland, Cott duly realised that military life and science did not necessarily operate independently from one another, something he would later exploit, whilst serving in WWII. Kirsch has drawn attention, in a study of the US Department of Energy’s Savannah River Site, that ‘thriving’ landscapes can be both a productive site of environmental knowledge and emblematic of military practices.⁴⁶² These sites of scientific knowledge production and military practice exist concurrently within the landscape; they engage in conversation with the local environment and with one another. Cott responded to places as active military landscapes *and* as fruitful scientific fieldsites. He brought to the military an interest in natural history and the military influenced Cott’s science by facilitating further study, and also by helping to form Cott’s military attitude towards his scientific work. These formative experiences of scientific and military spaces would, for Cott and camouflage, have lasting influence and unforeseen consequences.

On leaving the military at 21, Cott enrolled at Cambridge University to study theology, in order to become an ordinand. However, there was a change of direction when he undertook a university expedition to Brazil, under the Cambridge zoologist Balfour Browne in 1923.⁴⁶³ The expedition allowed for study in a variety of different areas of zoology and also included more typical tourist activities, such as visits to the Dumont Coffee Estate, the Campos sugar centre, and even free passes on the Sai Paulo and Lepoldina Railways.⁴⁶⁴ The expedition to Brazil had an important impact on Cott; it cemented his fervour for natural history and field observation. On return to Cambridge, Cott promptly donated some of the insect specimens collected on the expedition to the University Zoology Museum⁴⁶⁵ and switched his studies to zoology. Thereafter, when he could, Cott spent time in the field, a practice which remained an enduring passion throughout his life.

⁴⁶⁰ List of publications 1921-1960 H.B. Cott & Cott, H. (1922) Notes on the birds of Inishbofin, *The Irish Naturalist*, XXXI, 34. – CZM Box 2 Cott copies of publications.

⁴⁶¹ Livingstone, D. (2000) Making Space for Science, *Erdkunde*, 54 (4) p.285.

⁴⁶² Kirsch, S. (2007) op cit.

⁴⁶³ Cambridge University Zoology Museum Archival Chronicles, 1923.

⁴⁶⁴ Ibid.

⁴⁶⁵ Ibid.

A colleague recalled meeting an ageing Cott in the coffee room of the Zoology Department one grey afternoon and, on enquiring after him, Cott responded that he was looking forward to heading back soon to Africa because:

there is just too much concrete in England.⁴⁶⁶

Throughout his career, Cott travelled extensively in Africa, South America and in the Middle East, but there were two field trips that significantly informed his biological study of camouflage. In September 1925 Cott went to the Lower Amazon for six months, and then in December 1926 he travelled to the Zambesi for nine months. Cott's field report from the Zambesi arguably offers the greatest insight into his working methods. These trips were busy affairs, as Cott explained; on the expedition to the Zambesi he secured approximately 500 living specimens for the Zoological Society, including many different species of birds, puff adders, mambas, baboons, antelopes, warthogs and porcupines.⁴⁶⁷ Cott's report of the expedition to the Lower Amazon also reveals a more personal engagement with his science, as he describes his deep connection and emotional response to fieldwork. Moreover, it is clear that the field was not only an ecological site for him, but also required multiple cultural and social engagements:

It is with great pleasure that I take this opportunity to express sincere thanks to my friend, the Rev. A. Miles Moss, English Chaplain at Para, for his generous hospitality and assistance, and for the innumerable kindnesses which he showed me throughout my visit. I have also to thank a kind Brazilian gentleman, Snr. Demetrio Bezerra for his hospitality and kindness during my five most enjoyable weeks at his *fazenda* on Marajo Island. Finally I am indebted to the Colston Research Society for financial assistance in connection with the publication of the present paper.⁴⁶⁸

Cott recognised the need to secure support from established institutions, such as the Zoological Society, but he also realised the importance of becoming acquainted with the local community near his fieldsites. To capture a bird or a snake, Cott needed first to become acquainted with the local human population before becoming familiar with the local natural environment.

Camerini states that, when fieldwork is viewed as an object of study rather than solely as a means to produce scientific knowledge, what is uncovered is that fieldwork is a practice defined by its collective nature.⁴⁶⁹ Cott's scientific practice was indeed reliant on a number of

⁴⁶⁶ Conversation with Ray Symonds op cit.

⁴⁶⁷ Daily Telegraph, Obituary 25th April 1987 op cit.

⁴⁶⁸ Cott, H. (1930) The natural history of the Lower Amazon, *Proceedings of the British Naturalist Society* VII p.181.

⁴⁶⁹ Camerini, J.R. (1996) Wallace in the Field, *OSIRIS* 11 p.46.

economic, social and professional relations, and his expeditions became enmeshed with various lines of human as well as nonhuman relations, even if the produced scientific knowledge might then appear to be untainted by these networks of relations. Cott acknowledged:

It will be understood from the outset that in an expedition of this nature the success which a collector obtains will depend to a very large extent upon the amount of help he receives from the natives in different localities in which he is working. Single handed it is impossible to make extensive collections in a comparatively short time; moreover, for the capture of many species one has to rely almost entirely upon the natives' own methods of trapping - especially this is the case with birds.

On arriving at a new locality it was always, therefore, my first business to make the nature of my mission known to as great a number of the inhabitants as possible to enlist their interest, and to engage their assistance. The idea of a white man coming to Africa to collect snakes, lizards, and frogs seemed to them to be the utmost folly, never failing to arouse their curiosity, and was a never ending source of amusement; however, the news of a promised copper or two for specimens rapidly spread, and generally had the desired effect.⁴⁷⁰

With the funding from established research bodies and the aid of local help and knowledge, Cott could then turn his attention to the practicalities of field research. This required getting acquainted with the field itself, as Cott's instructions on hide building suggest (see How-To-Guide no. 1 p.131).

Once the fieldwork begins, the scientist then must start to 'grapple with the practical demands of collection',⁴⁷¹ which would often become a mix of established scientific practice and creative scientific craft. The field could be an unpredictable and troublesome place, as Cott discovered when in the Zambesi:

NOTES ON SOME OF THE DIFFICULTIES ENCOUNTERED

A brief account of some of the difficulties with which a collector of livestock in the tropics must of necessity face.

1. Attacks by Ants, Termites and Rats
2. Lack of food and accommodation, my violin case had to provide temporary accommodation
3. Difficulties of transport - in the case of delays local boys would be employed to keep away loiterers from the specimens.
4. Climate conditions (heavy and continuous rain).⁴⁷²

Cott had to be inventive in securing the safe collection and passage of scientific specifics, for example through his novel use of the violin case or the employment of local boys to be look

⁴⁷⁰ Cott, H. (1928) Report on the Zoological Society's Expedition to the Zambesi, 1927, *Proceedings of the Zoological Society London*, p.944.

⁴⁷¹ Camerini, R.R. (1996) op cit. p.48.

⁴⁷² Cott, H. (1928) op cit. p.948.

outs. The distinct and unpredictable nature of each fieldwork site meant, as Kohler explains, that it was necessary for field biologists to refashion or devise new instruments specifically for their field needs.⁴⁷³ On his expedition to the Zambesi, Cott hence found that capturing species required tools purposely designed for fieldwork, as well as the innovative use of more prosaic objects which took on new roles:

...a "snake-pole" fitted with an adjustable leather noose was supplied to me by Miss J. B. Procter and proved quite invaluable. A thick pair of motoring gauntlets also turned out to be very useful when holding smaller species likely to have been damaged by the snake pole.⁴⁷⁴

From Cott's own accounts of fieldwork in the Zambesi, we can begin to sense the creative and at times scrappy nature of scientific practice. Practical problems required novel solutions, objects were required to be malleable in their use, and scientists were required to respond to the demands of their fieldsite and the local environment. Cott became trained in this practical method of scientific enquiry, whereby it was essential to experience the field, to be sensually embedded in the natural world.

To Cott, empirical work needed to be performed in site and in place, meaning that for him the geography of his science mattered greatly.⁴⁷⁵

Cott had an under-riding belief that you had to be there in person and see it for yourself which was more valuable than recording datasets. He was a field naturalist, a trained hunter-gatherer almost.⁴⁷⁶

But for Cott, the field was not just the location of science; it was also a place that inspired awe and wonder. Fieldwork experiences stimulated the particular nature of his scientific knowledge which was also, in turn, shaped by the emotionally connected way in which he viewed nature. In his report of the expedition to the Lower Amazon, he mingled scientific writing with lyrical prose in an attempt to convey the experience of *being* in the field:

In the entire world, the Amazon valley is unique as regards the vast and unbroken extent of its mighty rain forests. The wonderful luxuriance of their vegetation, and the abundance, variety and gorgeous beauty of their peculiarly, interesting animal population combine to make the region a biologist's paradise, ... Silence reigns here, and a dense roof of foliage darkens the forest with a perpetual gloom, which few rays of sunlight can penetrate. The oppressive atmosphere, the sombre stillness, the indescribably grandeur and solemnity of the scene, all impress the traveller with a sense of wonder and admiration, not unmixed with awe.⁴⁷⁷

⁴⁷³ Kohler, R. (2002) op cit.

⁴⁷⁴ Cott, H. (1928) op cit. p.948.

⁴⁷⁵ Stoddart (1986) *On Geography and Its History*.

⁴⁷⁶ Conversation with Stephen Tompkins, op cit.

⁴⁷⁷ Cott, H.B. (1930) *The Natural History of the Lower Amazon, Proceedings of the British Naturalist Society*, VII p.181. This quote encapsulates nicely Stoddart's (1966 & 1986) op cit. observation that the practices of the field biologist and the geographer were akin.

How-to-Guide no.1:

COTT'S "HOW TO GUIDE" FOR IMPROVISED HIDE BUILDING

General

In a country where the natives are expert fieldcraft, there is no need to travel encumbered with a prefabricated hide. With local labour and local material a hide can be erected anywhere at short notice.

Siting

A site must be chosen which offers some natural attraction to which animals may come to feed or drink or shelter, such as:

- a water-hole
- a salt-lick
- a nest
- a burrow
- a basking place
- a carcass

In many cases this will be dependent mainly upon knowledge of locality and of its fauna.

Construction

Make the hide of local materials such as a grass thatch supported on a framework of sticks. The construction of the grass roof will provide shade and allow for free ventilation, which is so important in climates where the temperature inside a fabric enclosure soon can become intolerable. It is a mistake to economise in space. The hide should be high enough to allow one to stand erect and roomy enough for free movement. It should have a camouflaged window facing the 'stage', but also one on each side in order to remain alert so that you the observer have not become the observed. Be prepared for visitors such as hippo or elephant. It is useful to have knowledge of a climbable tree nearby.

Use

Patience is an asset. The naturalist must in effect be prepared to say, as the Footman of Alice's Adventures, 'I shall sit here till tomorrow ... I shall sit here, on and off, for days and days'. Unlike stalking a well-built hide will provide opportunities for close-range portraiture and also enable the observer to see and record his subjects behaving in a perfectly natural manner.

From this account of the Amazon valley, Cott describes how he is moved by the sensuality of the experience. Kuklick and Kohler suggest that fieldsites are ambiguous places where boundaries are porous and can be breached or transgressed, which makes them such an interesting and creative place: 'Experiences of natural places define the field sciences. Field scientists experience places largely through work, although the lines between work and leisure, between production and consumption, are less clearly marked in the field than in many social arenas'.⁴⁷⁸ Cott reveals that the sites of his fieldwork were not only experienced through the scientific perspective, but were also places that blurred the scientist with the awed traveller, and romantic artist.

Further, reflecting on his expeditions, Cott explained that the experience of field research extended beyond specific or fixed sites; field research was a process of travelling to and through places. It was this notion of space that awoke the keen observer in Cott:

Opportunities for travel are greater today than ever before. With less discomfort and difficulty we can go faster and further. But speed and distance are only means to an end. The essence of travel is not in hurrying from place to place; its rewards come through the enlargement of our capacity for appreciation. The successful traveller is more than a mere spectator: he feels part of the soil and scene - as one who is a citizen of the world. And the passing stranger has the advantage over the resident, for every impression that to the one is new with the stimulus of surprise and delight, to the other has grown stale through familiarity.⁴⁷⁹

Cott became corporeally connected to his science through the processing of travelling; 'natural history knowledge-gathering was inseparable from the movement through space, inseparable then from bodily involvement'.⁴⁸⁰ His experiences of travelling to fieldwork sites echo Ingold's discourse of the walk, as a way of making sense of how people inhabit their environments. Ingold describes how the traveller and the line both trace through space and become one and the same thing: 'it is a line that advances from the tip as he presses on in an ongoing process of growth and development, or of self-renewal'.⁴⁸¹ This discourse allows for the intimate experience of travelling through space to be articulated and acknowledged as a process which shapes impressions of sites of scientific activity. For Cott, travelling helped him to inhabit environments and therefore to observe nature more closely:

⁴⁷⁸ Kuklick, H. & Kohler, R. (1996) Introduction, *OSIRIS* 11 (1) p.14.

⁴⁷⁹ Cott, H. (1959) *Uganda in Black and White*, p.xx.

⁴⁸⁰ Outram, D. (1996) New Spaces in Natural History. In Jardine, N. Secord, J.A. & Spary, E.C.(ed.) *Culture of Natural History* p.255.

⁴⁸¹ Ingold, (2007) op cit. pp.75-76.

Cott watched and watched and watched and wrote as Darwin would have done. He would have scorned the quantitative work that is now being done.⁴⁸²

It was this keen interest in watching and observing that embodied Cott's Darwinian approach to scientific research. Kohler explains that: 'Darwin was the exemplary scientific naturalist, who worked out of doors and observed so well that observation was as good as experiment'.⁴⁸³

COTT AND OBSERVATION

This close attention to observation was the true skill of Cott's science, and his field observations led him, like Thayer and Kerr before, to become intrigued by the adaptive colours and patterns of many animals. This practice disclosed to Cott that there was often a disjuncture between material reality and what was observed. Vision, Cott realised, is produced through a relationship between psychology, physiology and physics; what happens in the world, the physiological reactions which occurs within the eye as it observes, and what sense the brain makes of this information.⁴⁸⁴ Hence:

Most of us make a mental reservation, based upon long years of experience, and we reject the evidence of the senses. Leaves, we know, are green in summer, not golden; and unless we are especially observant or specially trained, we refuse to see that the distant firs are pale grey, or that the snow on the hills is blue where it lies in shade and warmly tinted where bathed in sunlight, that indeed it may be almost any tint except the white which we think it is. Experience has taken much of the colour and variety out of life, and we go on our way almost unconscious of the real appearance of the visual signs we have learned from earliest childhood to construe.⁴⁸⁵

Cott proposed that the process by which we recognise and interpret the visual world around us is fourfold. Firstly, an object is observed as separate from its surroundings by its colour, which differs in depth and hue; secondly, an object is revealed by its relief; light and shade disclose to the eye texture. Thirdly, although an object is not bound by outlines, its form is exposed by its contour 'which divides the area where it is from the area where it is not in the visual field';⁴⁸⁶ fourthly, the shadows cast by an object render it conspicuous from its background. Cott proclaimed that:

⁴⁸² Conversation with Stephen Tomkins, op cit.

⁴⁸³ Kohler, R. (2002) op cit. p.33.

⁴⁸⁴ Cott, H. (1940) op cit. p.3.

⁴⁸⁵ Ibid p.2.

⁴⁸⁶ Ibid p.4.

Actually, we see nothing but flat stains of colour - variously shaded and variously shaped.⁴⁸⁷

Cott recognised that prey animals need to outwit possible exposure by concealing themselves through techniques of cryptic coloration and patterning, and he identified that to this end animals employ four fundamental methods. Firstly, *colour resemblance* whereby feathers, fur, skin, or scales are similar in hue to the natural surroundings; secondly, *obliterative shading* or countershading, which abolishes the appearance of roundness by the graduating shading of dark to light on the body;⁴⁸⁸ thirdly *disruptive coloration* when a superimposed pattern of starkly contrasting colours and tones blurs the outline of the body and breaks up surface form;⁴⁸⁹ and fourthly, *shadow elimination*, the effacement of cast shadows by cryptic behaviour, such as pressing the body close to the ground. He reflected:

Now it is a very remarkable fact, and one of much significance, that these theoretical principles ... together with various additional devices and instincts, are those actually found to operate in nature, whereby different animals - fishes and wild-fowl, toads and tree-frogs, dabs and crabs, cats and caterpillars and innumerable others - are rendered so extraordinarily difficult to recognise when seen in their natural surroundings.⁴⁹⁰

Cott's hours of observations in the field had rewarded him with some of the secrets of biological camouflage. Because of the essentially visual nature of his science, Cott relied on capturing and recording the different techniques of concealment employed across various species of animals in nature, and for Cott his eyes were his most instrumental tool. Lawrence and Shapin have considered how scientists' bodies are regarded 'as part of an instrumental exploration of the world'.⁴⁹¹ Studying animals' bodies required Cott to employ his body, in particular his eyes, 'as a tool for knowing, as tool for asking questions, as a tool to create a relation that provides new knowledge'.⁴⁹² But, as he knew well, the eye could so easily be fooled and thus technology had the ability to further this task:

Students of animal behaviour, as well as ecologists and others, seem to have increasingly felt the desirability of using photographs to record their observation and to illustrate their papers.⁴⁹³

⁴⁸⁷ Ibid p.3.

⁴⁸⁸ As mentioned in the previous chapter, countershading was Thayer's most important contribution to biological camouflage.

⁴⁸⁹ Disruptive coloration was the term Cott used and which became the scientifically accepted term for the principle in nature which had informed Kerr's parti-colouring and Wilkinson's 'dazzle' that had been applied to Admiralty ships in WWI.

⁴⁹⁰ Ibid.

⁴⁹¹ Shapin, S. & Lawrence, C. (1998) *The Body of Knowledge, Science Incarnate : Historical Embodiments of Natural Knowledge* p.6.

⁴⁹² Despret, V.(2004) op cit. p.129.

⁴⁹³ Butler, C. (1957) *The Technique of Nature Photography, Nature* 4559 p.551.



Figure 12. Stick insect displaying colour resemblance and cryptic behaviour - H.B. Cott

The combined use of the eye and the camera could produce a permanent documentation of the environment precisely and in great detail (figure 12 and 13). Therefore, the 'scientific experience is, so to speak, an instrument-body hybrid'.⁴⁹⁴ Indeed:

When properly used the camera discloses - in a way unrivalled by any other medium - a world of surprising beauty in common things: and a good photographic record will have pictorial qualities, as well as technical merit and scientific interest.⁴⁹⁵

The camera became a technological extension of the human optic in the art of observing nature. It became an essential tool for scientific endeavour, but was also an artistic device to prise open nature to reveal some of its concealed splendours:

With an instrument giving enlargement as well as reduction, combined with extreme precision of detail, it is possible to display the hidden and intricate beauty of surfaces right outside the province of painting and sculpture to reveal.⁴⁹⁶

⁴⁹⁴ Despret, V. (2004) op cit. p.130.

⁴⁹⁵ Cott, H. (1956) op cit. p.135.

⁴⁹⁶ Ibid p.137.



Figure 13. Young ringed plover - H.B. Cott

This discloses that in the field the scientific and the technological, the artistic and the emotional, were never clearly discrete, but instead were folded into one another through Cott's field practices. It should be highlighted that Cott's particular approach to his science, revealed through studying his expeditions, was also performed in the university, museum and at home. Domestic pets and their adaptive colourings and patterns were of as much interest to Cott as were wild animals observed on his more exotic fieldwork expeditions.⁴⁹⁷ His adored cats, Monkey, Bessie, Sailor and Queenie, were often the subjects of his scientific study (figure 14).

Jones discusses 'the messiness of our passions in our relationship with animals',⁴⁹⁸ and Cott's approach to scientific research offers an opportunity for witnessing such 'messiness' at work. Animals were not mere objects of investigation, bodies ripe only for dissection, study and experimentation (although at times they were); Cott approached them, wild and domestic, as lively and intriguing beings:

He really liked animals, and anyone else who did too, could not fail to like him.⁴⁹⁹

⁴⁹⁷ Cott, H. (1940) op cit. p.48.

⁴⁹⁸ Jones, O. (unpublished) op cit. p.8.

⁴⁹⁹ Letter from John Cloudsley-Thompson (a former student of Cott's) to Kraig Adler, 5th January 1997.



Figure 14. Sailor - H. B. Cott

Therefore, Cott and his contribution to camouflage knowledge can be studied through tracing scientific journeys, sites and spaces. By attending to Cott's fieldsites, an historical and geographical study of fieldwork becomes a spatial and temporal investigation into networks of relations, scientific practice and technology. When considering how Alfred Russell Wallace's contribution to science was informed by his field experience, Camerini states: 'His experiences in the field changed him from an inexperienced collector, smitten with natural history, into a committed and well-published naturalist'.⁵⁰⁰ This sentiment could be equally applied to Cott's scientific career where the pursuit of amateur natural history led him to academic scientific study.

By studying Cott in the field, it is also revealed that 'personalities mattered'⁵⁰¹ in the production of scientific knowledge. The field, for Cott, was never a bounded space; it was entwined with military postings and domestic settings, and it stimulated scientific inquiry as well as traveller's awe and artistic impression. Although he would become out of step with disciplinary methods, Cott's Darwinian attitude to science disclosed the sensual, emotional,

⁵⁰⁰ Camerini, J. (1996) op cit. p.64.

⁵⁰¹ Lorimer, H. & Spedding, N. (2005) op cit. p.15.

active, practical, technological and social character of fieldwork and scientific knowledge production. It was this approach that led Cott to rely on his senses and physical presence within and through places; for Cott, this *was* scientific rigour. Observation became the fundamental method of Cott's science and the expeditions undertaken became hugely influential, their findings and analysis the basis for *Adaptive Coloration in Animals*. These field expeditions framed Cott as biological expert on camouflage, and subsequently accomplished military camoufleur. Throughout his academic and military careers, a passion for the field never left Cott and, even after retirement, he continued to travel and study, leading him to reflect:

Looking back on these wanderings, I cannot help thinking, first and last, of work done in the field.⁵⁰²

COTT AND THE BOOK

It must be for a generation or more the standard book on adaptive colouration.⁵⁰³

As Cott continued his scientific research, the main thrust of his studies remained focused on biological camouflage. His first academic post was assisting in demonstrating in the Zoology Department at Cambridge University, before moving to Bristol in 1928 to become a lecturer in Hygiene. In 1932, Cott moved to the Zoology Department in Glasgow University with a Carnegie Teaching Fellowship, where he became an assistant lecturer. It was in Glasgow that Cott came under the supervision of Professor Graham Kerr, a character from the previous chapter, and the pair struck up a close alliance which would remain strong throughout Cott's career. Glasgow allowed Cott the opportunity to complete his doctoral studies on adaptive coloration and pattern perception in nature, and to pursue his passion for ornithology by studying the sea bird colonies on Ailsa Craig (figure 15).

In the thirties, when these photographs were taken, the rookery was subjected to frequent blasts from the sirens of passing ships, which sent thousands of Gannets, together with Kittiwakes, Guillemots and Razorbills, into the air at once, and so caused many fatalities. At one spot on the boulders at the cliff-foot I once counted ten or twelve dead Gannets – some recently killed, other decomposed or reduced to a sun-dried skin or skeleton.⁵⁰⁴

⁵⁰² Cott, H. (1956) op cit. p.xxiv.

⁵⁰³ Letter from Kerr to Cott, 3rd December 1939 – SCA SEPP/COTT/1/8 COTT PUBLICATIONS & CONTROVESY 1935-1940.

⁵⁰⁴ Cott, H. (1956) op cit. p.303. The photographs that Cott took during this period not only appear in this book, for some mounted prints remain in the Cambridge Zoology Museum. In the Cambridge Zoology Museum there are also several dioramas that Cott had commissioned after WWII, which depict various scenes of coastal ecologies. Two of the three which remain on display show the nesting habits of Guillemots and Razorbills.

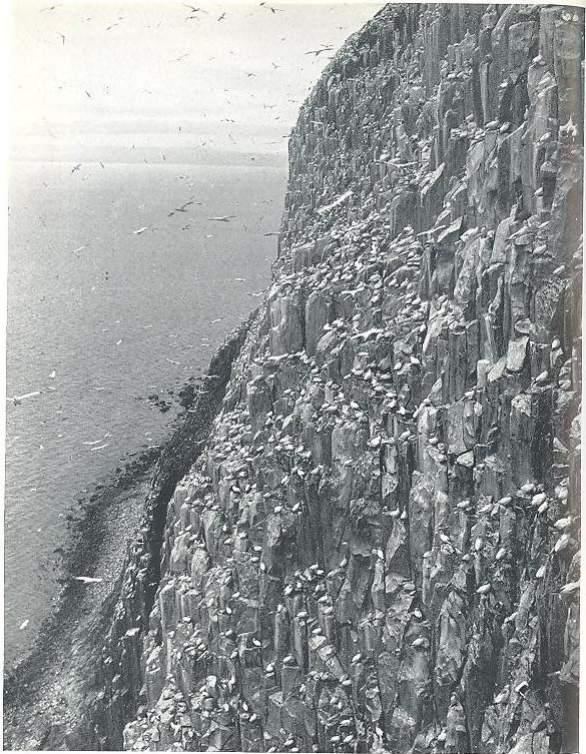


Figure 15. Gannet colony on Ailsa Craig - H.B. Cott

Other than continuing field work and completing his doctorate, the time spent at Glasgow University allowed Cott to begin to compile and condense his years of observation and fieldwork into a book on animal camouflage. Cott had the ambitious aim of writing a text that would satisfy the scientific researcher reader, as well as, attracting a more general audience interested in natural history. Such an intention at times slowed the progress of publishing. There was, for example, a long deliberation over a suitable title, with the

hope of avoiding too technical a name that might discourage lay readers from picking up the book from the shelves. There was also a protracted discussion with the publishers concerning an appropriate lay-out for the book, with Cott insisting upon suitably wide margins for the scientist to scribble notes.⁵⁰⁵ From the field to finished publication, *Adaptive Coloration in Animals* took over a decade to complete, and throughout this period Cott's scientific findings underwent a process of transformation. Alberti has reflected how museum objects undergo a 'sleight of hand' whereby a sense of stability and completeness is established upon them.⁵⁰⁶ Cott's book, as an object of scientific knowledge, through its structure, lay-out, tone and binding, underwent a similar process whereby his science was fixed and imbued with an objective, authoritative quality. Livingstone muses: 'All this opens up interesting questions about the movement of text from raw, thumb-imprinted scratches on rain-spattered sheets to the cultivated immediacy of the printed page'.⁵⁰⁷ As a result, *Adaptive Coloration in Animals*, from the field to publishing house, saw Cott's science smoothed and his creative methods of scientific practice muted. An objective tone pervades and his research is presented as a

From studying Cott's photographs of the sea bird colonies at Ailsa Craig, it is apparent that these became the model from which the dioramas were based. Conversation with museum staff reveals that when Tim Birkhead, a leading ornithologist, visited the museum, he realised - that from how the nesting strategies of the sea birds had been displayed - that Cott had understood birds' behaviour. Work on behavioural ecology had not to any extent been developed at this time and, although Cott never published in relation to this theme, it is evident from the dioramas that he had understood the behavioural ecology of sea birds.

⁵⁰⁵ Letter from the Zoological Society of London to Cott, 7th April 1937 - SCA SEPP/COTT/1/2 COTT PUBLICATIONS & CONTROVESY 1935-1940.

⁵⁰⁶ Alberti, S. (2009) op cit. pp.123-144.

⁵⁰⁷ Livingstone, D. (2005) op cit.p.9.

completed and sealed area of scientific study, working to establish Cott as an authoritative figure on the subject.

By the time the book was published in 1940, Cott had returned to Cambridge to take up a lecturing post in Zoology and the position of Strickland curator of birds in the Zoology Museum. Cott still relied greatly upon his mentor Kerr, who had advised Cott throughout writing his book and had proof-read the text. On its final completion, Kerr enthused:

It is by far the finest thing of the kind in existence, its importance will not be merely of to-day but really permanent ... it ought to catch on with the public, it is far more fascinating than many a 'best-sellar'.⁵⁰⁸

Through closer scrutiny of *Adaptive Coloration in Animals* as both an object of scientific knowledge and a performance in establishing scientific fact, Cott can begin to be traced through its pages. The book is divided into three main sections. The first section of the book entitled 'Concealment', focuses on colour resemblance, obliterative shading, disruptive coloration and, Cott's particular contribution to biological camouflage, coincident disruptive coloration (whereby the patterns on animals' bodies suggest continuity of surface over separate body parts, frogs proving most emblematic of this technique). The second section discloses methods of advertisement through behaviour and colour, and discusses the techniques where conspicuousness is directed at prey and enemies. The final section covers disguise and the means by which animals come to resemble other objects or species through their colorations, patterns and mimetic behaviour.

A key device by which Cott communicated this scientific research was through the accompaniment of his textual explanations of camouflage with visual examples (such as his field photographs). Rose explains that photographs should be considered as 'cultural documents offering evidence of historically, culturally and socially specific ways of seeing the world', because images participate in the construction of ideologies and discourses.⁵⁰⁹ Cott's detailed and instructive photographs were indeed not mere scientific descriptions or visual verifications; they formed part of Western scientific discourse whereby nature became known as distinct from the human. This division between nature and society has been long at the centre of Western rationality, serving to construct simplified perceptions of identity and difference.⁵¹⁰ Castree explains that understanding nature through this lens has led to the ordering of lives and objects whereby our 'comprehension of the 'reality' of those things' is

⁵⁰⁸ Letter from Kerr to Cott, 6th June 1939 – SCA SEPP/COTT/1/5 COTT PUBLICATIONS & CONTROVESY 1935-1940.

⁵⁰⁹ Rose, G. (2000) op cit. p.556.

⁵¹⁰ Philo, C. (2005) op cit. p.825.

‘deeply conditioned by the sorts of knowledges we imbibe, digest, and come to accept as legitimate knowledge’.⁵¹¹ Cott’s photography enrolls ‘the nonhuman body in co-creating the ideologies and placings afforded to it, asserting it as a presence, but simultaneously emptying it of precisely what makes it live’;⁵¹² yet Cott’s book and his science cannot be positioned as a neat example of the nature/society dichotomy. Cott’s view of nonhumans appears at times evocative of contemporary animal geographies, wherein the lives of nonhumans are taken seriously:

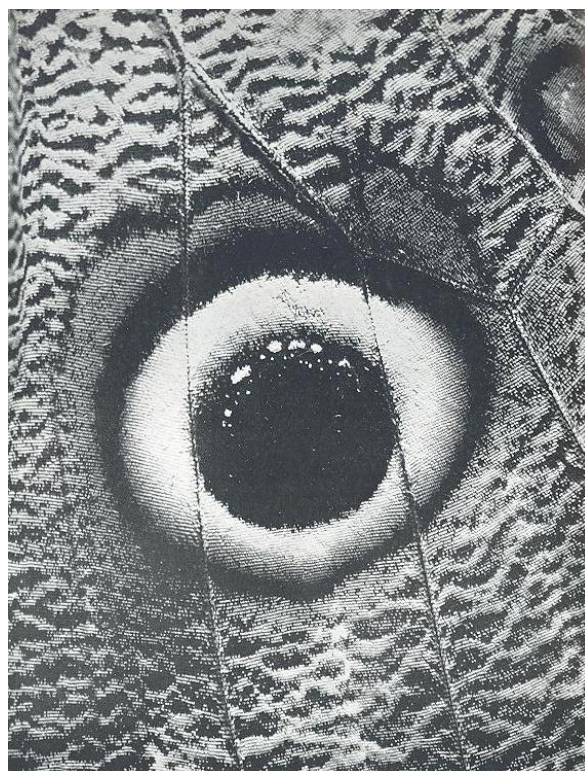
The pageant of nature marches on: we can recognize and give names to most of the actors; but of their own make-up, their parts, and their inner lives we still know little enough.⁵¹³

This quote demonstrates that Cott’s scientific biography expresses the complexities and individual perspectives that contribute to accepted scientific knowledge. His photographs also offer a means to examine the sometimes unintended lifepaths of scientific knowledge, once it is disseminated. Knowledge on natural camouflage has been utilised and incorporated by other disciplines, an example being Cott’s photography of an ocellus (illusionary eye) on the hind-wing of the Brazilian butterfly.

Figure 16. Ocellus - H.B. Cott

Such things are directed towards a seeing public; they are meant to attract the attention.⁵¹⁴

The eyes of an owl stare out from the butterfly’s wings, a false-warning display to ward off attackers, or at least direct attack on non-vital body parts; it is hence an uncanny and unsettling gaze from nature (figure 16). This knowledge of nature’s mechanisms has been transmuted to discourses on hybridity and subaltern identities by Zohar in his study of the mental breakdown of the Palestinian-Israeli painter, Ibrahim Nubani. Zohar employs the ocellus and



⁵¹¹ Castree, N. (2005) op cit. p.95.

⁵¹² Johnston, C. (2008) op cit. p.363.

⁵¹³ Cott, H. (1940) op cit. p.xvi.

⁵¹⁴ Cott, H. (1940) op cit. p.428.

butterflies because they represent ‘the gaze of those who were pushed aside, returning a dislocated, bodiless gaze’.⁵¹⁵ This is one example of where natural camouflage is used to explore psychotic experiences, the process of ‘losing one’s boundaries’ to become assimilated into the background for safety.⁵¹⁶

The techniques of biological camouflage, the disruption of the outline of animals bodies with their background, can offer a disturbing possibility: the ‘fear of losing all sense of separating boundaries, particularly the boundaries between the tangible realities of the external world and the imaginative realities of the inner world of feeling and idea’.⁵¹⁷ Thus, natural knowledges become enmeshed with other knowledges; nature becomes a tool to frame not just biological science, but also a means to explore politics, culture, and psychology. Cott’s photograph of the ocellus becomes more potent than a mere demonstration of his observation and scientific interpretation. Through the dissemination of science and its acceptance as knowledge, other knowledges can now make use of this knowledge in unforeseen ways. Objects and knowledges have complex and continually (re)forming lives long after they are first presented.

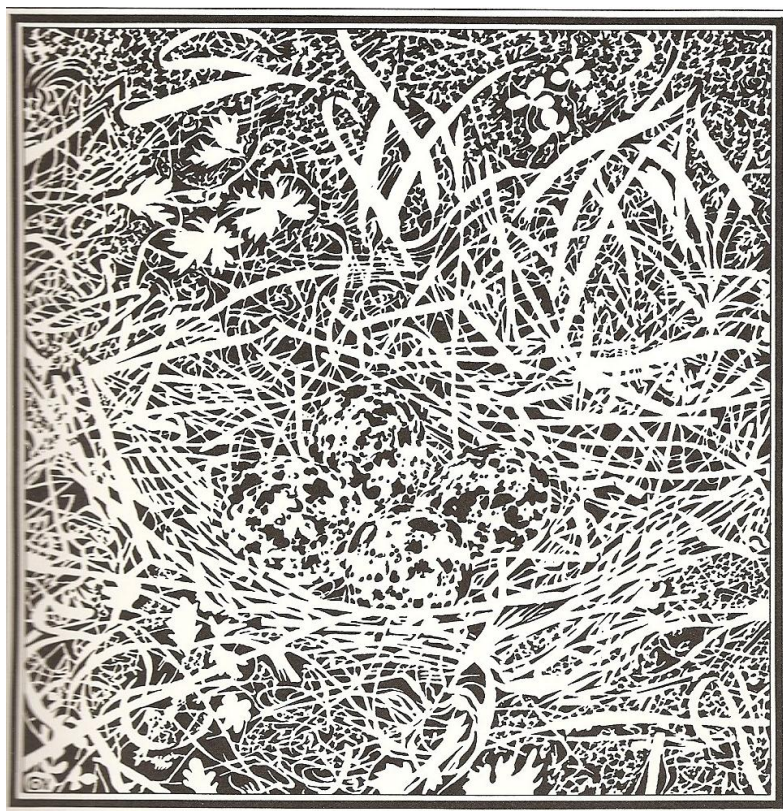


Figure 17. Cryptically concealed eggs - H.B. Cott

If it was not only photographs that Cott employed to aid in his scientific explanation, for *Adaptive Coloration in Animals* is infused throughout with his own intricate pen-and-ink illustrations of camouflage. These can be explored in a similar way to Cott’s photographs. Domosh states that visual materials are ‘discursive forms’ which participate in the ‘creation of meaning’,⁵¹⁸ and the drawings

⁵¹⁵ Zohar, A. (2011) The Paintings of Ibrahim Nubani: Camouflage, Schizophrenia and Ambivalence - Eight Fragments, *Theory Culture & Society* 28 (1) pp.15-17.

⁵¹⁶ Ibid p.12.

⁵¹⁷ Milner, M. (1971) *On Not Being Able to Paint* p.17.

⁵¹⁸ Domosh, M. (2001) Visual Texts in Historical Geography, *Historical Geography* 29 p.68.

therefore also offer different, perhaps more personnel insights than Cott's photographs. Cott described his drawings as:

...half-way between a thing and a thought; between a recording of fact and a revealing of experience.⁵¹⁹

And:

...the real work - a sort of hidden asset - that goes into the drawing comes not from the hand, but from the heart.⁵²⁰

Cott worked solely with black Indian ink on white paper, which gives his illustrations a crisp, clean, stencil-like finish (figure 17). The drawings were copied from his field photography, and thus his art is imbued with a sense of energy:

His works have a tremendous liveliness in the forms of the animals that he draws, not dead animals or stuffed specimens.⁵²¹

Cott could be irked by the supposition that, because his drawings were based on photographs they were in some sense cheating art. He emphasised how the practicalities of the field made



detailed sketches at times impossible to complete with any satisfaction, and that photographs therefore ensured that much which was observed was not lost.⁵²² As he said:

'Are those drawings copied from photographs?' is a question sometimes asked by people who have no very clear idea about pen technique. In one sense, no pen drawing can be a literal copy. The photograph contains no lines, but only patches of tone, varying in size, shape, graduation, and density. Now with pencil or brush it is in fact possible to copy in this way and to reproduce tone by tone, the content of print.⁵²³

Figure 18. Cryptically concealed bird - H.B. Cott

⁵¹⁹ Cott, H.B (1959) op cit. p.13.

⁵²⁰ Cott, H.B. (1975) op cit. p.207.

⁵²¹ Conversation with Stephen Tompkins, op cit.

⁵²² Cott, H. (1956) op cit. p.169.

⁵²³ Ibid.

Cott's illustrations are distinctive because of their level of detail (figure 18), which meant that his art required time. Since his interests lay in understanding and exposing the use of texture and tone in natural camouflage, his scientific drawings are characterised by exploring those features through the relationship between background and object:

A distinguishing feature of the pen and ink drawing is its capacity for intense contrasts of tone. The blackness of the Indian ink stands out from the whiteness of the paper, and if properly managed the pen work has a bright and almost sparkling quality.⁵²⁴

The vitalising influence of variety and contrast may be introduced in many ways: by changes of line and contour; by differences in the size or tone of masses; contrast introduces change.⁵²⁵

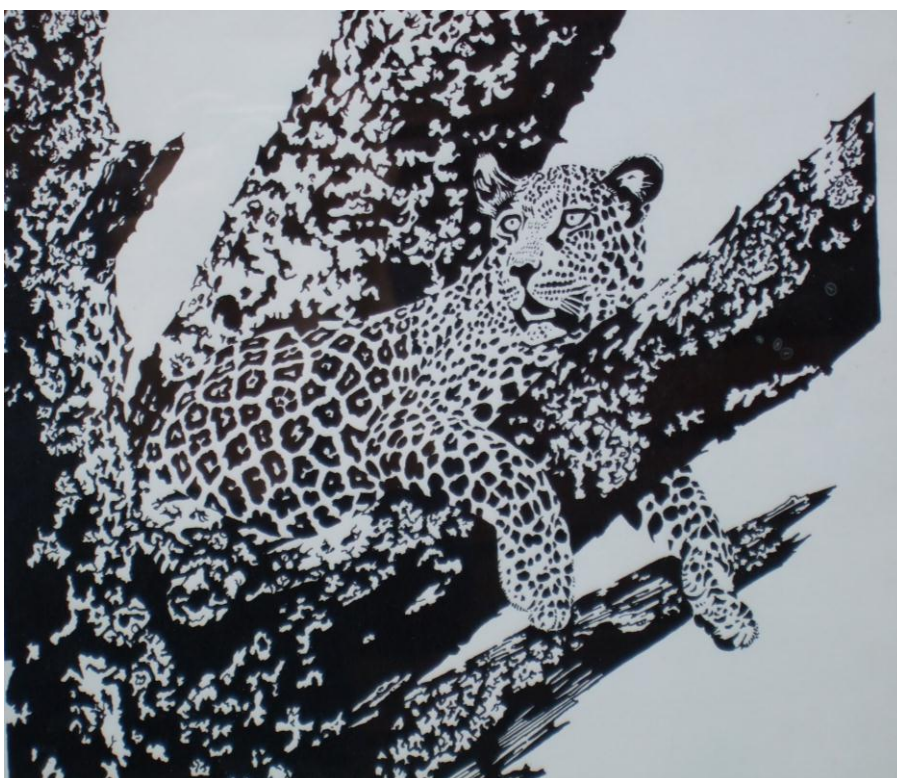


Figure 19. Leopard - H.B. Cott

It may be helpful, for a moment, to take a step back and to consider Cott's intricate technique of drawing. In *Adaptive Coloration in Animals*, it is through these graphic illustrations that we sense Cott within the science, as an active participant. But we also can sense the impact of witnessing these places; indeed, his appreciation and admiration for nature is portrayed through his art. Although the book is a scientific text, the other components of Cott's character can be obliquely perceived through closely attending to these scientific illustrations.

⁵²⁴ Cott, H. (1975) op cit. p.201.

⁵²⁵ Cott, H. (1956) op cit. p.137.

His vivid portraiture of nature revelled in texture, tone and the individual character of the animals studied. Each illustration draws the likeness and type of an individual life and biological life: the eyes have expression, the gait and posture portray more character than just an examples of species behaviour. Like a photograph, which captures a snapshot in time, Cott's illustrations record a fleeting moment, its temporal and spatial particularities depicted (figure 19):

A sense of vitality is expertly achieved by his artisan pen work. Robert Gillmor, an ornithologist and artist, who, alongside Cott, was one of the founding members of the Society of Wildlife artists, explains why Cott's art was important. He describes that Cott's black and white pen technique led his art to:

...produce line work that was highly, highly skilled.⁵²⁶

Cott realised that the means by which animals render themselves conspicuous could be inversely employed in art, so as to reveal the magic of their camouflage techniques:

The artist, by skilful use of light and shade, *creates upon a flat surface the illusionary appearance of roundness*: nature, on the other hand, by the precise use of countershading, *produces upon a rounded surface the illusionary appearance of flatness*.⁵²⁷

By attentively studying Cott's drawings, his intricate attention to detail and concern with lines can be glimpsed. Cott observed:

We are often told that there are no lines in nature. In the sense in which draughtsmen use the term, lines are rarely found in natural objects, though we occasionally meet with them - for instance, in the strands of a spiders web, or the antennae of a long-horned grasshopper, or the whiskers of a cat. In another sense, however, lines are everywhere apparent in the three-dimensional scene.⁵²⁸

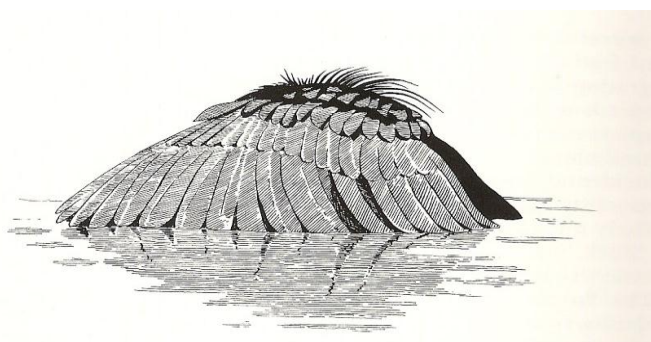


Figure 20. Black heron hooded whilst fishing - H.B. Cott

If we splash some ink onto a sheet of paper, both the black and white areas have a common boundary: this boundary is a line in the Euclidian sense - it is neither black nor white,

⁵²⁶ Conversation with Robert Gillmor, September 2009.

⁵²⁷ Cott, H. (1940) op cit. p.36, emphasis is the author's own.

⁵²⁸ Cott, H. (1956) op cit. p.145.

and it is without breadth; but it has length and direction. Such are the lines with which we are concerned in composition, namely, the edges that limn tonal masses.⁵²⁹

The deftness of Cott's pen renders lines, which hatch, mesh, wind, cross, curl, squiggle, swirl, scratch, wave, block, sweep, weave and trail, across the page. Through their relations to one another, these lines work ink into a smooth shiny beak, or give texture to feathers, whether of downy softness, or waxy sleek tips (figures 20). Skin, fur, horn, bone, earth, leaves, bark, stars, moist, rough, smooth, tacky, cloying, jagged and dry: these sensual qualities are conjured through Cott's illustrations. His animals and landscapes are constructed through a multitude of systematic and irregular lines, which assemble to become 'intrinsically dynamic and temporal'.⁵³⁰ Cott's lines are intrinsically spatial, conjuring the blank space of the page into lively, sensual places (figure 21).

How Cott interacted, viewed, interpreted and ordered nature, and how nature influenced his science, can all be glimpsed through these illustrations; thus he divulges something of himself too. These drawings at times avoided an outline containing the animal, which reflects Cott's fieldcraft where his own outline, as scientist, soldier and artist, blurred into the natural environs – rendering him both less and more tangible for the researcher. Therefore, the use of scientific illustration not only allows insight into Cott's technique of using visual aids to validate his research, for his drawings also flesh out his biography: it too becomes livelier. In this sense, the means by which Cott displays (both photographic and artistic) nature discloses how knowledge production and representation become inseparable:⁵³¹ Cott is simultaneously disseminating and constructing knowledge. Cott's art also serves another purpose in *Adaptive Coloration in Animals* as a means by which he reaches out to diverse audiences which he hoped would engage with his work. The illustrations are a medium, along with photography, that sculpts his science to become more accessible and understandable.

Illustrations were not the only technique employed by Cott to encourage the general as well as the scientific reader. He also infused the book with analogies between concealment in nature and relatable examples in modern society, so that the means of disruptive coloration could be compared to the mischievous methods of the common pickpocket:

When a pickpocket intends to relieve your watch or wallet, he, or his confederate, takes care to distract your attention from what he proposes to do by creating a diversion. He draws your eyes from what is really happening to what seems to be happening. Now the patterns worn by many animals such as Giraffes and Jaguars, Anacondas and Iguanas, Pipits and

⁵²⁹ Ibid.

⁵³⁰ Ingold, T. (2007) op cit. p.72.

⁵³¹ Alberti, S. (2008) Constructing Nature Behind Glass, *Museum and Society* 6 (2) pp.76-77.

Plovers, and various Grass-frogs, Grasshoppers, Moths and Matids, operate in a somewhat analogous way.⁵³²



Figure 21. Elephants - H.B. Cott

To assist in Cott's description of contradictions in form by strongly contrasting tones, he drew on the mundane qualities of the net curtain, the ubiquitous symbol of English suburbia:

In general, very light markings on a dark object, and very dark markings on a light one, will be most effective. The principle is similar to that which makes an open network curtain effective as a screen in preventing a casual passer-by from seeing into the interior of a room ... details in the room beyond are openly exposed to view - although they cannot be seen clearly. The curtain acts in this way, merely dazzling and distracting the eye.⁵³³

However, most of the parallels that Cott invoked to explain camouflage techniques in nature were comparisons with the military and modern warfare. Considering Cott's early experience of fieldwork in Ireland and the geopolitics of the time this can perhaps be expected, as these would, for Cott, have been easily relatable examples. As he observed:

This book was written in a period of unsettled peace, in which the nations of Europe were preparing for, or against, war. Now the war has

⁵³² Cott, H.(1940) op cit. p.48.

⁵³³ Ibid p.51.

come, and with it the intensification of industrial energy and of that preoccupation with machines which has long been an accompaniment of modern life. In these days that lie ahead, when too exclusive an interest in mechanical and scientific contrivances must tend to encourage the development of what Lord Dawson once called the 'gadget-mind', which is restless, unreflective, and unemotional, the study of natural history provides a welcome antidote - not indeed as a way of escape from reality, but rather as a means of seeing, as from a mountain-top, and in clearer and wider perspective, that struggle for existence which is the lot of men not less than of animals.⁵³⁴

Close attention is paid to the parallels between the struggle for survival in nature and the techniques of modern warfare. The way that moths and birds attempt to blend their bodies into their natural surroundings with cryptic patterning that resembles their normal habitat-background, such as bark, foliage or lichen, could be applied to camouflaging static objects in war, such as observation posts.⁵³⁵ Shadow elimination used to deceive aerial predators, to confuse the 'birds-eye view', could also be used through the employment of overhead screens, tricking the all-seeing eye of the aerial observation in modern warfare.⁵³⁶ Hence:

The gradual perfection and specialization of visual disguises and displays, and of eyes which penetrate or appreciate them, find a close parallel in the increasingly complex equipment of modern warfare.⁵³⁷

Cott nonetheless fervently concluded that the means developed in the military to camouflage soldiers and equipment falls far short of the near-perfect equivalents found in nature:

Various recent attempts to camouflage tanks, armoured cars, and the roofs of buildings with paint reveal an almost complete failure by those responsible to grasp the essential factor in the disguise of surface continuity and contour ... in nature vigorous disruptive contrasts are frequently seen at work, and their wonderful effectiveness in hindering recognition needs to be experienced in the field to be fully appreciated.⁵³⁸

Adaptive Coloration in Animals can duly be read not only as a work of natural history, but also as a manifesto for applying biological principles of camouflage in the development of modern military camouflage. Cott's previous experiences in the military, a life experienced against a backdrop of geopolitical uncertainty, and his close alliance with Kerr, who had been outspoken on camouflage issues in WWI, not only informed how Cott interpreted natural history, they also ensured that his science would correspond with the contemporary context of conflict. Cott's science, since his first ornithological publications in the 1920s, arguably had been a hybrid of biology and war. That said, it was the differentiation between the effectiveness of camouflage methods in nature and the seemingly lack-lustre attempts in

⁵³⁴ Ibid p.xv.

⁵³⁵ Ibid p.98.

⁵³⁶ Ibid.

⁵³⁷ Ibid p.429.

⁵³⁸ Ibid pp.53-54.

modern warfare that Cott sought to convey throughout his book. In this sense, his book was not only an important contribution of scientific knowledge, but also a call to arms. Biological camouflage needed to be closely scrutinised and understood if the British military was successfully to develop its military technology.

Camouflage, a product of the Great War, is still in its infancy – a child suffering from arrested development. Its importance and possibilities have yet to be fully appreciated in official quarters.⁵³⁹

Cott had used *Adaptive Colorations in Animals* to become established as an expert in biological camouflage and also to position himself and his science as potentially key to the further evolution of modern military camouflage.

COTT AND THE MILITARY

Indeed, the primeval struggle of the jungle, and the refinements of civilized warfare, have here very much the same story to tell.⁵⁴⁰

As war came closer, Cott was active in approaching the military to promote his skills in developing military camouflage. His first step was to give a lecture to the Royal Engineers at Chatham in October 1938, published in the *Royal Engineers Journal* in December that year, allowing for Cott's ideas on camouflage to be circulated widely through the military. Cott was pleased to note that within the year nearly all the copies of this issue of the journal, and therefore his lecture, had been sold.⁵⁴¹ Throughout the lecture, Cott laid out his blueprint for biological principles of camouflage in nature to be effectively transferred to military technology:

It is my intention to describe the optical principles upon which concealment depends: to indicate the methods by which this end has been achieved in nature: and to refer to the bearing of these principles and devices upon the important problem of applied camouflage.⁵⁴²

Cott emphasised the importance of looking to nature to find answers to the conundrums of modern military camouflage against increasingly sophisticated and effective weapons such as aerial observation and bombing:

⁵³⁹ Ibid p.438.

⁵⁴⁰ Ibid p.xii.

⁵⁴¹ Letter from Cott to Kerr, 10th December 1939 - GUA DC6/725.

⁵⁴² Cott, H. (1938), Camouflage in Nature and in War, *The Royal Engineers Journal*, p.1 – CZM Box 2 Cott copies of publications.

In this sphere of visual concealment different wild animals have attained a degree of perfection far beyond the comparatively clumsy attempts at camouflage with which we are too easily satisfied.⁵⁴³

The lecture at Chatham was just one of Cott's attempts to become 'utilised' by the military, and his next step was to demonstrate his skills and scientific principles through a camouflage experiment on a military installation. In the early summer of 1939, Cott persuaded the military to allow him to camouflage an aerodrome at Mildenhall for their inspection:

All the aerodromes I have seen are glaringly conspicuous. At Mildenhall the hangars are made of real brick, and have a serrated roof-structure which can catch the eye from great distances. And of course the landing grounds stand out on account of their great extent of unbroken green.

Certain of the hangars at Mildenhall have a roof-pattern of round light blobs of colour which look like a print frock pattern from above, and a similar pattern (done by someone who took no notice of the roofing adjacent) has been put on the ground on a smaller scale - so there is not attempt to correlate roof and ground. This kind of thing is bound to occur until there is some proper co-ordination.⁵⁴⁴

Cott devoted much time, enthusiasm, and expertise to this experiment. The rigours of military experimentation were thoroughly enjoyable, even exhilarating, for Cott, and the importance of academic life began to pale in comparison:

I have a few zoology lectures to give at the latter end of this term. I had hoped to get out of this distraction now that I am doing what is, at the moment, far more important work, but I am trying not to let this interfere too much with my activities at Mildenhall.⁵⁴⁵

His scheme received praise from several quarters in the military, including Mildenhall's Station Commander,⁵⁴⁶ Sir Ernest Swinton,⁵⁴⁷ who would be the first chair of the Advisory Panel in Camouflage established later in , and from the war artist Eric Kennington:

I have come from Mildenhall. It does you credit. It's not bombed at all, and no doubt it would be if it was more obvious. The pilots say they have great difficulty returning to it. You did a grand job, and a lot of young men are completely at ease there between their bouts of activity.⁵⁴⁸

However, echoing Kerr's earlier experience, the reception from higher military quarters was not as positive. After an inspection of his work, it was perceived that Cott's scheme was impractical. The military authorities decided that to replicate Cott's camouflage scheme for aerodromes elsewhere would be too time and labour intensive, require specialist skills and

⁵⁴³ Ibid.

⁵⁴⁴ Letter from Cott to Kerr, 16th of April 1939 – GUA DC6/709.

⁵⁴⁵ Letter from Cott to Kerr, 4th May 1939 – GUA DC6/710.

⁵⁴⁶ Ibid.

⁵⁴⁷ Letter from Swinton to Kerr, 27th September 1941 – GUA DC6/443.

⁵⁴⁸ Letter from Kennington to Cott, 9th December 1940 – GUA DC6/761.

ultimately be too expensive.⁵⁴⁹ Beginning to feel frustrated, Cott turned to his close friend and former colleague from Glasgow, Kerr. Since 1935 Kerr had become an elected member of parliament for the Combined Scottish University and was well-positioned to openly challenge decisions on military camouflage in the House of Commons. Cott and Kerr were united in their objective, that camouflage should be co-ordinated across the Service Departments in the military, and that it should be implemented under scientific supervision. Kerr became Cott's champion, drawing on his influential political contacts in an attempt to place Cott where Kerr believed that he belonged, at the helm of improving the effectiveness of camouflage:

Cott, in addition to being the one man in the country - so far as I know - with a real grasp of the scientific principles involved, as well as large practical experience of the way Nature makes effective use of these principles - (his large book on camouflage in Nature which I have read in typescript is certain to be the standard work on the subject for many a day) - is also a magnificent teacher. He was on my staff in Glasgow and there was no one in greater demand for lecturing to outside bodies such as the Workers' Educational Association.

As I have emphasised before, the work of applying camouflage principles so as to be effective is not in itself a work of difficulty. It can be done by ordinary tradesmen so long as tradesmen have been given a proper grounding in the basic scientific principles. To give such grounding Cott possesses outstanding qualifications.⁵⁵⁰

Cott and Kerr were not the only scientists to realise the potential of transferring biological knowledge on camouflage to the development of military technology. For example, Professor Hale Carpenter, an Oxford zoologist, also contacted his local MP to promote the military use of Cott as *the* established authority on the matter:

Dr Cott's services should be fully utilised, and he should be given "the whole time job" of trying to get the Army to understand, and act upon fundamental principles upon which invisibility depends.⁵⁵¹

Meanwhile, Cott was becoming increasingly exasperated by the military's seeming inertia in employing his specific skills. He resigned himself to returning to academic life, but this was no longer fulfilling, not when so serious matters were beginning to be played out. Cott felt certain that he possessed essential knowledge and skills for the developing of an important military technology:

I am tremendously keen to carry on this work, which I feel to be much more important just at present than anything I can do in zoology.⁵⁵²

⁵⁴⁹ Letter from Cott to Kerr, 9th June 1939 – GUA DC6/712.

⁵⁵⁰ Letter from Kerr to Sir John Anderson, 7th July 1939 – GUA DC6/296.

⁵⁵¹ Copy of letter from GD Hale Carpenter, Prof of Entomology Oxford to A.P. Herbert MP, 18th May 1940 – GUA DC6/307.

⁵⁵² Letter from Cott to Kerr, 5th July 1939 – GUA DC6/714.

Zoology seems rather to sink into insignificance these days, beside the events happening elsewhere. Cambridge is quiet and normal and here I can almost forget the war - but that is not so much to my liking and I do wish I could persuade one of the Service Departments to use me for camouflage in a practical way.⁵⁵³

Cott continually appealed to Kerr with mounting desperation to exert his influence to secure him a position in the practical application of military camouflage. Cott also continued to research the ways in which the biological principles of camouflage could be effectively incorporated into military technology, although on a smaller scale than of his Mildenhall experiment. His daughter Ruth recalled her father bringing home toy cars, trucks and aircraft, not as gifts for his children, but instead as part of scientific experiments, such as a simulated fly-over:

I can remember him painting Dinky Toys in Cambridge (I was nine or ten!) in various patterns and running upstairs to have a look down at them below!⁵⁵⁴

Cott's ingenuity, his sometimes *ad hoc*, scrappy methods and creativeness for experimentation into military camouflage can clearly be traced to his scientific research. It was field-based, with emphasis on the importance of personal experience, witnessing and observation. Although he clearly established a boundary between scientific and military knowledges, perhaps even a hierarchy where scientific knowledge was established as more advanced, it is evident throughout his pursuit of natural history that he regarded science as having a porous and malleable boundary, one that needed to be blurred under the grave circumstances of war. His early attempts to be used by the military, the Chatham lecture and the Mildenhall experiment all made Cott visible to official military authorities. In 1939, soon after the aerodrome experiment, and with Kerr as his keen sponsor, Cott was finally enrolled into the military services, specifically because of his specialist scientific knowledge and skills relating to camouflage, as a member of the newly formed Camouflage Advisory Panel.

CONCLUSION

Cott, thus far, has proved a fruitful scientific biography as a means to trace the history of camouflage. In particular, the focus on Cott and his science demonstrates the usefulness of employing a micro-history in an attempt to engage meaningfully with macro discussions of knowledge production and transformation. The personal and small can highlight the

⁵⁵³ Letter from Cott to Kerr, 3rd April 1949 – GUA DC6/741.

⁵⁵⁴ Email from Ruth Lyons (Cott's daughter) to James Taylor at the IWM 12th December 2005.

complexity of historical narratives, which, like biographies, can over time become smoothed, seemingly complete and unproblematic. It has been evident throughout that Cott and his science cannot be located in a fixed place or time, he is only traceable from the lines and trails that his life has left in the archive. These trails at times jolt from objective science to soaring romanticism, from colonial explorer to contemporary animal geographer. He has proved an historical and geographical exercise in the complexity of life, and the importance of making space for the flicker of personalities within research. Importantly, from the paper trail in the archive and tracing the threads of Cott's engagement with camouflage through science, art and militarism, it is evident that all of these elements were continually engaged in 'conversation' with one another through the figure of Cott. A geographical focus on a scientific biography has sought the entwined spaces, sites and routes of Cott and camouflage, whereby technology and human life have been mutually narrated. By tracing military camouflage's life-path through the narrative of Cott's scientific biography and his continual blurring of disciplines and spaces, camouflages' lively interaction between human and nonhuman, animal and technology, has begun to be highlighted.

Further, the hybridity of knowledge production is evident from studying Cott's fieldwork practices and the production of his book. In the field Cott was simultaneously a scientist, an artist and also at times a soldier, all components of his self which contributed towards how he observed, recorded, understood and disseminated scientific research. When approaching the military Cott used his status as an authoritative figure in the field of biological camouflage to position himself as useful to the technological innovation and development of military camouflage. This standing as a potential specialist on military camouflage was further enforced through his social relations with fellow zoologist Kerr who had the political leverage as a MP to openly support and endorse Cott. *Adaptive Coloration in Animals* and Kerr's collegial support, alongside the practical demonstrations and lectures for the military, positioned Cott as a person of interest to those charged with innovating British military camouflage. It can be seen that Cott applied the same meticulous preparation for working in the field towards his attempts to become enrolled in the military to develop camouflage for the battlefield. Cott reveals that understanding camouflage in nature and in war is a truly hybrid practice and knowledge, born of diverse disciplines, skills and approaches.

Here, may I remind you of the very interesting fact, that there is a close analogy between the adaptations of animals and the inventions of man - whether used in nature or in battle. Indeed, almost every

invention, including some of the most recent, has its counterpart in the modifications and behaviour of various wild creatures.⁵⁵⁵

⁵⁵⁵ Cott, H. (1948) Camouflage, *The Advancement of Science* IV p.301.

THE ABC OF CAMOUFLAGE: N-P

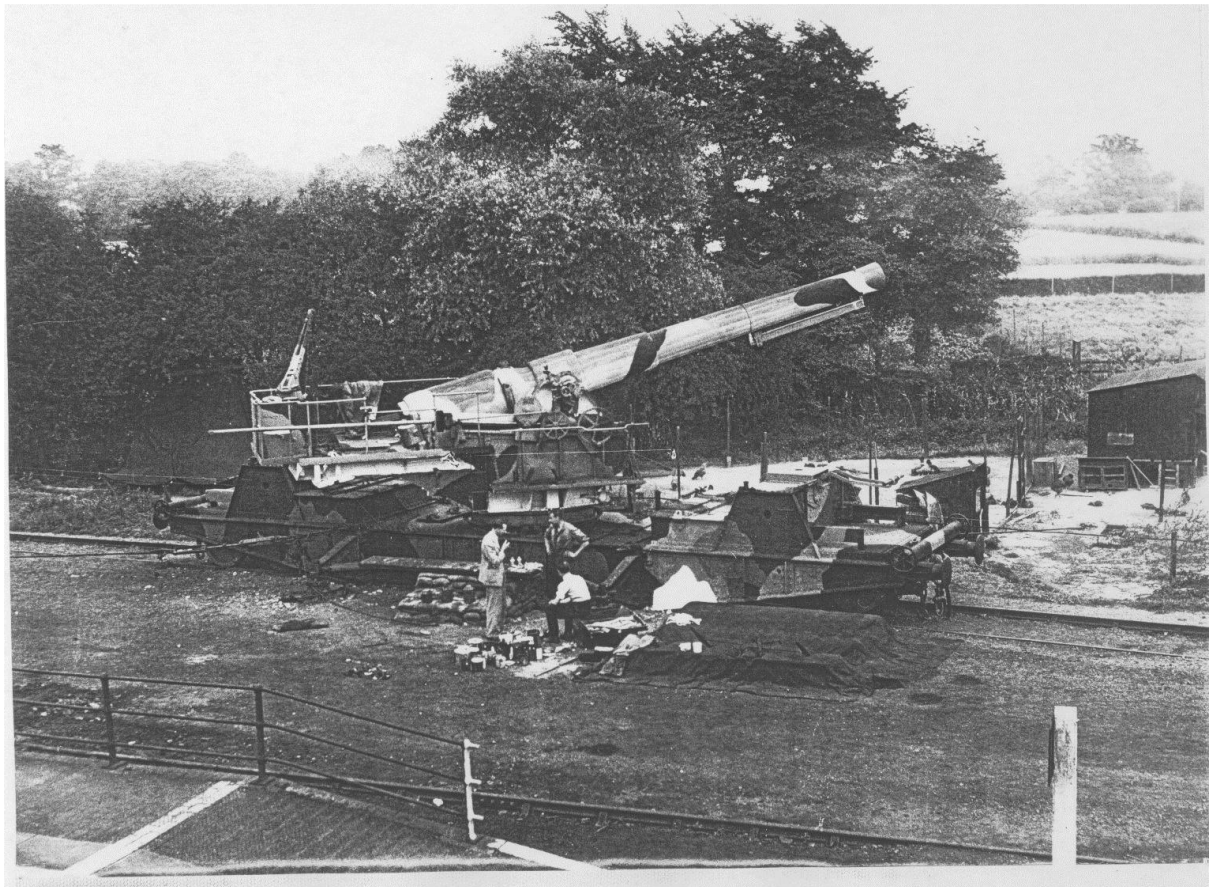
N is for Nets which are simply a frame for the garnishing of them, so garnish the same

O is Opacity: over the gun you must garnish opaquely, but think of the sun.

P is for Patches of Scrim. Calico unevenly shaped will be useful in snow

Chapter 6.

The Politics of Position: Charting A Failed Camouflage Network



PLACING CAMOUFLAGE IN THE WWII REGIME

There are people who want to study the transformation of technological objects without worrying about the engineers, institutions, economies, or populations involved in their development. The theory of evolution can take such people for a ride!⁵⁵⁶

WWI had seen the birth of widely applied camouflage within the British military and the beginnings of coherent application across the Services. The foundations had been set for WWII when great innovation in camouflage technology and design arrived. As a military technology camouflage was similar to many other inventions of WWII, such as advances in radar and the dawn of the atomic bomb.⁵⁵⁷ Barnes explains that '[f]rom World War II onwards, ideas, techniques, machines, academic subjects, and institutions were brought together in combinations that never existed before'.⁵⁵⁸ Pickering named this epochal shift in engagement between the military and outside disciplines as the 'WWII Regime', which saw the breaching of boundaries between science and the military, resulting in the transformation of scientific and military knowledge and practices 'that sustained and were sustained by those breaches and flows'.⁵⁵⁹

This chapter considers the implications of the WWII Regime for initial attempts to organise and structure interdisciplinary and also, importantly, inter-service (between Army, Navy and Air Force) research and experimentation into British military camouflage through tracing the formation of the ill-fated Camouflage Advisory Panel (CAP). The Panel was the first concerted effort in WWII by the British military to standardise and co-ordinate camouflage designs and techniques, and to generate co-operation across the Service Departments. The CAP created a space where the once distinct worlds of art, science and militarism converged and at times collided, as a complex network of knowledge, skills, military aims, personal hopes and materials were assembled in an attempt to innovate in camouflage. Geographers, such as Barnes and Gregory, have already studied the hybrid spaces of knowledge production in war directed research and analysis (R&A).⁵⁶⁰ In particular, Barnes has examined the use of geographers in the USA military's Office of Strategic Services (OSS) in WWII.⁵⁶¹ He is concerned with how to understand networks of diverse researchers in specific and peculiar circumstances, applying in particular Latour's approach to the sociology of scientific knowledge. With this focus, Barnes identifies that new configurations of knowledge and

⁵⁵⁶ Latour, B. (1996) *Aramis, or, The Love of Technology*, p.2.

⁵⁵⁷ Hartcup, G. (2000) op cit.

⁵⁵⁸ Barnes, T. (2008) op cit. p.4.

⁵⁵⁹ Pickering, A. (1995b) op cit. p.5.

⁵⁶⁰ Barnes, T. (2006) op cit. Gregory, D. (2007a) op cit.

⁵⁶¹ Barnes, T. (2006) op cit.

technology in WWII were ‘often uncertain and faltering, only sometimes paying off’.⁵⁶² In WWII military R&A, the pressure of organising and conducting immediate action, demanding the swift formation of novel networks and the thrusting together of discrete professions to engage in interdisciplinary co-operation between one another and with the military could create resentment, but ‘there was no option. It was a military order’.⁵⁶³ The OSS and the US military were not peculiar during WWII in establishing such new configurations of military and non-military networks. The history of the CAP is a short period in the biography of WWII camouflage, but - through a Latourian engagement it is possible to consider the CAP in a manner similar to the ill-fated Aramis⁵⁶⁴ - the Panel offers an intriguing false start to the relations that the technology engendered, upsetting coherent narratives of military camouflage.

SETTING UP THE CAMOUFLAGE ADVISORY PANEL

In the 1930s, as tensions between the European nations grew more and more fraught, the British military began to prepare for the likely event of another war. Bateman explains that a large proportion of the military’s role is not the act of waging war; instead, ‘much time, effort and finance is expended on preparing for the event of war, or, in other words, defence’.⁵⁶⁵ One of the greatest fears for Britain was the likelihood of enemy attack and invasion from the skies. The plane had evolved from its WWI infancy to become a powerful weapon, both as observant watcher and precision bomber. The military began to organise camouflage research and experimentation expanding the camouflage lessons of WWI and forming new camouflage networks. In October 1936 the Committee of Imperial Defence (CID) made a recommendation that the Home Office should take charge of matters concerning the security of vital British ‘factories, key points and landmarks’ from aerial attack in the event of war:⁵⁶⁶

In 1936 we came to know that the Germans were displaying interest in camouflage problems, and this led to a revival of camouflage development in the United Kingdom. In any case, it was obvious that, in any future war, air attack, both on military and on civil installations, would be far stronger than had even been imagined in 1918.⁵⁶⁷

⁵⁶² Ibid p.151.

⁵⁶³ Ibid p.154.

⁵⁶⁴ Latour, B. (1996) op cit.

⁵⁶⁵ Bateman, M. & Riley, R. (1987) op cit. p.2.

⁵⁶⁶ Goodden, H. (2007) op cit. p.22

⁵⁶⁷ Wiseman, D. (1953) op cit.

By WWII, the aeroplane was cast as a ‘technological triumph’ which essentially redefined the nature and methods of war.⁵⁶⁸ Kaplan explains that, as mobility grew swifter, increasingly efficient and more deadly through the military’s expansion into airspace, war became ever more obviously a contest of technological cunning;⁵⁶⁹ bombers versus anti-aircraft weapons, fighter planes and also camouflage. Williams expands on the impact of the aeroplane in warfare, explaining that it led to geopolitics having vertical dimensions,⁵⁷⁰ and by WWII it was increasingly recognised that war was now to be waged in cubic space.

Hewitt explains that, as Western militaries had realised the importance of the aeroplane in conflict, by WWII they had also become aware of urban centres being vital yet vulnerable sites for the state. It was upon this ‘thesis’ that the bombing raids of WWII, which devastated cities throughout Europe, were based.⁵⁷¹ At the beginning of the war, the British military began to calculate the potential impact of the aeroplane as bomber. Deer reveals that the military recognised the ‘capacity for the bomber to outrun naval or land forces in attacks on enemy airfields, factories, or cities’, which meant that the ‘civilian experience of war would be irrevocably altered’.⁵⁷² Hewitt nonetheless issues a note of caution in the study of WWII air attacks on civilian populations, as given that, although this was a new form of warfare, the outcome, the destruction of civilian settlements, does have a much longer history. He draws on the Roman sieges of the second century through to the 1942 German annihilation of the Czech village of Lidice, to exemplify the numerous acts of violence to places, the ‘man-made blank on the map’, which preceded the devastating air raids in WWII.⁵⁷³

Yet, the aerial bombing of cities in WWII did usher in new perspectives on acts of destruction and violence. The bombing raids threatened to ‘annul the distinction between the front line and the home front, between combatant and civilian’.⁵⁷⁴ The British military knew that aerial attacks on cities were likely, since the aeroplane’s blurring of vertical and horizontal battlespaces clearly signalled the blurring of the division between civilian and target. Civilian populations in WWII became justifiable casualties, while the aeroplane created a ‘new and terrible space of war on the Home Front’⁵⁷⁵ as the city, through a series of visualizations,

⁵⁶⁸ Pick, D. (1993) *War Machine: The Rationalisation of Slaughter in the Modern Age* p.11.

⁵⁶⁹ Kaplan, C. (2006a) op cit. pp.395-403.

⁵⁷⁰ Williams, A. (2011a) op cit. p.256.

⁵⁷¹ Hewitt, K. (1983) op cit. p.258.

⁵⁷² Deer, P. (2009) *Culture in Camouflage: War, Empire, and Modern British Literature* p.73.

⁵⁷³ Hewitt (1983) op cit. p.259.

⁵⁷⁴ Gregory, D. (2007b) op cit. p.93.

⁵⁷⁵ Deer, P. (2009) op cit. p.74

became a target.⁵⁷⁶ This blurring of spaces, angles, sites, battlespaces and bodies has of late been explored by Gregory in a study on the history of bombing. Gregory critically examines the swift, disconnected and seemingly ‘clean’ attack that the aeroplane allows, and describes how WWII can be traced as an important moment defining the ‘contours’ of the geography, as well as the history of bombing. Since WWII military maps have increasingly become emptied of detail through a ‘process of abstraction’, creating a tidy aesthetic where the distance from map to target became a mere performative exercise,⁵⁷⁷ with the effect on the ground remaining anything but ‘clean’. The uncluttering of the imagined geographies of battlespaces has carried the ability to legitimise violence on civilian bodies which ‘represent the most immediate and delicate scale of politics as corporeal sites’.⁵⁷⁸ The work of the CAP was one attempt by the British military to defend against the aeroplane, and work with space not as flat or easily bound but as cubic.

The CAP’s predecessor had been the Camouflage Sub-Committee (1937-1939), which before it was wound down had created the Camouflage Research Unit at Farnborough under Colonel Wyatt at the Royal Aircraft Establishment, which the War Office and Air Ministry - who had their own small camouflage sections - used for advice.⁵⁷⁹ The sub-committee was also responsible for the production of the Air Raid Precautions (A.R.P) Handbook No.11 on Camouflage.⁵⁸⁰ However, by 1939 it became evident that the Camouflage Sub-Committee was insufficient to address the demands of the camouflage issue that was facing the military at the cusp of another war. Moreover the existing organisation within the Home Office was also inadequate to deal with the ever greater responsibilities falling upon it.⁵⁸¹ Thus:

It was clear much greater centralisation of effort was necessary. Existing H.O organization inadequate to deal with responsibilities therefore centralise H.O and Air Ministry. 13th of July Committee of Imperial Defence with Lord Privy Seal authorised set up of an organisation.⁵⁸²

Therefore, on 13th July 1939 the CID decided that the Home Secretary, Sir John Anderson, should authorise industrial camouflage under the Civil Defence Act, set up a Camouflage

⁵⁷⁶ Gregory D. (2007a.) op cit.

⁵⁷⁷ Gregory, D. (2010) op cit.

⁵⁷⁸ Fluri, J. (2011) op cit. p.282

⁵⁷⁹ CAP – Preliminary Memorandum by Camouflage Division – NA HO 186/171/1. At the time the Admiralty had no camouflage section and the Home Office had one officer who dealt with all correspondence on the issue of camouflage.

⁵⁸⁰ Camouflage Advisory Panel Interim Report - NA HO 186/668/6.

⁵⁸¹ CAP – Preliminary Memorandum by Camouflage Division, op cit.

⁵⁸² Preliminary Memorandum by Camouflage Division, Ministry of Home Security, n.d. – NA HO 186/171/4.

Establishment and co-ordinate camouflage questions with the Fighting Services.⁵⁸³ As a result, the Air Ministry camouflage section was transferred to the Home Office as the nucleus of a central Government organisation to deal with all industrial and other civil camouflage, and was amalgamated with the Camouflage Establishment which contained a Research Unit. Meanwhile, the Service Departments were to retain responsibility for the camouflage of all warlike equipment, such as tanks, guns and ships, and their own property, such as barracks, air stations and docks.⁵⁸⁴ At the same time the Home Secretary set up the Camouflage Advisory Panel in order to advise him:

...from its wider knowledge and outside contacts, so that policy may not be entirely restricted to the experience and information gained by my officers and may be given every opportunity to embrace the problem which will arise in war-time and to solve them with all the ingenuity that can be collected.⁵⁸⁵

And to:

...absorb all ideas from outside and to contribute its own conceptions of what should be done, so as to form a recognisable policy which can be given in the form of advice to this Department.⁵⁸⁶

The need for protective camouflage and effective organisation became most evident in Britain in 1940, when the country, and specifically cities, came under aerial attack from the German air force. Hewitt explains that in WWII, area bombing, which involved mass raids 'usually by hundreds of heavy bombers arriving in waves'⁵⁸⁷ and increasingly using fire raids, became the main means of aerial attack. Importantly, Hewitt identifies that area bombing was only seriously employed 'after the agonising inability of bomber crews to make precision raids against well-defended or distant targets'.⁵⁸⁸ Bomber crews attempting to attack vital military installations suffered great losses from antiaircraft and fighter defences.⁵⁸⁹ As a result, there was a shift to area bombing and attacking civilian morale, where the national collective affect was targeted as an object to become 'known, rendered actionable, and intervened on'.⁵⁹⁰

The effect of such indiscriminate destruction and violence on civilian populations in WWII could be explored, its effectiveness as a military strategy questioned⁵⁹¹ and its lasting

⁵⁸³ Letter from John Anderson to Sir Ernest Swinton, 27th September 1939 – NA HO186/668/4.

⁵⁸⁴ Ibid.

⁵⁸⁵ Letter from John Anderson to Sir Ernest Swinton, 27th September 1939 op cit.

⁵⁸⁶ Letter from Mr Galpin from the Air Ministry to Ernest Swinton, 15th September 1939 – NA HO 186/668/3.

⁵⁸⁷ Hewitt (1983) op cit. p.260.

⁵⁸⁸ Ibid p.261.

⁵⁸⁹ Ibid.

⁵⁹⁰ Anderson B. (2010) Morale and the affective geographies of the 'war on terror', *Cultural Geographies* 17(2) p.223.

⁵⁹¹ Hewitt (1983) op cit. He explains that ironically, bombing to terrorise civilians was mainly used by countries, such as Italy, Germany and Japan, which had suffered most from area bombing.

consequences considered (as Sebald has done by questioning the silence surrounding the WWII allied attacks on German cities, giving voice to collective horror)⁵⁹². However, for this study it is useful to consider area bombing in relation to the development of military camouflage. As Hewitt described, a factor in the shift from precision targeting to terrorising civilian populations was the inability of bomber crews to make accurate hits. Bombers were required to make instantaneous decisions; when the moment (perhaps a mere fraction of second) past, the target would be missed, the bomber's load wasted. Camouflage had the task of creating these moments of confusion, to lead the bomber pilot to hesitate, momentarily to mistrust his eyes and map. Camouflage was a technology generating a churning sense of unease and confusion in the enemy. Therefore, the military's intentions for protective camouflage should not be confused with the protection of civilians. Places such as London, with its vital infrastructure for the running of the country and war, and objects like oil tankers and buildings such as factories were the civilian elements that required the camouflage attention, not the civilian body *per se*.⁵⁹³ A shade ironically perhaps, the very shift from targeting vital military installations to 'place annihilation' was due to the difficulty and costs of precision targeting to which camouflage schemes and technology clearly contributed. This positions 'concealing camouflage' in an ambiguous and uneasy 'protective' role, arguably, it even prompted more fire bombing and hence more danger to civilians. Yet, despite the questionable morals of camouflage, it was clear that, due to technological innovation in weaponry, camouflage had an important role to play in WWII and therefore it needed efficient organisation and execution, to which the CAP should contribute. Its structure and working arrangements are worthy of more detailed attention.

THE CAP

It fell upon the Home Secretary, Sir John Anderson, to appoint suitable members for the CAP from within the military, and to scout for experts from diverse fields and disciplines who would be beneficial to the committee's research and experiment section.⁵⁹⁴ Although Anderson's central aim was:

...to have a body of independent persons of standing with expert knowledge of the scientific and other considerations involved ... to whom to refer for guidance on matters of principles affecting this new and important subject [camouflage].⁵⁹⁵

⁵⁹² Sebald, W.G. (2003) *On the Natural History of Destruction*.

⁵⁹³ However, the camouflaging of factories, roads, railway tracks and large buildings could be considered as boosting civilian morale and contributing to a sense of protection and safety.

⁵⁹⁴ Letter from John Anderson to Mr Swinton, 12th January 1940 – NA HO 186/174/3.

⁵⁹⁵ *Ibid.*

He also had another aim in setting up the CAP; Anderson hoped to change the prevailing and potentially destructive attitudes between different established camouflage experts. This attitude had emerged from WWI camouflage initiatives, as in the acerbic dispute between Kerr and Wilkinson over the invention and origins of ‘dazzle’ patterning. The Home Secretary hoped that the CAP would soothe grievances between differing factions and, further, create a space for collaboration. In a letter to Ernest Swinton, whom the Home Secretary appointed as chair of the CAP, Anderson shared his aspirations for the Panel.⁵⁹⁶

There are conflicting theories: there is, for example, the biologist school and the artistic school. What we must secure is that the whole matter is tackled vigorously on a sufficiently high plane and that all the petty jealousies and rivalries, which are largely the result of the manner in which the whole thing has grown up, are eliminated.⁵⁹⁷

Anderson recognised that in a time of national threat, ‘imposed cooperation with other disciplines’⁵⁹⁸ was required. Therefore, individual and interdisciplinary disputes would have to be reconciled, and the military would be necessitated to forge networks and connections with outside knowledges and skills. He turned to the Research and Experiments branch to compile a list of proposed members for the CAP who would be useful in providing the diverse and specialist skills required. Among the list submitted were artists such as Norman Wilkinson and Paul Nash, paint manufacturers, military academics and other professions⁵⁹⁹ that had been successfully drawn upon during WWI. Scientists were also included on the list, since Anderson had acknowledged that developments in military camouflage had, so far, possessed too limited a scientific input:

The personnel of the Advisory Panel, though competent are perhaps rather weak on the scientific side. The Air Staff, supported by Tizard, have pressed urgently for a stronger controlling and directing body on camouflage which would co-ordinate both the work which is being done on the civil side under the Civil Defence Act and also that which is being done on the Service side on aerodromes, ships and so on ... A controlling body of this kind would be strengthened by scientists.⁶⁰⁰

Cott was one of the scientists on the list, and had come recommended by the Air Ministry after his experiment on the Mildenhall aerodrome, mentioned in the previous chapter, where he had demonstrated an aptitude for camouflage:

⁵⁹⁶ Letter from John Anderson to Mr Swinton, 6th January 1940 – NA HO 186/174/2.

⁵⁹⁷ Letter from John Anderson to Mr Swinton, 12th January 1940 op cit.

⁵⁹⁸ Barnes, T. & Farish, M. (2006) op cit. p.814.

⁵⁹⁹ Letter deputy under-secretary of state from research and experiments branch, 13th June 1939 – NA HA 188/668/1.

⁶⁰⁰ Letter from John Anderson to Mr Swinton, 6th January 1940 op cit.

You will remember Dr Cott's rather impressive effort, which we saw at Mildenhall. It seems to us that Dr Cott would make a very useful member of the advisory panel, which the Lord Privy Seal is getting together on camouflage technique. We have not sounded Dr Cott, but we would be quite ready to do so if you would like him as a member of your panel.⁶⁰¹

Thus, Cott was invited by the Home Secretary on the 28th July 1939 to become a member of the CAP:

I should be very pleased if I could think that your advice was available to me; and I should be glad if you could see your way to assist me by acting as a member of this Advisory Committee.⁶⁰²

Cott was delighted to be offered this position, feeling that his efforts at Mildenhall and the lecture at Chatham had finally led him to be recognised as an expert on camouflage. After consulting with Kerr on how to proceed, Cott accepted the invitation. In his acceptance note, Cott set out clearly what he felt could be his particular contribution to the Panel namely; the application of biological camouflage to military technology:

I shall be pleased to place at your disposal my knowledge and experience of the scientific principles upon which usual concealment depends and their applications to war camouflage.⁶⁰³

From the moment of Cott's acceptance letter, Kerr's archive becomes full of rapid and frantic correspondence between the two zoologists. Every action the Panel took was relayed from Cott to Kerr, and attitudes of the military service departments and the other members of the CAP towards camouflage were scrutinised. For Cott, Kerr was a close ally and mentor, from whom he sought advice and guidance at every turn. For Kerr, Cott's appointment to the Panel was an opportunity to position Cott and thus science at the helm of military camouflage initiatives. Indeed, Kerr hoped Cott could succeed where he had failed, securing the military's acknowledged application of biological camouflage to all military service camouflage designs and technology. This close relationship between the two scientists and Cott's reliance on Kerr's opinion and advice saw the threading of WWI anxiety and tensions into the CAP. Old grievances thus did resurface in the WWII boardroom of camouflage development: the Home Secretary's desire to establish cohesion from the outset undermined; the carefully selected network of camouflage specialists already precariously positioned.

⁶⁰¹ Letter from Sir Arthur Street to Sir Eady, 31st July 1939 – NA HO 186/668/4.

⁶⁰² Letter from John Anderson to Cott, 28th July 1939 – GUA DC6/715.

⁶⁰³ Letter from Cott to John Anderson, 1st August 1939 – GUA DC6/717.

CAP: A SAFE SPACE FOR ANTICIPATED ATTACKS

Camouflage was a unique feature of the war in that it brought together an extraordinary group of like-minded individuals who combined passionate eccentricity with practical knowledge.⁶⁰⁴

Goodden's sentiments above appear potentially true; indeed, the range of professionals enrolled in camouflage had a vibrant mix of passionate eccentricity and practical knowledge, which Cott, Kerr, Solomon and Thayer had already well demonstrated. However, the suggestion that they were a 'group of like-minded individuals' appears from camouflage experiences in WWI to be a generalisation, with the early history of camouflage being at times rife with tension and rivalries as well as like-minded passion. The CAP, an interdisciplinary body, would surely put this 'like-mindedness' to the test. When the full panel was assembled the personnel listing of the CAP was as follows:

The Panel

Major-General Sir Ernest Swinton (Chairman) Professor of Military History, Oxford
Norman Wilkinson (Artist)
Dr H.B. Cott (Biologist) Lecture in Zoology, Cambridge, (Friend of Professor G.Kerr)
S.K. Thornley (Paint Manufacturer)
Dr L.A. Jordan. Director, Paint Research Association
A member form Civil Defence Research Committee
Dr E.V. Appleton (ex officio) paint research
W. O. Kennington Engineer Vauxhall Motors experiments with the camouflage of buildings

Departmental officers:

Mr Galpin
Mr Jowett
Capt Glasson
Col Wyatt
Mr Pegg (Secretary)⁶⁰⁵

The CAP assembled civilians and military officials from across the Service Departments. Its members gathered from Oxford, Cambridge, Stratford-on-Avon, Teddington, Farnborough and across London to attend meetings held every second week, usually on a Friday morning, at 10.30am, in Room 101, Home Office, Whitehall, although on occasion meetings were held in Room 301, Horseferry House, Thorney St, Westminster. The CAP interpreted its aims as:

- (i) To cover all forms of industrial camouflage within the limits imposed by the C.I.D. decision of 13th July 1939
- (ii) To include within the term "camouflage" all forms of visual deception or concealment from an enemy.⁶⁰⁶

⁶⁰⁴ Goodden, H. (2007) op cit. p.162.

⁶⁰⁵ Camouflage Sub-Committee Civil Defence Research Committee – NA HO 186/668/1 and Camouflage Advisory Panel Minute of Meetings – NA HO 186/171/1 NA HO 186/171/4-17.

Latour has described that at the beginning of technological invention ‘there is no distinction between projects and objects’; in that both circulate together through letters, designs, models, offices and meetings.⁶⁰⁷ The CAP can be understood in similar terms, as a group working on the cusp of camouflage ideas and camouflage technology, constituted through precisely this homogenous set of loosely networked objects. The potential effectiveness of military camouflage lay in the discussions and actions of the Panel, but also in the part capacity of the Panel to function as a network within the military. Camouflage projects and objects devised and tested by the CAP moved often uncertainly, with open-ended outcomes, through boardroom meetings, plans, scale models, and trials, as well as between and across Service Departments.

Very quickly after its inception, Cott was frustrated by the seeming inertia of the CAP. It took nearly three months from the invitation to join the panel, at the end of July, to the CAP holding its first meeting. Cott urged Kerr publicly to question the procrastination in the CAP’s activities, hoping that this would speed up the organisation of meetings.⁶⁰⁸ Again, he also appealed to Kerr to use his influence to find him more satisfying employment in the military:

In the meantime, if you have an opportunity please put a word in the right quarters that will speed up camouflage. I am of course quite prepared to go anywhere at home or overseas, where I can be useful.⁶⁰⁹

Eventually, the CAP held its first meeting, and Cott’s spirits were buoyed by the attitude he found in the panel towards the importance of effective camouflage. He wrote to Kerr:

I came away with the impression that many members are really alive to the urgency of the whole problem of concealment and visual deception.⁶¹⁰

In the first meeting the role and areas of camouflage that would be the responsibility of the Panel were established, which included:

Camouflage Advisory Panel

Subjects for consideration

1. Camouflage of large areas, such as London
2. Treatment of highly regular patterns, such as oil tank installations
3. Camouflage of railway tracks and roads
4. Camouflage of water
5. Systems of smoke screen
6. Methods of decoy e.g. dummy building, decoy light, baffle lighting

⁶⁰⁶ Camouflage Advisory Panel Interim Report, op cit.

⁶⁰⁷ Latour, B. (1996) op cit. p.24.

⁶⁰⁸ Letter from Cott to Kerr, 21st October 1939 – GUA DC6/724.

⁶⁰⁹ Letter from Cott to Kerr, 13th September 1939 – GUA DC6/720.

⁶¹⁰ Ibid.

7. Infra-red photography
8. Other methods of confusing enemy airmen⁶¹¹

The list demonstrates that the CAP was charged with researching camouflage's potential for protection through pre-empting security threats and designing protective camouflage. Anderson explains: 'if the event is pre-empted, it is not simply prevented. Instead through sovereign action, the consequences of an event are brought into the present to be acted over'.⁶¹² Bringing likely future threats (such as bombing raids) into the present in the safety of the committee room, so that they could be understood and undermined, was hence a key aim of the CAP. Anderson *et al* explain how technologies undergoing experimentation are neither real nor imaginary, but rather an attempt to bring dreams and fantasy into reality.⁶¹³ In this process of potentiality becoming reality - or, to return to Latour, the move from 'project and object' to 'object' - anticipated technologies are imbued with 'hopes, and the ingressions of fear and anxiety'.⁶¹⁴ In WWII, the camouflage work of the CAP, to research and develop concealing camouflage, can be understood to be comparable, as it also worked to invent technology full of hope by eradicating anticipated threats.

The members of the CAP understood the importance of their task, and the research committee began to explore ways in which enemy aerial observers and bombers could be deceived as to the precise location of likely vital targets. The Panel considered a range of issues such as: the camouflage of cities and large towns, which was deemed not practical;⁶¹⁵ the treatment of highly regular patterns such as oil tank installations and explosives through diverse means of screening;⁶¹⁶ the importance of protecting against infra-red (it was concluded that camouflage should confuse the eye not the camera);⁶¹⁷ the possibility of hiding cemeteries from aerial identifications, which was considered 'not necessary or desirable';⁶¹⁸ and recommending the establishment of a supply committee to regulate supplies. As well as exploring these issues of camouflage, the CAP meetings also included presentations from military experts on camouflage, such as Wing Commander Hawtrey, who addressed the CAP on the effectiveness of the black-out policy.⁶¹⁹ On occasion invitations were extended to

⁶¹¹ Advisory Panel, Subjects for consideration, n.d. - NA HO 186/171/5.

⁶¹² Anderson, B. (2007) *op cit.* p.159.

⁶¹³ Anderson, et al (2007) *op cit.* p.139.

⁶¹⁴ *Ibid* p.140.

⁶¹⁵ CAP 2nd Meeting, 3rd November 1939 – NA HO 186/171/5.

⁶¹⁶ *Ibid.*

⁶¹⁷ CAP 7th Meeting, 26th January 1940 – NA HO 186/171/12 & CAP 10th Meeting, 8th March 1940 – NA HO 186/171/12.

⁶¹⁸ CAP 4th Meeting, 1st December 1939 – NA HO 186/171/9.

⁶¹⁹ CAP 3rd Meeting, 17th November 1939 – NA HO 186/171/8.

those experimenting with camouflage designs and technology; and so a Mr David Jones attended the CAP's sixth meeting to demonstrate by means of a model his design for portable field shelters for air-craft. The Panel tested the practicality and potentials of inventions by, in this case, questioning the durability, weight and cost of production (which was expected to be in the region of £160-£180 per set) of Mr Jones' invention.⁶²⁰ From these discussions and by elucidating problems, the CAP delivered feedback on the state of camouflage across the Service Departments in order that issues could be addressed and problems resolved. For example, problems such as changes in personnel had led to confusion over the standard colours of paint for camouflage schemes between the War Office and Air Ministry, and a new publication on paint proposed by the Work Directorate of the Air Ministry was also advised against:

It was AGREED that an individual approach to the subject was to be deplored.⁶²¹

Thus, the main recommendations of the Panel were derived through discussions, presentations and demonstrations. It appears from reading through the minutes of the CAP that only two members were active in conducting camouflage experiments of their own. Mr Kennington experimented with fabricated metal screening and the treatment of concrete roads with coloured colloidal cement; the intention of this experiment being to reduce the shine of the road's surface, and thus the enemy's attention, by making it corrugated which produces a matt effect.⁶²² The other was Cott, who experimented with baffle lighting.

Cott set himself the challenge of exploring the possible techniques of baffle lighting, a camouflage technique used to confuse the bomber by disrupting the night-time geography of the landscape so that enemy maps were near useless. As one document reported:

THE FUNCTION AND EFFECTIVENESS OF BAFFLE LIGHTING

Dr Cott stated that the difficulty of disguising geographical features at night is effectively met by the blackout only at times when the ground is already in darkness e.g. moonless nights. Under strong moonlight landmasses stand out ... and the question rises whether the blackout system unmodified is the most effective method of reducing visibility under such circumstances. Dr Cott gave a practical demonstration of the employment of violent contrasts of tone and light, which serve to distract the eye of the observer from the relatively slight tonal contrasts presented by dimly illuminated objects. It was claimed that the use of dazzle lighting on moonlight nights would overcome differences in tone between land and water areas and between town and country areas. He could not

⁶²⁰ CAP 6th Meeting, 12th January 1940 – NA HO 186/171/11.

⁶²¹ CAP 9th Meeting, 23rd February 1940 – NA HO 186/171/14.

⁶²² Ibid & CAP 8th Meeting, 10th February 1940 – NA HO 186/171/13.

agree the cost would be prohibitive and asked for experiments on a small scale to be carried out.⁶²³

Cott's proposed scheme of dazzle lighting on the large scale seemed too grand an ambition, demanding much labour, materials and finances. In the war, with great demand on resources, the Ministry of Defence (MoD) had to prioritise, budget and cap technological innovation. It seemed that, similar to his aerodrome scheme at Mildenhall, Cott's methods of camouflaging, although likely effective, had yet again not impressed the military sufficiently to become adopted. Thus:

CONCLUSION

Principle of dazzle lighting in effectively overcoming visible differences in tone accepted, but that adoption of a sufficiently large scale at present time was not in accordance with the policy of the Ministry of Home Security.⁶²⁴

Officially experimentation into and execution of baffle lighting was postponed.⁶²⁵ But for Cott, it was another rejection of his suggested camouflage methods, and so, after only a few meetings, residual tensions between the differing camouflage camps of WWI resurfaced. Cott wrote to Kerr fuming at Wilkinson's attitude⁶²⁶ and his apparent unwillingness to share with the panel camouflage schemes implemented in the RAF of which he was head.⁶²⁷

...everything which you prophesised has come to pass Norman Wilkinson is the villain of the piece.⁶²⁸

But old rivalries also produced the possibility of new alliances in the committee. Mistrust of Wilkinson's role in the CAP brought Cott into contact with the already-mentioned Mr Kennington, an engineer who had established himself as a camouflage expert through his experiments in the light and shade elimination of camouflaged buildings.⁶²⁹ Cott wrote to Kerr:

You will remember me telling you some time ago that one of the most active members of the Camouflage Panel is Mr W.O. Kennington, Director of Vauxhall Motors. You and he will have this much in common at any rate, in that he is in the opposite camp to Wilkinson, and about the only person on the panel who cares to speak strongly in that direction.⁶³⁰

⁶²³ Notes on the 6th Meeting of the Advisory Panel, 12th January 1940 – NA HO 186/171/6.

⁶²⁴ Ibid.

⁶²⁵ Notes on the 13th meeting of the Advisory Panel, 17th April 1940 – NA HO 186/171/19.

⁶²⁶ Although Wilkinson was a member of the CAP, he was also the official advisor on camouflage to the Air Ministry. It was felt by some on the Panel, such as Cott and Kennington, that Wilkinson was unwilling to share with the CAP the camouflage initiatives and activities that were taking place within the Air Ministry. Letter from John Anderson to Mr Brook, 1st April 1940 – NA HO 186/668/6.

⁶²⁷ Goodden, H. (2007) op cit. p.182.

⁶²⁸ Anderson's notes from meeting with Cott to discuss his resignation, 4th March 1940 - NA HO 186/668/7.

⁶²⁹ Minutes and Meetings of the Advisory Panel, n.d. – NA HO 186/171/3.

⁶³⁰ Letter from Cott to Kerr, 14th March 1940 – GUA DC6/731.

Cott's correspondence with Kerr reveals the important role that social relations had in the day-to-day workings of the CAP; as alliances were built, links within the network were strengthened, whilst others were severed.

A FRAGILE NETWORK OF FRUSTRATION AND TENSION

The CAP's failure to adopt baffle lighting scheme, along with the discontinuation of any further camouflage lectures he hoped to give to the army and also the influential role of Wilkinson in the development of RAF camouflage, jarred with Cott:

It is clear to me now that their Departmental people wish to exclude anyone with a real grasp on the subject. Wilkinson as you know is now Air Commander, and in charge of R.A.F camouflage. So it looks as though I shall spend the most of the war in Cambridge after all - unless you can persuade the Army in France to use me.⁶³¹

After only four months of attending the Panel, the CAP was proving, for Cott, an unsatisfactory camouflage organisation. Dejected about limited camouflage progress, Cott felt that his position on the Panel had rendered him impotent to contribute meaningfully to developing effective military camouflage. Cott yet again appealed to Kerr to use his influence to find him a more active and influential role in the military:

I am hoping fervently that your message may mean that the authorities will one day make use of me in a more active capacity than is the case at present.⁶³²

Reports regarding mishaps in the application of camouflage deepened Cott's feeling of impotency in matters of military camouflage. He wrote to Kerr informing him of one incident that he thought encapsulated the danger of errors which the military were willingly ignoring in their use of official camouflage technology and techniques:

Last night I dined with Carter in Corpus, and while there had a conversation with Sir Will Spens about the camouflage muddle. I now learn that senior Army Officers are very much concerned at the moment over two things: - (i) the steel helmet; and (ii) the anti-tank gun. It is abundantly clear that in both cases these objects are extremely conspicuous under service conditions. The gun shines and as used at present has a bright finish. The hat also is frightfully conspicuous in the field. Both problems could be met, by the use of cloth or canvas covers for the first and matt paint for the second. But I am told that Lord Government will have nothing done. The Commandant of the Small Arms School at Hytle is one of those who would like to see these matters dealt with, which are obviously of more than mere academic importance.

⁶³¹ Letter from Cott to Kerr, 14th January 1940 – GUA DC6/726.

⁶³² Letter from Cott to Kerr, 18th February 1940 – GUA DC6/729.

Sir Will Spens told me he hoped you would as soon as possible ask the necessary questions in Parliament. He gave me the impression that an important matter of this kind is one which could not be safely brushed aside by an evasive reply to any questions which you asked.⁶³³

Cott's anger was compounded by an article in the *Evening Standard* revealing new camouflage designs, which he felt demonstrated the military's flimsy grasp of the basic theories of concealment and effective camouflage:

Did you see in today's *Evening Standard* "London Buses Camouflage - Roofs Only" - "All 5000 London buses in the London Passenger Transport Board's fleet have been camouflaged so that they will be less conspicuous from air".

This is the latest display of official incompetence. Anyone possessing even the most elementary knowledge of flying conditions will realise that the sides are even more important than the top, and if any camouflage is to be attempted top and sides should be treated. I take it the tips will imitate bits of pasture land in the London streets. Cambridge buses are of course treated in this way, and the whole thing would be very funny if it was not so serious.⁶³⁴

Cott hence saw widespread errors in official military camouflage, fuelling the growing realisation that his role on the CAP was contributing little to improving this situation. On the Panel Cott did not take any decision or action without Kerr's considered opinion or appraisal, and so Cott, only with Kerr's approval,⁶³⁵ resigned. Using a resignation letter, penned by Kerr,

...almost word for word on the lines of the draught which you so kindly suggested yesterday[.]⁶³⁶

Cott wrote to the Home Secretary setting out his perceived failings of the CAP, which in the main he attributed to: lack of co-ordination between and within the Service departments; lack of attention to the scientific principles of camouflage; and, the Panel not being fully briefed on camouflage initiatives that were being carried out. He argued as follows:

Eight months ago, you did me the honour, which I appreciated greatly of inviting me to serve on an Advisory Committee relating to war-time applications of camouflage. I appreciated this particularly since I have for several years been actively engaged in research connected with the scientific principles of camouflage and visual deception, and I looked forward to being able to help in some small way towards correcting the gross errors and waste of money so obviously apparent in much of the camouflage work already carried out.

I have now had experience of eleven meetings of the committee and have come to the conclusion that I am wasting my time and therefore would beg leave to resign my membership. I hope you will not misunderstand and think that I grudge any amount of expenditure of time and energy so long

⁶³³ Letter from Cott to Kerr, 1st April 1940 – GUA DC6/736.

⁶³⁴ Letter from Cott to Kerr, 27th May 1940 – GUA DC6/743.

⁶³⁵ Letter from Cott to Kerr, 30th March 1940 – GUA DC6/737.

⁶³⁶ Letter from Cott to Kerr, 27th March 1940 – GUA DC6/732.

as that promises to be fruitful. My experience has been that the committee has to great extent working in the dark; having been kept in ignorance of what was being done by the various Government Departments concerned.

You will of course appreciate the fact that the same set of scientific principles rule the effectiveness of camouflage whether applied to civil, naval, military or air defence and that accordingly if it is absolutely essential that there should be the fullest co-ordination between various Departments; and that on no account should individual departments be carrying out their research and application - as at present - in secrecy and without co-operation.⁶³⁷

Cott's resignation from the CAP offered Kerr the opportunity to publically revive his dispute with the military in regards to their seeming preferential adoption of the skills of artists over the specialist knowledge of the biologist in matters of camouflage development. Thus, he launched a new attack on the failings of the military's official and, in Cott and Kerr's minds, scientifically weak camouflage technology and practices:

So now the way is quite clear for you to come into action which I shall await with great interest ... Well Professor, I will close this and shall anxiously await the result of your offensive.⁶³⁸

Kerr enrolled Cott's report on the problems in the Panel to question, indeed to continually critique, the limited role here of biologists, keeping alive the issue of camouflage in the House of Commons, as his questioning of the Camouflage Experiment Section demonstrates:

What qualifications lacking a biologist of recognised standing on its personnel does the Camouflage Experimental Section possess to assess adequately the value of advice received from biologists, on what principle does the section act in accepting or rejecting such advice; what is the nature of the objection to adding a biologist of standing to the personnel of the section, whose work is necessarily largely based on biological considerations?⁶³⁹

In the summer of 1940 Cott took the biologist's critique of military camouflage further. After resigning from the CAP, Cott published a searing article in *Nature* criticising official and military seriousness about the development of effective camouflage:

Well-defined principles of camouflage, derived from research in biology and psychology are now established; but authorities in the various Service Departments concerned have been slow to make the most of this available knowledge. Indeed, the history of war camouflage provides an

⁶³⁷ Letter from Cott to John Anderson, 27th March 1940 – GUA DC6/733. After receiving Cott's resignation, Anderson arranged a meeting with Cott to discuss the issues he raised and see whether they could be reconciled and Cott continue to be a member of the CAP. See letter from John Anderson to unknown, 4th April 1940 op cit.

⁶³⁸ Letter from Cott to Kerr, 5th April 1940 – GUA DC6/734.

⁶³⁹ Question put in the House of Commons by Graham Kerr to Lord Privy Seal n.d. – GUA DC6/456.

extra-ordinarily convincing example of the ineptitude of the existing system where science is concerned.⁶⁴⁰

In this article, Cott laid out his criticisms of the CAP in blunter terms than had appeared in his resignation letter to the Home Secretary:

After an interval of eleven weeks from its constitution, this Committee was summoned to meet for the first time on October 18, 1939. During its subsequent brief history, the scientific experts serving on this panel were kept to a great extent in ignorance of the camouflage policy and programme operating in the Service Departments; co-operation between the different departments and even within individual departments was lacking; insufficient attention was paid to research and to the advice of members of the panel; and there was evidence of slackness and lack of initiative and interest by the officials concerned on the executive side.⁶⁴¹

Furthermore, Cott added to this critique by also protesting about the employment of people not acquainted with the biology of camouflage, by which Cott mainly meant the use of artists:

Camouflage research and application are at the present time largely dominated by artists, or in the hands of Civil Servants or Army Officers, and in either case controlled by people lacking the necessary scientific training ... the general lack of appreciation of the scientific background of camouflage has led to the neglect, or misapplication, of such basic principles as countershading, disruption, coincident patterning and deflection.⁶⁴²

As well as complaining about the CAP, Cott's article also took to task the British military's organisation, execution and attitude towards camouflage, and it generated a terse exchange in *Nature's* letters page in the following weeks. One correspondent was angered by Cott's emphasis upon the importance of military camouflage's biological heritage, and by his strong critique of the involvement and role of artists in camouflage:

The "fundamental biological principles" seem to me to be neither profound nor difficult to understand; in fact they are so fundamental that the average artist or physicist can grasp them without any intellectual effort.⁶⁴³

The sentiment that the biological principles of camouflage had been exaggerated was not restricted to the readers of *Nature*, for it was also felt by those who were at the blunt end of Kerr's continual camouflage questioning in the House of Common. A letter to the Secretary of the Prime Minister reveals that Kerr was seen by some as a bit of a 'nuisance', and it was felt that by appointing a biologist to the CAP the scientific perspective had been sufficiently represented in military camouflage organisations the letter ended on a belligerent note:

⁶⁴⁰ Cott, H. (1940) Camouflage in Modern Warfare reprint 22nd June 1940 *Nature* 145 p.949 – GUA DC6/768.

⁶⁴¹ Ibid.

⁶⁴² Ibid.

⁶⁴³ Letter to the Editors of *Nature* from T.R. Merton, 28th September 1940 – GUA DC6/681.

In any event we are not caterpillars concealing ourselves from toads.⁶⁴⁴

The artist employed in camouflage was similarly to Cott more than capable of reasoning why their specific expert skills were the most vital to the innovation of camouflage technology.

The artist is trained and all his life continues to train himself, to analyse and memorise what he sees. By means of this discipline he develops powers of observation and visual retention far above the normal standards. Moreover the artist is constantly preoccupied with trying to reproduce solid objects in two dimensions. This requires an intimate knowledge and understanding of form. Engineers, architects and scientists of all sorts have a part to play as well. The artist by using his abilities in exactly the same way, as he would do if he were following his normal peacetime trade, brings to Camouflage a contribution which is indispensable and which he alone can bring.⁶⁴⁵

The failings of the CAP and Cott's subsequent actions, exposes a jarring tension circulating between some representing the different professions and disciplines enrolled in military camouflage development. Artists and scientists alike were clear on their specific skills and contributions, and some, such as Cott, were keen to privilege their knowledge as of most value to developing camouflage technology, to divergent effect.

To return to Cott's provocative article, another letter - carefully considering the spirited debate between the author and his critics - took a more measured response, suggesting that both the camouflage artist and scientist had similar concerns about the organisation and application of military camouflage:

Camouflage in Modern Warfare

Since the publication of NATURE of June 22 of the leading article under this title, correspondence has revealed the interest which has been aroused. On p.168 a letter on the subject, written from the point of view of the artist, demonstrates that scientific workers are not alone in their criticism of the official methods of dealing with camouflage.⁶⁴⁶

Cott may perhaps have been in the minority when advocating a solid grounding of science in military camouflage and reducing the predominance and precedence awarded to artists on the issue. Yet, the above letter suggests that some of Cott's critiques of the CAP and military camouflage were shared by others, even from different and disagreeing factions.

Cott's resignation had come at the same time as that of Kennington's,⁶⁴⁷ whose problems with the Committee largely echoed Cott's, and he also expressed concern to the Home Secretary over the conduct of Wilkinson on the Panel. The Chair too, Sir Ernest Swinton, had resigned;

⁶⁴⁴ Letter from Mr Cherwell to Miss Watson, 4th September 1941 – NA PREM 4/97/3/4.

⁶⁴⁵ Notes by Mr Darwin on ARTISTS IN CAMOUFLAGE, 18 February 1943 for the M.o.I - HO 186/1648.

⁶⁴⁶ News and Views *Nature* August 3 1940 op cit.

⁶⁴⁷ Letter from John Anderson to Mr Brook, 1st April 1940 – NA HO 186/668/6.

this officially was attributed to other commitments pressing on his time,⁶⁴⁸ although, in a letter to Kerr, Swinton revealed that he was also weary of the lack of co-ordination between the Service Departments over the issue of camouflage:⁶⁴⁹

As you probably know I chucked the chairmanship of the Camouflage Committee in February last year. I felt I was wasting my time because the Committee was to a great extent ineffectual.⁶⁵⁰

In April 1940 as the Panel appeared to be disintegrating, it was required to submit to the Home Secretary an Interim Report charting the CAP's work and progress, but this task was rather difficult for those who remained:⁶⁵¹

It is most unfortunate but in the absence of an expression of opinion from Cott and Kennington and the adverse opinion of Wilkinson, it seems impossible to rush our fences.⁶⁵²

Despite their absence, the report mirrored the concerns of Cott, Kennington and Swinton:

Camouflage Advisory Panel

Interim Report 08/04/1940

SUPPLEMENT ON ORGANISATION

Lack of co-operative effort between the Services. Camouflage at once implies anti-camouflage and we are not satisfied that the necessary close and continuous interchange of knowledge and ideas exists between those who are observing and breaking down the enemy's attempts at concealment and those who are responsible for effecting concealment (whether of military or civil targets) on our side.

We would strongly commend to the 3 fighting services that they should co-operate by pooling their experimental work within the Establishment.⁶⁵³

Draft additional paragraphs for C.A.P Interim Report

The major criticism to be levelled against the organisation which has been built up so that the greater part of its work has been schemes designed by artists to be realised in paint and that sufficient weight has not been given to constructional methods of illumination, based on science and engineering.

By the Panel's 12th meeting 03/04/1940 Kennington had resigned.
By the Panel's 13th meeting 17/04/1940 Cott had resigned.⁶⁵⁴

The resignations and the Interim Report had established that the CAP was a failure. Reflecting on the collapse of the CAP, the Home Secretary found that, alongside the fall-outs, the disputing factions of the outside specialists and the economic and material limitations of wartime, there were also problems in how the military had dealt with the CAP:

⁶⁴⁸ Ibid.

⁶⁴⁹ Letter from E.D. Swinton to Kerr, 4th March 1940 – GUA DC6/442.

⁶⁵⁰ Letter E.D. Swinton to Kerr, 27th September 1941 – GUA DC6/433.

⁶⁵¹ Camouflage Advisory Panel, Notes from the 11th Meeting, 20th March 1940 – NA HO 186/171/17.

⁶⁵² Letter from unknown to Mr Jordon, 26th March 1940 – NA HO 186/668/5.

⁶⁵³ Camouflage Advisory Panel Interim Report, 8th April 1940 – NA HO 186/171/9.

⁶⁵⁴ Draft additional paragraphs for C.A.P. Interim Report - NA HO 186/171/10.

There can, I think, be no doubt that there is still a good deal of stupidity and waste in the execution of camouflage ... I believe the War Office, or rather the military authorities, to be the particular sinners in this respect.⁶⁵⁵

Tracing the CAP's brief troubled history, it is evident that the reasons for its breakdown were complex and multifaceted, and in this sense the CAP echoes Latour's *Aramis, or The Love of Technology*.⁶⁵⁶ In brief, Latour reports the fate of Aramis, the failed guided-transportation system intended for Paris. The tale of the technology's birth and death is narrated from shifting perspectives, including the unrealised technology at the centre of the investigation, Aramis, to whom Latour attributes a voice and thus agency. This narrative draws a textured 'spatial imaginary of 'networks', demonstrating the complexities created with we think about connections and relations rather than discrete subjects and objects'.⁶⁵⁷ Latour's eulogy to Aramis could be applied to the demise of the CAP: 'No, there's nothing scandalous here. Everybody, every one of you believed you were doing the right thing. There wasn't a shred of wickedness in this collective drift of good intentions'.⁶⁵⁸ Similarly, the failure of the CAP does not appear to have been caused by any one person or factor.

Through weaving the personnel letters of Cott and Kerr with the official military documents charting the CAP's meetings, together with the Home Secretary's correspondence, there is a sense that each member was individually and at times discordantly striving to produce effective camouflage. However, the CAP network, comprised of professional competition, social relations and a diversity of knowledges, practices, economic resources, material limitations⁶⁵⁹ and military strategies, was precarious. At times the CAP strained in different directions, unwittingly undercutting its efforts, and the Panel also had the problem of fitting into, and operating within and across the Service Departments, who were already entrenched in their own mechanisms and relational threads. Laurier and Philo explain the complexity and messiness involved in the failure of technology:

There is seldom a fatal flaw inherent in either the originating design or the basic machinery, and such an inevitably retrospective view of things – supposing that success or failure can only be judged post-hoc – hides all the work of the engineers along the way and ignores too the

⁶⁵⁵ Letter from J.Anderson to Herbert Morrison M.P, 20 August 1941 – NA HO 186/1343/1.

⁶⁵⁶ Latour, B. (1996) op cit.

⁶⁵⁷ Laurier, E. & Philo, C. (1999) op cit. p.1048.

⁶⁵⁸ Latour, B. (1996) op cit. p.290.

⁶⁵⁹ Letter from the Committee to the Minister of Home Security, 26th March 1940 op cit. As well as Cott finding that his schemes were too costly, the CAP had other problems accessing resources for its duties, including insufficient aeroplanes to assess camouflage work, and restricted camouflage materials, mainly comprising paint, which for many camouflage schemes had limited effectiveness.

multiple connections to other actors (human and nonhuman) upon which any machinery relies.⁶⁶⁰

They succinctly summarise the faults in CAP, which were due not to any one scheme or person or crack, but due to multiple strains and errors within the panel network.

The demise of the CAP did not mean complete failure for British military camouflage, however, and, despite his camouflage scheme's rejection and his resignation, Cott was still hopeful for camouflage initiatives in the British military. During his resignation meeting with the Home Secretary, it had been hinted to Cott that the authorities had begun to recognise the problems and limitations of the panel and that a new committee was soon to be established.⁶⁶¹

On returning from the meeting, Cott wrote to Kerr:

Our camouflage panel has been given to understand that big things may be happening to camouflage policy in very high official quarters. But we are quite in the dark at present as to the contemplated changes. General Ernest Swinton is, I believe, in the van. I have of course still no idea whether or not I am to be made use of. One just goes on hoping.⁶⁶²

REFORMING THE CAP

By the end of April 1940, letters were sent out to those (including Cott) who had been invited to join the military's new attempt at camouflage organisation, the Camouflage Committee. The Camouflage Committee aimed to be more effective than the CAP by increasing the committee's function from advising on camouflage across the military to a goal expressed as follows:

To promote the unification of design, practice and methods of maintenance and the fullest technical co-operation in camouflage in all departments.⁶⁶³

Cott hoped that the CAP's new incarnation would be a more valuable use of his camouflage expertise:

I ought now to return to the Panel under its new constitution I can of course make it clear that I shall not continue to act if I can see that the position is not greatly improved.⁶⁶⁴

Thus, Cott politely replied, accepting a position on the new committee:

⁶⁶⁰ Laurier, E. & Philo, C. (1999) op cit. p.1053.

⁶⁶¹ Letter from John Anderson to unknown regarding Cott's resignation from the Advisory Panel, 4th April 1940 – NA HO 186/668/7.

⁶⁶² Letter from Cott to Kerr, 9th March 1940 – GUA DC6/730.

⁶⁶³ Report on Camouflage memo from Morrison, 18th August 1941 – NA HO 186/1343/3.

⁶⁶⁴ Letter from Cott to Kerr, 3rd May 1940 – GUA DC6/741.

Many thanks for your letter of 27 April in which you are good enough to express the hope that - in view of changes in the function of the Camouflage Advisory Panel - I should be able to continue to service. I am very satisfied to know that it is Sir John Anderson's wish that I should not withdraw from my association with this work and I should be grateful if you will tell him that I have much pleasure in placing my services at his disposal and look forward with interest to taking a share in activities of the new Camouflage Committee.⁶⁶⁵

Nonetheless, it is clear that within the military authorities there was some reticence about using Cott again. In a letter to the Home Secretary, Sir Eady, charged with appointing the Camouflage Committee, laid out his concerns as regards to his reappointment:

Camouflage of Service equipment must be rather rough and ready job, except aircraft, and the Service members have suffered under the advice tendered by persons like Dr Cott and Mr Kennington. The advice was probably good from the point of view of abstract camouflage, but you will remember that when you saw the camouflage in the Air Ministry Establishment last summer, Dr Cott's camouflage, although admittedly more effective than the alternative, was about 5 times as expensive ... The solution I think is to reconstitute the Panel and reorganise the Camouflage Establishment ... As regards the Panel, I think Stradling is the right Chairman. One might hope that Mr Kennington would agree to serve, we need not press Dr Cott but there is another scientist probably Prof Merton - who might represent science.⁶⁶⁶

Cott, like Kerr before him, had secured the reputation as a bit of a pest to some in the military, but reluctantly, under pressure from the Home Secretary, Eady extended to Cott an invitation to join the Camouflage Committee. Once again, though, Cott felt that the newly formed committee was too slow to convene and he contacted Kerr imploring him to use his influence in the House of Commons to find Cott a practical job in one of the Service Departments, signing off his appeal rather dejectedly:

Do our people ever intend to take camouflage seriously?⁶⁶⁷

In response, Kerr once again raised the issue in the House of Commons,⁶⁶⁸ but Cott was not prepared to wait to see what action may arise from Kerr's intervention. Luckily for Cott, he was now offered an opportunity to demonstrate his expertise, for he was set the challenge to demonstrate exactly how biological camouflage could be more effective than official military designs:

Wyatt has just written asking me to show him how to camouflage, on Thayer's principles, a big 12" railway gun for which I understand the Government department concerned may be prepared to pay my expense fee. I

⁶⁶⁵ Letter from Cott to Sir Eady, 27th April 1940 - NA HO 186/668/11.

⁶⁶⁶ Draft, Minister re: camouflage by W.Eady, 10th April 1940 - NA HO 186/668/9.

⁶⁶⁷ Letter from Cott to Kerr, 17th May 1940 - GUA DC6/742.

⁶⁶⁸ Question put in the House of Commons by Graham Kerr to John Anderson, 7th August 1940 - GUA DC6/645.

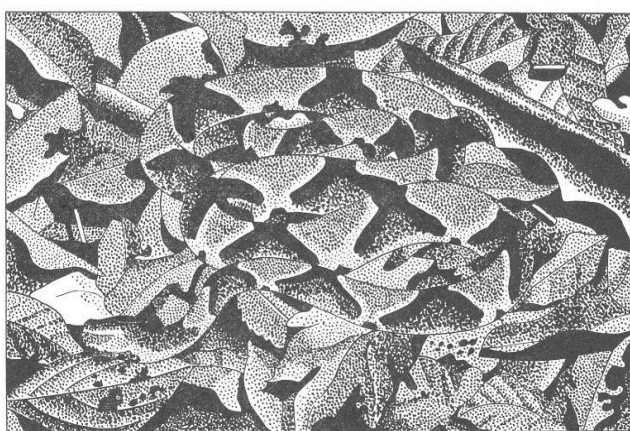
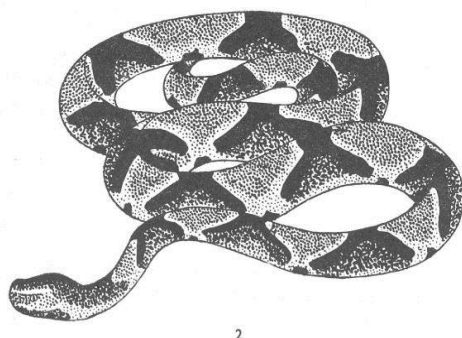
have suggested that before accepting his offer I should be allowed to go and look at the job.

It would seem to be an opportunity for me to demonstrate once and for all what can be done with paint.⁶⁶⁹

BIOLOGY VS MILITARY: COTT'S GUN EXPERIMENT

Cott accepted Wyatt's proposal and spent two weeks in June 1940 setting up a comparison between two railway guns; one demonstrating camouflage adhering to adaptive coloration and patterning in nature; and the other using standard British military camouflage designs. Cott hoped that this would provide definitive proof that military camouflage grounded in biological techniques was the most effective means of camouflage.⁶⁷⁰ Cott's railway gun experiment (and in particular the gun that he designed) offers insight into the performance of human and nonhuman in the production of technological innovation; a practice that Pickering calls 'a performative image of science', which describes the process whereby scientists 'manoeuvre in a field of material agency'.⁶⁷¹ Cott's railway gun enrolled multiple human and nonhumans in the production of the camouflage.

Figure 22. Effective disruptive contrasting of copperhead snake - H.B. Cott



Firstly, Cott had to draw upon his scientific studies and his fieldwork observations. He knew the camouflage techniques to employ, countershading alongside disruptive patterning; and, for this particular scheme, Cott understood that to conceal the round relief of the gun barrel he might consider closely the snake (figure 22 and 23) and how it flattens its coiled round body into the ground, breaking up its smooth surface by scattering the eye's perception through patterning. The

⁶⁶⁹ Letter from Cott to Kerr, 27th June 1940 – GUA DC6/747.

⁶⁷⁰ Letter from Cott to Kerr, 19th August 1940 – GUA DC6/753.

⁶⁷¹ Pickering, A. (1995a) op cit. p.7.

concealment methods of the caterpillar might also serve a purpose:

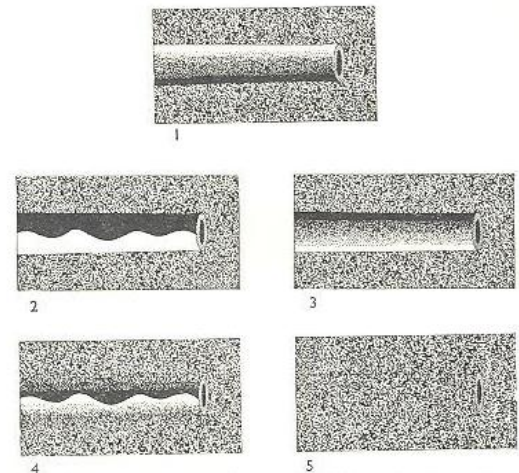
Caterpillars are beautifully countershaded, being pale apple-green on the back grading over the sides to dark greyish sage-green beneath. This inverted countershading, correlated with the inverted attitude, effaces the larva so effectively that all appearance of solidity is destroyed. The illusion is completed by the superimposed design representing the effect of light and shade on lateral leaf-veins.⁶⁷²

Cott understood that to camouflage a gun effectively, he would need to mimic the techniques employed by these animals in their interface with background surfaces. Prior to Wyatt's offer to test concealing camouflage on the railway guns, Cott had already made an assessment of the errors of camouflaged guns. He wrote:

The conditions of light which affect the appearance of a caterpillar or a snake are the same as those which cause a gun or torpedo-tube to stand out conspicuously *even against a background covered with exactly the same paint*. Hence it is essential that rounded objects be treated with paint properly graded in tone so as to counteract the effects of relief.⁶⁷³

Figure 23. Obliterative shading of guns - H.B. Cott

Cott's gun experiment brought the natural and military world into correspondence. Through his scientific efforts and artistic eye, the natural pigment and patterns of the snake and caterpillar were replicated by human-made paints and materials on human-made weapons. Therefore, colour,



form and pattern traversed the 'breached boundaries' of science, militarism, nature and art. Both guns used the same paints, the earthy muddy pigments of greens and browns, and the contrasting tones of black and white, but through different application and differing patterns the same colours on the two guns had different effects. Young explains that 'colour is at once knowledge and being'.⁶⁷⁴ Cott had made nature's colours - as enrolled in interspecies warfare (the struggle for survival) - his study: colourful patterning on nonhuman animal bodies, their contrasts and blending in relation to one other and in an ecological dialogue with their habitat. Thus, Cott similarly enrolled the colours of military paint in the performance of power and violence: 'colours can be a compelling, exact and calculated medium for producing and

⁶⁷² Cott, H. (1940) op cit. p.44.

⁶⁷³ Ibid p.46.

⁶⁷⁴ Young, D. (2006) The Colour of Things. In Tilley, C. Keane, W. Kuchler, S. Rowlands, M. & Spyer, P. (eds.), *Handbook of Material Culture* p.182.

reproducing power and for transmitting knowledge'.⁶⁷⁵ The biologically camouflaged gun can duly be seen as an intriguing object, and Eglash summarises the place of these objects in research as 'artefacts that transform matter and energy [which] hold a special place as troubling objects of social inquiry'.⁶⁷⁶ Cott's gun is troublesome in the complexity of its production, born by the sidings of a railway, in the naturalist's field and in nature's struggle for survival, bringing together and transforming, scientific, artistic and military knowledges. Cott's camouflaged gun, through the visual performative in the coupling of human and nonhuman,⁶⁷⁷ was a thoroughly cyborg object.

On completing his experiment, Cott enthused about the success of his comparison:

My gun is quite indistinguishable while its counterpart can be easily recognised.⁶⁷⁸

In numerous military fly-overs to test the effectiveness of the camouflage, the gun demonstrating official military camouflage was identified each time and described as being as 'glaring as a stick of peppermint rock'.⁶⁷⁹ Cott's gun, on the other hand, seemed simply to melt into the backdrop (figures 24 and 25), it was only identified once, on a low fly-over when its exact co-ordinates were known to the pilot. This exercise clearly supported Cott's claim about the specialist and scientific nature of camouflage. Wyatt wrote to Cott to verify the success of his experiment into the uses of biological camouflage:

I have had your gun flown over three separate occasions. Twice to a somewhat vague location (i.e. merely railway station) and the third time to its pin point. The first two times it was not identified at all and on the third occasion at 2,0000 ft. So we can say that it's done well, and you should be pleased with it.⁶⁸⁰

For Cott, the gun experiment was a victory in the struggle to promote the importance of the scientific principles of camouflage. Buoyed by his triumph, he sent Kerr several photographs of the railway guns.⁶⁸¹ Kerr was quick to act on these photographs, sending copies to the Prime Minister and the War Cabinet, requesting a meeting to discuss the proved effectiveness of biological knowledge to military camouflage. Even so, there was still some mistrust surrounding the legitimacy of the photographs, it being suggested that the guns had been positioned so as to place Cott's gun in a favourable or diminishing light:

⁶⁷⁵ Ibid. p.180.

⁶⁷⁶ Eglash, R.(2006) Technology as Material Culture. In Tilley, C. et al. (eds.), *Handbook of Material Culture* pp.329-341.

⁶⁷⁷ Pickering, A. (1995b) op cit. p5.

⁶⁷⁸ Letter from Cott to Kerr, 19th August 1940 – GUA DC6/753.

⁶⁷⁹ Letter from ED Swinton to Sir Graham Kerr, 27th September 1941 – GUA DC6/754.

⁶⁸⁰ Letter from Cott to Kerr, 11th December 1940 – GUA DC6/761.

⁶⁸¹ Letter from Cott to Kerr, 30th August 1940, GUA DC6/754.

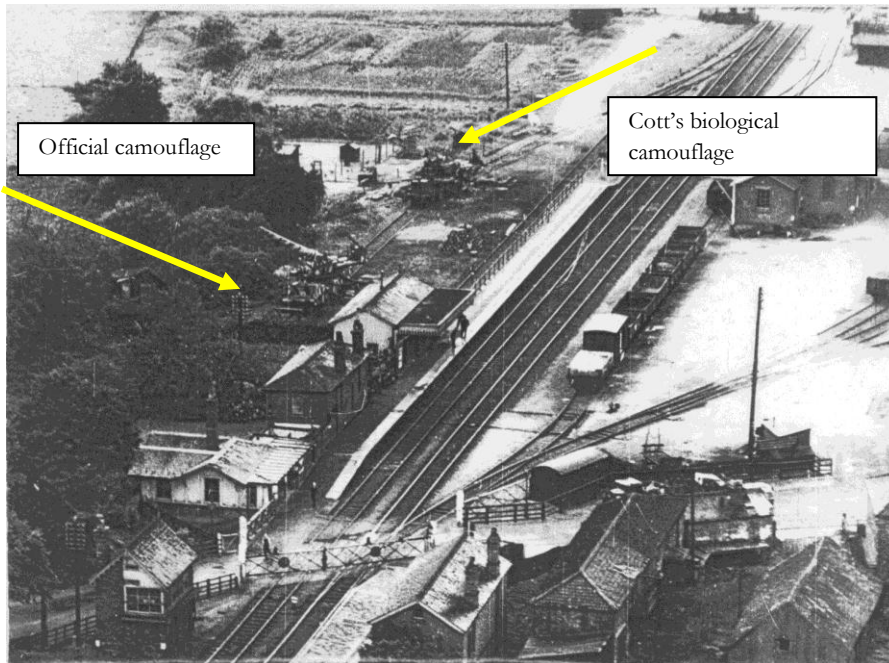


Figure 24. Photograph of the two railway guns, foreground shows the official military camouflaged gun, the gun behind is Cott's own attempt at camouflage - H.B. Cott



Figure 25. Aerial view of railway gun experiment - H.B. Cott

The photograph enclosed is quite inconclusive as to the superior merits of the 'biologically correct' camouflaged gun. This gun is against a variegated background and therefore well concealed. The other, which he says is wrongly camouflaged, stands against deep shadow and is for this reason only very noticeable.⁶⁸²

Undeterred, Kerr created a pamphlet (figure 26) of the gun experiment which he issued to MPs and made a speech to the House of Commons explaining the effectiveness of the biological gun, highlighting along the way the failings of the official military camouflage design. Kerr explained that Cott, the architect of the experiment, was *the* great authority on camouflage.⁶⁸³

Camouflage is one of the most important parts of war technique. Delaying recognition, most operations in war are carried out in a hurry, therefore it is vital.

General principles have been worked out not by physicists or by artists but by biologists - not the biologist who works in a laboratory or museum, but the biologist who in nature, particularly, in tropical nature is endeavouring in the course of ages in never ending warfare between wild animals in their struggle for existence.⁶⁸⁴

Although Kerr had turned himself into a nuisance for the government and military authorities with his persistent questions and criticisms on camouflage,⁶⁸⁵ he was keen to press the issue further. He concluded that the experiment demonstrated how:

Marvellously efficient biological camouflage is being withheld from our fighting men.⁶⁸⁶

Cott's gun experiment can also be considered in broader terms than the specifics of WWII camouflage development. His biologically camouflaged gun demonstrated that, as a tactical

⁶⁸² Letter from Mr Cherwell to Miss Watson, 5th September 1941 – NA PREM 4/97/3/5. From studying the photograph that Kerr sent to members of the War Cabinet and the Prime Minister it may seem the claim of staging the photograph has some veracity. However, the testimony from Wyatt should prove conclusive that Cott's gun was more effective. The only view that could prove the efficiency of the different camouflage techniques would be the aerial view of the reconnaissance or bomber pilot, which would be at different angles and altitudes from the photographs that were produced of the experiment.

⁶⁸³ Speech by Kerr in the House of Commons, 3rd October 1940 – NA PREM 4/97/3/1. The transcript of Kerr's speech to the House of Commons records Cott's name incorrectly; instead it appears in the minutes that a Dr Hubert Cox is 'the great authority on camouflage': once again demonstrating that camouflage, although of the utmost importance to Cott and Kerr was one of many issues demanding the government's and military's time and resources.

⁶⁸⁴ Ibid. Kerr stresses the importance of the expert who has witnessed camouflage in nature. The process of being in the field, as Kerr describes it, lends greater authority to the scientist's claims of knowledge on effective camouflage.

⁶⁸⁵ Throughout 1940 to 1942 there is correspondence between Kerr and different military personnel involved in camouflage, including Colonel Beddington, the director of the Camouflage Development and Training Centre (CD&TC), with whom there is a long and terse exchange regarding the direction of military camouflage. Kerr is eventually persuaded to visit the CD&TC and by this point feels he is being bullied by the authorities to cease complaining about their camouflage initiatives. GUA DC6/538, DC6/547-550, DC6/597, DC6/618-19, DC6/767.

⁶⁸⁶ Speech by Kerr in the House of Commons, 3rd October 1940, op cit.

technology, camouflage - although born through a complex network of relations (between the predator and prey; the field scientist and his recording instruments; the military and the outside specialist; the barrel of the gun and the application of the painter's brush) and knowledges (military, biological, technological, aerial and artistic) – could indeed be a success. Cott's experiment offers just a few examples of the dynamic constellation of heterogeneous relations that contributed to both the CAP network and similar networks which enabled the emergence of British military camouflage.

However, in the study of any military technology there should be a pause, a moment of hesitation before moving on. Although studying Cott's railway gun experiment offers insight into a complex and interdisciplinary process of creativity, it also raises troubling and uneasy considerations; for Cott's gun was enrolled in a competitive network and system of violence and destruction. Woodward has called for military geographies to 'make war real' and to 'bring the battles back to the home front'.⁶⁸⁷ Camouflage, through its promise of protection, was certainly an indication of the proximity of war and destruction for the British population; camouflaged guns, factories and defences, a continual and starkly visible sign that the enemy was watching and that danger was now ever present.

Returning to Cott, success with the railway gun experiment, soon followed by an invitation to attend a training course in camouflage, meant that he never did become an active member of the Camouflage Committee. Cott's time involved in the boardroom politics of camouflage organisation and implementation had left a sour note, and he would later warn his students to:

avoid politics because it's a dirty game.⁶⁸⁸

Therefore, the move away from operating in an advisory capacity on camouflage to becoming more actively engaged with camouflage on the battlefield was a thrilling prospect. In one of his last letters stored in the Kerr archive, Cott gleefully noted:

I shall be submerged in the Army as a subaltern.⁶⁸⁹

The CAP had failed and thus ceased to operate, but Cott's hope to influence the development of camouflage, and more specifically the military's efforts to implement effective camouflage schemes, designs and technology had not.

⁶⁸⁷ Woodward, (2005) op cit. p.732.

⁶⁸⁸ Letter from John Cloudsley-Thompson to Kraig Adler op cit.

⁶⁸⁹ Letter from Cott to Kerr, 19th September 1940 – GUA DC6/756.

of a less spectacular and less successful network in the history of military technologies and practices, similar to the less-than-heroic failure of Latour's Aramis.

On the cusp of WWII, when the British military began to prepare for another war, it needed to resurrect its interest and research regarding camouflage as part of its defence strategy. The impact of the role of the aeroplane in any future conflict, both for intelligence gathering and aerial bombing, promised to be great. This was simultaneously an exhilarating possibility as attacker and a terrifying prospect as defender. The extension of warfare into airspace had a potentially devastating impact on the home front; national boundaries could now easily be penetrated, with vital state infrastructure such as cities becoming vulnerable targets, and indeed the civilian population now framed as legitimate target. Camouflage was one means by which the military began to invest efforts to defend against this new aerial threat. At the beginning of WWII, camouflage technology was hence increasingly aimed at the aeroplane, a technology of location,⁶⁹² in an attempt to undermine its gaze by an effectively developing a craft of erasure.

By focusing on the British military's initial attempts, such as the CAP, to instigate a network of useful military personnel and non-military experts to begin researching and experimenting with camouflage technology and design, the complexity of camouflage's biography has begun to emerge and some of the human, nonhuman, social, political and economic tensions and relations exposed. Utilising ANT is a useful means for getting at some of the myriad and hybrid ways that humans, animals and technologies were employed in innovative camouflage development. This allows military camouflage to be understood as a synthesis borne of multiple knowledges demanding the fusion and transformation of diverse and often discrete knowledges and skills. However, by following Cott's experience on the CAP, the failure of this network can be seen as expressing the Panel's failure to synthesise its personnel, their knowledges and practices, and its weak association with other organisations such as the different military service departments.

Cott's railway gun experiment, a moment in his own scientific biography and the gun itself as a fragmentary biography, offers a more successful example of the development of camouflage technology as military cyborg object. By tracing the life-path of one military object, camouflage can be seen to traverse across and breach boundaries between multiple disciplines, skills and knowledges; and, by plotting this life-path through the biography of Cott, the gun's

⁶⁹² Kaplan, C. (2006b) *op cit*.

creator, the human narrative is never entirely flattened.⁶⁹³ The place of the human in inventing technology and as the operator with intent and motivations, such as Cott, is not placed as equal alongside the material technology he sought to execute. This works to hold technology and the vast array of researchers and specialists, their creativity, ingenuity and cunning, the disciplines, institutions, economies and materials, and the organisations and systems which demand them, to account. In the complex biography of camouflage technology, human fragility and intent are also accounted for and the impacts and lasting consequences are not left lingering unnoticed, unaccounted and unaccounted.

⁶⁹³ This is where the narrative of the CAP as a failed network and Cott's gun diverges from Latour's study of Aramis. In the investigation the failure of the guided-transport technology, the flattening of the human narrative was one of Latour's intended outcomes.

THE ABC OF CAMOUFLAGE: Q

Q is the Question you cannot decide,
but the Camouflage Officer's there as a guide.

Chapter 7.

Tricksters Transformed to Soldiers: A Dialogic Site for Camouflage Training



FARNHAM ON ARRIVAL

I am now being taught camouflage at the Camouflage Training Centre here, and I find the change over from academic to military activities a most welcome and desirable one.⁶⁹⁴

On an autumn afternoon in October 1940 a ‘curious collection’⁶⁹⁵ of men disembarked from a London train at the small provincial station at Farnham, Surrey. This group were the first and perhaps the most illustrious students of British military camouflage to attend the Camouflage Development and Training Centre (CD&TC), Royal Engineers (RE). From the station, they could gaze across a picturesque town towards Farnham Castle, their home for the next six weeks; that is if they noticed the castle at all.

For over 900 years Farnham Castle has topped a gently sloping hill perched above the town. Since the Norman Conquest it had been home to the Bishops of Winchester, rich and authoritative figures who were as influential in politics as they were in religion,⁶⁹⁶ and the castle has been characterised by its role as an administrative power, rather than one of battle. The site occupied reflects the castle’s historical narrative. A conical earthy mound is an overgrown memorial to the original Norman defences, and the fortress’s design tells an overlapping tale of life in Medieval and Tudor periods. The Bishops periodically restored and added to the castle’s structure such that it became a mix of building materials, designs, styles and eras; a place of historical and architectural meshing and layering. Although above the town, Farnham Castle can only be glimpsed from certain angles as it is set back slightly from the crest of the hill, with trees often shrouding it from view. It does not seem to dominate the landscape. Instead, built and designed by ecclesiastical men, the castle seems to be more intent on internal matters, with only the occasional glance cast outwards. This shrouding within its surrounds, coupled with its expansive estate of closely clipped lawns and wooded stretches were features that likely attracted military attention to the site as a location for the CD&TC. During WWII, Farnham Castle was the base for Army camouflage teaching and experimentation, a site playing with and perfecting concealment, disguise and deceit.

This chapter follows Cott on his arrival on the first CD&TC at Farnham and introduces other camoufleurs, such as Julian Trevelyan, Jasper Maskelyne, James McIntosh Patrick, Stephen Sykes and Geoffrey Barkas, whose fragmentary-mobile biographies will prove of value in supplementing Cott’s scientific biography for this narrative on the cultural-historical geography of camouflage. It will explore the site of the CD&TC at Farnham Castle as a site

⁶⁹⁴ Letter from Cott to Kerr, 26th October 1940 - GUA DC6/758.

⁶⁹⁵ Fisher, D. (1983) *The War Magician* p.17.

⁶⁹⁶ <http://www.farnhamcastle.com/history/>.

that fostered interdisciplinary collaboration,⁶⁹⁷ a dialogic space of experimentation and learning, that made room for diverse skills and personalities, with the ultimate end of better developing effective camouflage. At Farnham the professional skills of individuals were subsumed into specialists in camouflage and a group of men with a distinct military identity and role, with a distinct perspective on how to visualise and execute war, duly became ‘camoufleurs’, readied to:

propagate the camouflage gospel and train unit camouflage instructors in formations in Britain and overseas, whilst also advising on all necessary camouflage designs and technology.⁶⁹⁸

Whereas the CAP failed as a network to develop camouflage, the CD&TC at Farnham provides an example of successful military technological innovation as camouflage became cyborg object and transformative kind of knowledge.

Figure 27. Farnham Castle



⁶⁹⁷ This collaboration and interdisciplinary engagement that characterised Farnham and was promoted by the CD&TC, although novel at the time, will for many academics today feel very familiar. Research bodies such as the AHRC claim: ‘there is growing recognition of the interconnections and complementarity between the sciences and the arts and humanities’, with ‘the potential for creativity and innovation’ (www.ahrc.ac.uk); and the ESRC supports research which fosters collaborations ‘between social scientists and organisations in the private, public and civil society sectors’, with the aim to ‘increase research influence on policy and practice’ (www.esrc.ac.uk).

⁶⁹⁸ Wiseman, D.J.C. (1953) op cit.

FARNHAM: A DIALOGIC SITE OF COLLABORATION

The 'curious collection' that had been directed to present themselves at Farnham Castle (figure 27) in October 1940 had been handpicked by the military for service in camouflage because of their professional expertise, varied and diverse. The War Office delegated the assignment of selecting and organising the CD&TC to Colonel Beddington,

moustached and dapper; a card by any standards,⁶⁹⁹

and Colonel Buckley, a kind and likeable man possessed with a keen shrewdness, remembered by his students for being tasked with:

clearing away the various nonsenses into which we eagerly rushed.⁷⁰⁰

Approximately thirty men were chosen to enter the first class at Farnham Castle. The arts were represented by surrealist painters Julian Trevelyan and Ronald Penrose (who earlier in the war worked together in the freelance Camouflage Industrial Unit),⁷⁰¹ designers Steven Sykes and Ashley Havinden, as well as stained-glass artists, filmmakers such as Geoffrey Barkas, a cartoonist, a surrealist poet and a restorer of religious art.⁷⁰² This cast was completed by the well-known stage magician and conjuror Jasper Maskelyne.⁷⁰³ Other disciplines were also drawn upon, including architecture and engineering.⁷⁰⁴ Cott found himself the only scientist amongst this group and also the only person on the course with previous military experience, the latter, he was pleased to note, seeing him exalted to Senior Officer.⁷⁰⁵ Cott's experience in the war had been chequered thus far. His stint on the CAP proved a disappointment, and the rejection of his schemes, the halting of his camouflage lectures and his close allegiance to Kerr had all informed his cool and distrustful attitude towards artists in

⁶⁹⁹ Trevelyan, J. (1957) *Indigo Days* p.118.

⁷⁰⁰ Ibid, letter from Cott to Kerr, 26th October 1940 op cit. & Barkas, G. (1952) *The Camouflage Story*.

⁷⁰¹ The Camouflage Industrial Unit was an independent camouflage research group set up in the Spring of 1939 by four artists, including Trevelyan and Penrose, alongside Bill Hayter and John Buckland Wright. It experimented with civilian and military static camouflage. Trevelyan would recall: 'It has to be confessed that we in our camouflage unit knew very little more about it than the man in the corner garage'. Trevelyan, J. (1957) op cit. & Industrial Camouflage Research, Unit Report 1939-1940 - DG GMA A35/1/1/RPA758 & TWL JOT 54/1.

⁷⁰² Fisher, D. (1983) op cit. p.17.

⁷⁰³ Ibid. It is said of Maskelyne that, when he heard the news that war had been declared he was drinking a glass of razor blades on stage. This would be characteristic of Maskelyne's heavily stylised recollections of the war. In his memoirs Trevelyan suggests that Maskelyne was a suave urbane character who ended up as an Entertainments Officer in the Middle East. This contradicts much of Maskelyne's description of his own role in camouflage. Reading both these views alongside military reports and letters, it would seem the truth lay somewhere in-between, as Maskelyne was both an Entertainments Officer and a Camouflage Officer, although he does appear to take credit for some inventions that other sources suggest were not actually his own. Trevelyan (1957) op cit.

⁷⁰⁴ Letter from Cott to Kerr, 26th October 1940 op cit.

⁷⁰⁵ Ibid.

military camouflage. This antagonistic outlook was tested during his period of service at the camouflage school. However, importantly for Cott, he was now as he desperately desired: active in the military, utilising his knowledge of the biological principles of camouflage in the design and application of modern military camouflage.

On arrival at the castle, the camouflage students were pleasantly surprised by their palatial surroundings, since this was not the austere military training that they had been expecting. As Trevelyan enthused:

What was my surprise then, to be driven up to a venerable Tudor castle, amongst cedar trees, and to be greeted by a charming young adjutant who apologised profusely for the shortcomings of the staff and the incompleteness of the furniture! ... Where were my endless rows of sleeping soldiers, and the harsh camp routine that I had come to expect? Certainly all my conceptions about Army life would have to be quickly revised.⁷⁰⁶

CD&TC life at Farnham took on its own unique shape; new highly polished boots clattered up and down the grand oak carved staircase, drill took place on the cobbled courtyard, the men milled around the great hall attired in stiffly fitting khaki uniforms between lectures, and they shared comfy attic bedrooms after long evenings being entertained by stage performers in military service.⁷⁰⁷ A usual training day at the school lasted from 9am or 9.30am to 5.30 pm,⁷⁰⁸ and it was a mix of tutoring, training exercises and experimentation. In the mornings, the students, as well as participating in basic drill training, attended lectures. The topics of these lectures ranged across the basic principles of camouflage such as: effective camouflage in nature; the importance of the background; the visibility of an object; the interpretation of air photographs and 'what they reveal'.⁷⁰⁹ They were also taught the practicalities of carrying out camouflage schemes, covering: camouflage materials; general application to field; and to medium artillery positions (a troop in action).⁷¹⁰ These lectures were complemented by practical exercises in the afternoons conducted in the castle's grounds, which included the trainees attempting to conceal themselves and military equipment against the natural surroundings,⁷¹¹ as well as testing the design of dummy aeroplanes⁷¹² (figure 28) constructed in the castle's stables, which had been transformed into the camouflage workshops.⁷¹³ For some,

⁷⁰⁶ Trevelyan, J. (1957) op cit. p.116.

⁷⁰⁷ Ibid p.117 and guided tour of Farnham Castle.

⁷⁰⁸ Army Camouflage School Programme – DG GMA A64/1/16/7/1

⁷⁰⁹ Lectures and Training in CD&TC R.E. – IWM Major D.A. Pavitt 86/50/3/1-9 & Camouflage: MS notes for lectures – DG GMA A64/1/16/3/1-17.

⁷¹⁰ Ibid.

⁷¹¹ Maskelyne, J. (1949) op cit. p.17.

⁷¹² Camouflage: MS notes for lectures op cit.

⁷¹³ Guided tour of Farnham Castle.

such as Trevelyan, this period proved to be highly agreeable, an almost enchanting rural idyll with:

days of pearly autumn mornings, particularly beautiful in the wooded precincts of Farnham Castle.⁷¹⁴

For others, such as the magician Maskelyne, the time spent learning techniques in concealment did not initially appear to be of benefit:

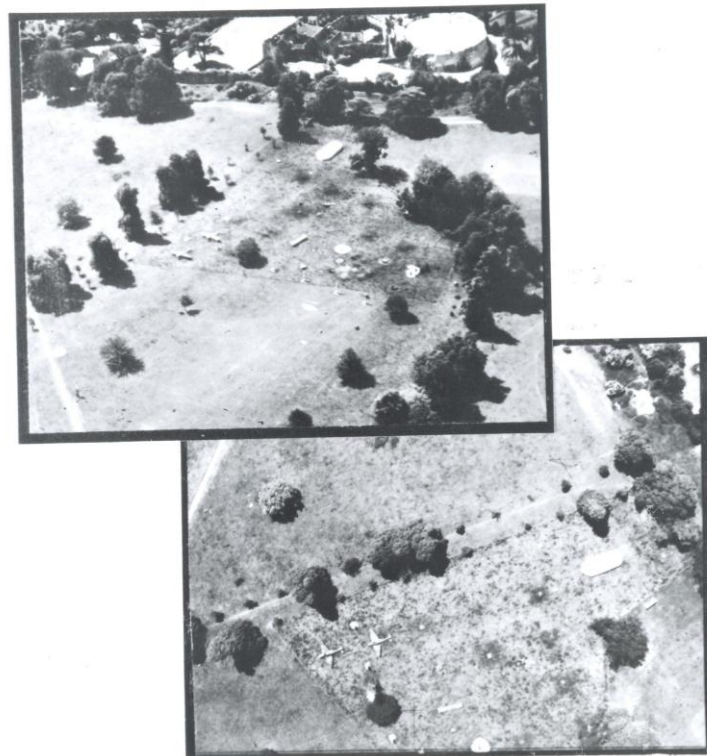


Figure 28. Photographs of dummy practice in the castle grounds - J. McIntosh Patrick

Six weeks of being told very elementary truths about the art of hiding things almost drove me out of my mind. I think I may say without particular vanity, and certainly without any aspersion on my lecturers, that a lifetime of hiding things on stage had taught me more about the subjects than rabbits and tigers will ever know.⁷¹⁵

It appears that Maskelyne, similarly to Cott, had brought specific ideas and practices to military camouflage that he believed elevated his level of expertise. Like Cott's attempt to contribute knowledge to the CAP and the Air Ministry, Maskelyne found that not all of his ideas drawn from the world of the stage were welcomed:

⁷¹⁴ Ibid p.119.

⁷¹⁵ Maskelyne, J. (1949) op cit. p.17.

I had many specific ideas of how to apply this knowledge to the art of war. But whenever I tried to interest any authority in the matter, I received suspicion and obstruction. "The man" they said freezingly, "is an actor".⁷¹⁶

Maskelyne's experience of military authority should not necessarily be regarded as generally indicative of the relationship between the specialist camoufleurs and official military authority at the CD&TC.

The Chief Instructor, Buckley, had served on the Western Front during WWI working under Solomon,⁷¹⁷ and therefore he had experience of camouflage and also of working with experts from outside military circles; learning from them, utilising and incorporating their skills and knowledge into military practice. Buckley's aptness for the job is remarked upon in letters, memoirs and interviews, where he is remembered with great warmth and fondness by his camouflage trainees.⁷¹⁸

As the first CD&TC course progressed, Farnham became an intriguing, interdisciplinary, and dialogic site that created possibilities for the potentials of military camouflage to be realised. In these dialogues Cott initially appeared to cut a rather ambiguous and isolated figure amongst the colourful artists and artisans. However, his expertise and its particular application to warfare was soon ascertained by his fellow camouflage trainees, and Trevelyan's relationship with Cott offers an example of the burgeoning environment of collaboration fostered at the CD&TC. Thus:

There was also a distinguished Cambridge zoologist, Dr Hugh Cott, who had written the most authoritative study on the protective coloration of animals and who now applied the principles he found in the animal kingdom to the disguise of guns and tanks. We laughed at him for his passionate addiction of counter-shading, the trick by which, for instance, the white belly and dark back of a gazelle, when seen at a distance in strong light, seem to flatten out and destroy form.⁷¹⁹

Although respected, Cott's formal manner perhaps singled him out amongst his more artistically inclined camoufleurs. With time and through training exercises, there nonetheless developed respect and a mutual appreciation for the role, style and skill of each profession present at the camouflage school. Trevelyan recalled the forging of interdisciplinary knowledge, which later would become central to the lessons that he taught as a Camouflage Officer:

⁷¹⁶ Ibid.

⁷¹⁷ Letter from Mr Thomson to Kerr, 14th July 1941 - GUA DC6/326; Hartcup, G. (1979) op cit. p.81 & Fisher, D. (1983) op cit. p.20.

⁷¹⁸ Letter Cott to Kerr, 26th October 1940 op cit; Trevelyan (1944) op cit; Interview with Trevelyan (1978) - IWM 3172, Barkas, G. (1952) op cit.

⁷¹⁹ Trevelyan, J. (1957) op cit. p.118.

Occasionally I would be asked to give a demonstration of how to paint some piece of equipment so as to merge it with the broken country around it. I would arrive at the barrack square with pots of paint and brushes, and set to work daubing the shield of some anti-tank gun with spots of different greens and browns, touching the underside of the barrel itself with pure white on the principles of Dr Cott's gazelles. Against the dreary barrack walls it looked an unholy mess, but when it was wheeled out into the country and placed against the hedge, there were cries of astonishment at my magic.⁷²⁰

This engagement with different disciplines and the co-mingling of knowledges and practices to create innovative camouflage designs and technologies even came to be appreciated by the most self-assured of camoufleurs. Maskelyne realised that his 'highly expert and specialised knowledge'⁷²¹ in the art of hiding things could, after all, be improved upon by the assimilation of other expert knowledges. For example, one lesson, upon which he drew repeatedly throughout the war, is revealed in his description of inventing a concealing disguise for ships in the Middle East:

We must use the magic known to a few specialists in the world of eye-doctors, of creating lines and projections, and patches of light and shade ... I had many interviews and conversations with such men, and with naval engineers, as well as artists and such people as Professor Cott, the Cambridge biologist and author of a famous work on animals' protective colourings, before I was satisfied enough to go ahead, first on scale models, and finally on a real launch.⁷²²

By the end of the war, Maskelyne had even come to believe that creatures such a rabbits and tigers *did* have a thing or two to teach him about the craft of camouflage:

In much of our work we had to go back for lessons and ideas to Nature, which, in the end, teaches man everything. We had to copy the colourings and also the mannerisms of animals and fishes and birds, which render themselves invisible.⁷²³

In epistemic terms, as the camoufleurs collaborated to positive effect, Farnham can be seen to have opened space for dialogue and the blurring and transformation of knowledges. The camouflage school can therefore be read as more complex site than just one more example of the 'performance spaces of science'.⁷²⁴ Replicating the concealment technique that Cott developed in his railway gun experiment, Trevelyan's method was an acknowledgement of 'Cott's gazelles' (or biological camouflage) coupled with his own artistic flair. This paint job provides an illuminating example of the CD&TC accomplishments with its first batch of pioneer Camouflage Officers. The military's materiality, such as anti-tank guns, were visually

⁷²⁰ Ibid p.130.

⁷²¹ Maskelyne, J. (1949) op cit. p.17.

⁷²² Ibid p.113.

⁷²³ Ibid p.157.

⁷²⁴ Livingstone, D (2005) op cit.

altered by an interwoven and interactive process whereby the military, art and science were indeed brought into a close correspondence and ‘locked together as a complex, social, material, and conceptual cyborg entity’.⁷²⁵ Through the ambiguous nature of camouflage the CD&TC produced at Farnham a heterogeneous performance space, an ambiguous site of hybrid knowledge production and technological innovation. In setting up a dialogic space at Farnham Castle the CD&TC and the fieldcraft of camouflage can be seen to form part of Pickering’s WWII regime⁷²⁶ which allowed for, and made possible, ‘disciplinary and material transgression’.⁷²⁷

Figure 29. Watercolours of camouflage in nature - J. McIntosh Patrick



Evidence of this outcome can be found in Buckley’s deployment of artists as instructors in camouflage on the regular staff at the CD&TC. After attending the training course at the CD&TC James McIntosh Patrick, a Scottish landscape painter, became an instructor at Farnham.⁷²⁸ By then Cott’s scientific knowledge had become a dominant influence in teaching at the school, marking a clear shift from ‘trainee’ to ‘expert’. *Adaptive Coloration in Animals* became the key text informing camouflage lectures, and also became an essential tool in the camoufleur’s kit bag.⁷²⁹ McIntosh Patrick’s lecture notes

appear to be directly drawn from Cott’s zoological research. For example, McIntosh Patrick’s synopsis of the lecture ‘Camouflage in Nature’ summaries examples of biological camouflage that Cott’s book reveal to be near perfect specimens of biological concealment.⁷³⁰

Hence:

⁷²⁵ Pickering (1995a) op cit. p.18.

⁷²⁶ Ibid.

⁷²⁷ Ibid & Barnes, T. & Farish, M. (2006) op cit. p.809.

⁷²⁸ James McIntosh Patrick Notes - IWM 16560.

⁷²⁹ Penrose’s copy of *Adaptive Coloration in Animals* - DG GMA A35/2/RPL1/0507; Camouflage: MS Notes for Lectures - DG GMA A64/1/16/3/1-17.

⁷³⁰ Synopsis of Lecture 11 - DG GMA/1/16/3/11 & Synopsis of Lecture 5 - IWM 86/50/3 7/5.

Nature provides all the principles of concealment; some are useful to us
- others we cannot usefully adopt:

Merging (Hare, Grouse, Polar Bear, etc.)

Disruption (Ringed Plover, Zebra, etc.)

Disguise (Stick insect, Leaf insect, Sea Horse, etc.)

Mis-direction (Butterflies, fish)

Dazzle (Grasshoppers, some birds)

Decoy (Angler fish, Spiders)

Smoke Screen (Cuttle Fish)

The Dummy (Flies, Ants)

False Display of Strength (Toads, Lizards, Birds)

N.B. Several of the above principles may be combined in one creature.⁷³¹

McIntosh Patrick's appreciation of biological camouflage and its contribution to the development of military camouflage can also be glimpsed through the small water colours and sketches kept amongst his handwritten lecture notes. Amongst the illustrated ideas of camouflage designs, there are drawings in the techniques of the camouflage of moths, frogs, birds and their eggs (figure 29).⁷³² The images' own origins and passage between instructor and trainee reflects the interdisciplinary nature of dialogue that characterised the evolution of modern military camouflage. McIntosh Patrick's drawings tell of Cott's growing influence, and also of the place of wider zoological research in camouflage prior to WWII. Cott's scientific illustrations themselves disclose Thayer's and Kerr's influences, and suggest myriad connections and correspondence (rather than the tensions) between art and natural history in camouflage at the turn of the nineteenth century. The work done at Farnham is suggesting a different story for the development of camouflage than the one that has thus far be explored in this inquiry which has drawn out the tensions and jealousies that were present in camouflage innovation. Camouflage at Farnham, by traversing the worlds of art, science and war, camouflage (military and biological) captured the imaginations of many practioners, with contrasting perspectives and points of view.

Whereas, certain knowledges at particular times throughout the history of camouflage have been privileged due to multiple factors - economic, social, material and political - there appeared at the CD&TC to have existed a seemingly more democratic entanglement of knowledge. The soon to be Camouflage Officers in the CD&TC appreciated Cott's biological research; Penrose, Trevelyan and McIntosh Patrick in their camouflage writings acknowledge the loss of the instinct for concealment in humans and the need to look to nature to regain

⁷³¹ Synopsis of Lecture 11 op cit.

⁷³² At the back of the booklet on 'Camouflage Spring 1942' there are some of McIntosh Patrick's sketches of camouflage in nature and ideas for military camouflage - DG GMA A64/1/16/2/4/5-7.

this capacity for cunning.⁷³³ In private letters to Kerr, Cott had often lamented at the follies of the artist and blamed the failings on the military on ‘ungrounded’ artistic skills, but such complaints largely ceased after his time spent at the CD&TC. Beddington even began a correspondence with Kerr in the hope of encouraging him to visit the CD&TC, to examine first-hand the work at Farnham, before again publicly critiquing the military’s commitment to camouflage.⁷³⁴ At the end of the war, Cott reflected on military camouflage in *The Advancement of Science* (1948). This piece marks a change from the harsh and damning commentaries that characterised his earlier publications. Post-war Cott detailed the achievements and triumphs in military camouflage, although he could never quite resist portraying these as ultimately a feat of camouflage’s scientific heritage:

...we have seen that there exists certain well-defined scientific principles of camouflage - many of them derived from research in biology.⁷³⁵

That said, Cott’s narrative of military camouflage had shifted from the lone, embattled authoritative voice of the scientist, deploring the employment of artists in camouflage, to a tale of the wily camoufleur who in war had to prove himself to some ignorant military men, marking a wartime shift in identity from scientist to scientist *and* camoufleur:

When in early 1941 I took up my first service appointment, the Brigadier to whom I reported to duty welcomed me with these words he said: ‘A camouflage officer is as much use to me as a refrigerator at the north pole’. It happened that we were nowhere near the north pole, but in tropical Africa.⁷³⁶

The cultivation of social and personal relations between the newly trained camoufleurs on the pioneer CD&TC course could be considered as key in the cultivation of collaboration. Therefore, the military as a cohesive agent (as opposed to rigid infrastructure) requires close study in the process of WWII camouflage development. The CD&TC proves it was not simply a case of pooling experts with the required skills to innovate British military camouflage, fitting them up in uniforms and sharpening their military manners. Rather, it facilitated the ‘space’ to invent, and subsequently for the military to adopt and produce their most effective inventions. Although camouflage had enjoyed only a faltering start in WWII, the military had a keen awareness of what was required of modern camouflage:

⁷³³ McIntosh Patrick, J. (1942), Booklet; Camouflage - DG GMA A64/1/16/2/4/1; Penrose, R. (1941) Home Guard Manual of Camouflage - DG GMA A35/RPL1/0608; Trevelyan, J. (1944) Camouflage, *Architectural Review* TCWR JOT 54/4(142).

⁷³⁴ Letters from Beddington to Kerr 1941 - GUA DC6/547 & DC6/550.

⁷³⁵ Cott, H. (1948) Camouflage, *The Advancement of Science*, IV p.307.

⁷³⁶ Ibid.

...it is useless in warfare to be merely brave, if bravery means presenting oneself as a useless target to the enemy. It is far better to employ intelligence and concealment, so as to induce *him* to present a target. A man who is concealed can bide his time, watch for the enemy to expose himself and hold his fire until his target is sufficiently close to make sure of it.⁷³⁷

And, therefore, the military's instructors at Farnham knew what was required of their trainee Camouflage Officers, who would be responsible for teaching and inventing camouflage throughout the war.

APPRECIATING AERIAL GEOGRAPHY: VIEWS, ANGLES AND DECEPTION

Beddington had chosen Farnham Castle as the site of the CD&TC not only because of its grounds suited for experimentation, its stables which were easily converted into workshops or because of its quiet set-apart location. Another important factor was its proximity to the RAF base at Farnborough. Practice in flying would train the camoufleurs in appreciating and understanding the aerial view when designing and executing their schemes. It was recognised that airpower would play an important role in the method of warfare, and potentially the outcome of conflict. It was recognised that in the last war:

we were dominated by the air but we were not airminded.⁷³⁸

Commodore Charlton wrote *The Menace of the Clouds* in 1937, in which he imagined the pivotal effect that the aeroplane could have if its capabilities were fully realised in another war:

With the coming of air power the theatre of operation has been extended into the cubic space, with the result that the former strategy is outmoded, and the former policies, to which war was calculated to give expression, are now, in many instances, wrongly conceived.⁷³⁹

To ensure that the military was ready to take on this task, it worked to make certain that the aerial essentials were taught to its camoufleurs, and with that direction the camoufleurs took to the skies. It was vital that the camoufleurs understand their aerial enemy and the geometry of bombing if they were to master the craft of concealment. As has been discussed earlier in this study in relation to bombing, the coming of airpower can be seen to have to an extent untethered and made nearly total the military's gaze with a 'vision from everywhere and nowhere'.⁷⁴⁰ But bombing was not the only potential for waging war from above, since in

⁷³⁷ Penrose, R. (1941) *Home Guard Manual of Camouflage*, op cit. p.102.

⁷³⁸ Booklet: Backgrounds op cit.

⁷³⁹ Charlton, L.E.O. (1937) *The Menace of the Clouds*, p.V.

⁷⁴⁰ Haraway, D. (1991) op cit. p. 191.

WWII ‘the sky had become omnipresent and dangerous’⁷⁴¹ with aerial interpretation as much the enemy as the bomber.

The emergence of aerial reconnaissance in conflict can be traced to its use by balloon observers on a limited and localised scale in the American Civil War and Franco-Prussian War.⁷⁴² These aerial observers were stationary, tethered to one allied location so that their scope on enemy activity was partial and restricted. Flight greatly transformed aerial reconnaissance because the aeroplane, alongside the technology of the camera, opened and freed spaces for observation. The aeroplane and camera allowed for greater mobility, and the immediate and lasting visual recording of enemy activity. The camera also crucially created the capability to study images in detail subsequently with great care and time, therefore rendering vast spaces knowable. This change in the method of aerial observation began to be seen in WWI when its importance to military planning grew, precisely because the aerial gaze could, as Adey explains, ‘permits a way of seeing-as-knowing’,⁷⁴³ and this ‘knowing’ in war could lead to command, control and ultimately power. Hauser explains that trench warfare, the dug-in, predominately static nature of battle, meant that the potential for victory ‘depended more and more upon accurate mapping of the precise position of the enemy and its developing defences’.⁷⁴⁴ Aerial photography instigated a new overhead technique to render the battle space and trench terrain legible; military aerial intelligence became an effective and potentially deadly weapon, and it was the aeroplane (as well as the tank) that ‘rescued the First World War from stalemate’.⁷⁴⁵ It was nonetheless a trained eye that was required to decode and interpret the intentions of enemy movements on the earth below.

This mastery of space heralded by aerial photography required skill such as visual literacy of the earth’s surface, given that the familiar on the horizontal perspective became unfamiliar from the vertical: ‘trees, fields, church towers, towns; the receding orders of the earth and sky, foreground, middle ground and misty distance – were all made unfamiliar from the air, all turned inside out’.⁷⁴⁶ To attempt to conceal military intentions and presences from the detached roving eye above, necessitated the camoufleurs to possess not only the ability to decipher the aerial image, but also the cunning to compose an image that could lie to the skilled eye which, in safety and at leisure, could be examining these images in their minutiae. On the cusp of WWII, the British military knew that victory would in part be determined by

⁷⁴¹ Wohl, R. (2005) *The Spectacle of Flight; Aviation and the Western Imagination, 1920-1950*, p.214.

⁷⁴² Stanley, R.M. (1998) *To Fool a Glass Eye; Camouflage versus Photoreconnaissance in World War II*, p.10.

⁷⁴³ Adey, P. (2008) op cit. p. 1323.

⁷⁴⁴ Hauser, K. (2008) op cit. p.29.

⁷⁴⁵ Ibid p.37.

⁷⁴⁶ Hauser, K. (2007) *Shadow Sites; Photography, Archaeology, and the British Landscape*, p.172.

gathering effective aerial intelligence of enemy strategy, and concurrently by developing aerial knowledge of the earth's surface so as effectively to camouflage operations from enemy observation. As a result, it was essential that the pioneer group of trainee Camouflage Officers at the CD&TC should appreciate the aerial perspective and incorporate it into their own visual capabilities whilst inventing camouflage designs. Therefore, the military needed camoufleurs to become experts in understanding the eye of their observant enemies:

It came to be recognised that training in concealment was inseparable from training in observation: the practice of one invariably demanded a knowledge of the other.⁷⁴⁷

The lecturers at the CD&TC ensured that the trainee camoufleurs would be as visually literate in the air view as their enemy observers. For some, such as Cott, the importance of the aerial view had already begun to be understood through his previous camouflage experiment at Mildenhall aerodrome and the railway gun. These previous incursions into military camouflage had allowed Cott to gain important flying experience in all weather and light conditions:⁷⁴⁸

On Friday flew over Bishops Stratford and then west to Coventry. On the way home I was much amused to recognise the lake of Combe Abbey with its small island and heronry which I used to raid as a schoolboy.⁷⁴⁹

From these experiences, Cott realised the significance of comprehending the earth's surface on which the military needed to be concealed, and it was through the blurring and interpenetration of the military with its environmental background that this concealment might be achieved:

The old conventional methods of siting and lay-out had to be modified, in favour of methods which utilised to the utmost the existing features in the ground-pattern as seen by the air observer or photographic reader. Training in the proper use of ground for concealment from this new viewpoint became of paramount importance.⁷⁵⁰

During their time on the Industrial Camouflage Unit, Penrose and Trevelyan attempted, to understand elements of concealment from the aerial perspective for the static camouflage of factories, car parks, oil tanks and gasometers, whilst also considering all light conditions and angles, but without the advantage of themselves taking to the sky.⁷⁵¹ An important task for the CD&TC was hence both to formalise and standardise training in the aerial perspective so

⁷⁴⁷ Wiseman, D.J.C. (1953) op cit. p.167.

⁷⁴⁸ Letters from Cott to Kerr - GUA DC6/709 & DC6/710.

⁷⁴⁹ Ibid.

⁷⁵⁰ Cott, H. (1948) op cit. p.307.

⁷⁵¹ Industrial Camouflage Research, Unit Report 1939-1940, op cit.

that all camouflage technologies would have at their core the interplay of the horizontal and vertical axes, now so vital to camouflage design and technique, as Penrose explained:

...the aeroplane among other things is the eye of the modern army. Its invention makes camouflage more urgent, more difficult.⁷⁵²

One of the key lessons that the military addressed in their training of camoufleurs was the importance of the 'military signature' which revealed all to your enemy precisely because these signatures were so easily captured by the air photograph. Lectures, charts, pamphlets, films and posters emphasised that:

The army treads down the rich, natural texture and writes in white reflected light.⁷⁵³

FILM: Air View

The army has scrawled its signature across the landscape ... The army must conform to the ground pattern to be inconspicuous ... To survive the army must fit itself into the ground pattern.⁷⁵⁴

The military's tracks, camps and equipment betrayed its presence to the aerial camera and these were the 'signatures' (figure 30) that the camoufleurs had to conceal. At the centre of reading the military's ground signature was the need to appreciate the character of the background within which the military were operating, and on which they needed to conceal themselves. This, however, was not an easy task as humans have long altered and rearranged the character of the earth's surface through their activities: settlements and cities, deforestation, draining and agriculture, tracks and road building - all have served to modify the texture of the earth's skin. The training literature devised by the CD&TC emphasised the pressing need to consider the earth's patterns from the air view in order to camouflage effectively. Hence:

BOOKLET: "Background" Spring 1942

We must become background conscious. Concealment in short, means fitting or merging something or oneself into the background and becoming part of the background. The machine-made soldier does not do this naturally.

I am going to show you a number of slides which will show some of the typical backgrounds into which the Army must fit its activities without upsetting the existing rhythm if it hopes to be inconspicuous from air.⁷⁵⁵

SYNOPSIS OF LECTURE NO.4

BACKGROUND

⁷⁵² Penrose, R. (1940) *Home Guard Manual of Camouflage* op cit.

⁷⁵³ Camouflage Instruction chart No.IIIc AIR PHOTOGRAPHS TEXTURE - DG GMA A63/3/1/4.

⁷⁵⁴ Film *Air View* - IWM DRA 220/01-04.

⁷⁵⁵ Booklet: Backgrounds, Spring 1942 op cit.

To hide it is essential to belong to one's background ... To-day the observing eye is usually in the air. Therefore the background has moved to the ground under our feet.⁷⁵⁶

The need to blend and merge inconspicuously with the background meant the camoufleurs, to develop a craft of concealment, had to understand the earth not only from the aerial perspective but also through the colours, tones and angles from which the aerial camera would capture the scene below. In WWII the earth as captured by the camera was depicted in a 'series of tones ranging from black to white'.⁷⁵⁷ Landscapes exposed through light and shade, known through tones of grey, meant it was texture, shine and shadows which told the story from the air view. The air camera, it was realised, was thorough, alert and dangerous:



Figure 30. The visibility of the military from above

It is the most difficult eye of all. It is the 'all-seeing eye'.⁷⁵⁸

The camera was dangerous because it offered an unfamiliar vision of earth, where objects near invisible to the naked eye were heightened through tonal contrasts. Whereas previously the backdrop of camouflage was visually vertical vegetation leading up to the horizon, this had changed with the aeroplane, and so the camoufleurs were warned that to camouflage efficiently you must see the ground as the enemy observes it from overhead:

Each abstract pattern with a dynamic of its own. Yet to the Camoufleur the appreciation of these designs is more a practical issue; for if he is to effectively hide anything from a slit trench to an aircraft factory,

⁷⁵⁶ Lectures and Training notes - IMW 86/50/3 7.

⁷⁵⁷ Ibid.

⁷⁵⁸ Ibid.

he must learn not to disturb, or at least, to recreate, the basic pattern of the country.⁷⁵⁹

This shift in emphasis to the aerial view meant for the camoufleurs a shift in emphasis from concealing along the horizontal to envisioning disguise from the vertical. This change in visual perception rendered an object which on the horizontal plane would dominate the landscape, such as tall chimney or skyscraper, become from the vertical a mere pinpoint:

When flying the first thing that one notices is that things that had appeared important on the ground are no longer of any importance, i.e. tall buildings.

Everything falls into a patchwork quilt effect.⁷⁶⁰

The camoufleurs needed to know the nature of this eye and so in their flying lessons at the CD&TC they had to pay closest attention to the geometry of space and of bombing. This meant that the vital lesson for the camoufleurs during their afternoons flying from Farnborough, studying the Surrey landscape and even at times their own camouflage experiments in the grounds of Farnham Castle, was to become familiar with the tones and textures visible through an aerial geography of the perspective below.

They also became adept in calculating the optical effects of an angular perspective as well as a vertical one. The angle of the plane, camera and sun's rays could then reveal much to the aerial eye, and the camoufleurs were to learn that effective camouflage demanded an intimate knowledge of two angles in particular, vertical (figure 31) and oblique (figure 32).

INSTRUCTORS' LECTURE NOTES

PHOTOGRAPHIC INTERPRETATION

Vertical

The air camera is fixed in a vertical mounting, with the lens pointing directly downwards through a hole in the fuselage. The vertical photograph thus presents a view of the area covered as seen from a point immediately above the area. In general, the vertical photograph is more valuable for intelligence purposes than the oblique.

Oblique

The camera is fixed (or hand-held) so that it points towards the ground to the horizon this angle normally being from 15 to 40 degrees. The oblique thus represents a perspective view of the area covered ... It is more difficult to compare the area covered with the correspondence area on the map.⁷⁶¹

⁷⁵⁹ Trevelyan, J. (1944) op cit.

⁷⁶⁰ The Training Problem Presentation, n.d. - DG GMA A64/1/16/3/1/8 p.5.

⁷⁶¹ Instructor's Lecture notes 'Photographic Interpretation' IWM 91/2/1.

The vertical was the more advantageous view from which to photograph and study the terrain. The technique of operation was simple because the camera was fixed, and the resulting image would relate to known maps of the area because linear and angular measurements could be made,⁷⁶² permitting the photographs to be more accurately interpreted and incorporated into a wider geographic and military knowledge of the battlefield. The method of reading the vertical photographs was itself a skill, and aerial photographic interpreters had been drawn into the military, similarly to camoufleurs, due to their expertise in reading the visual, including from the fields of geography and archaeology.⁷⁶³

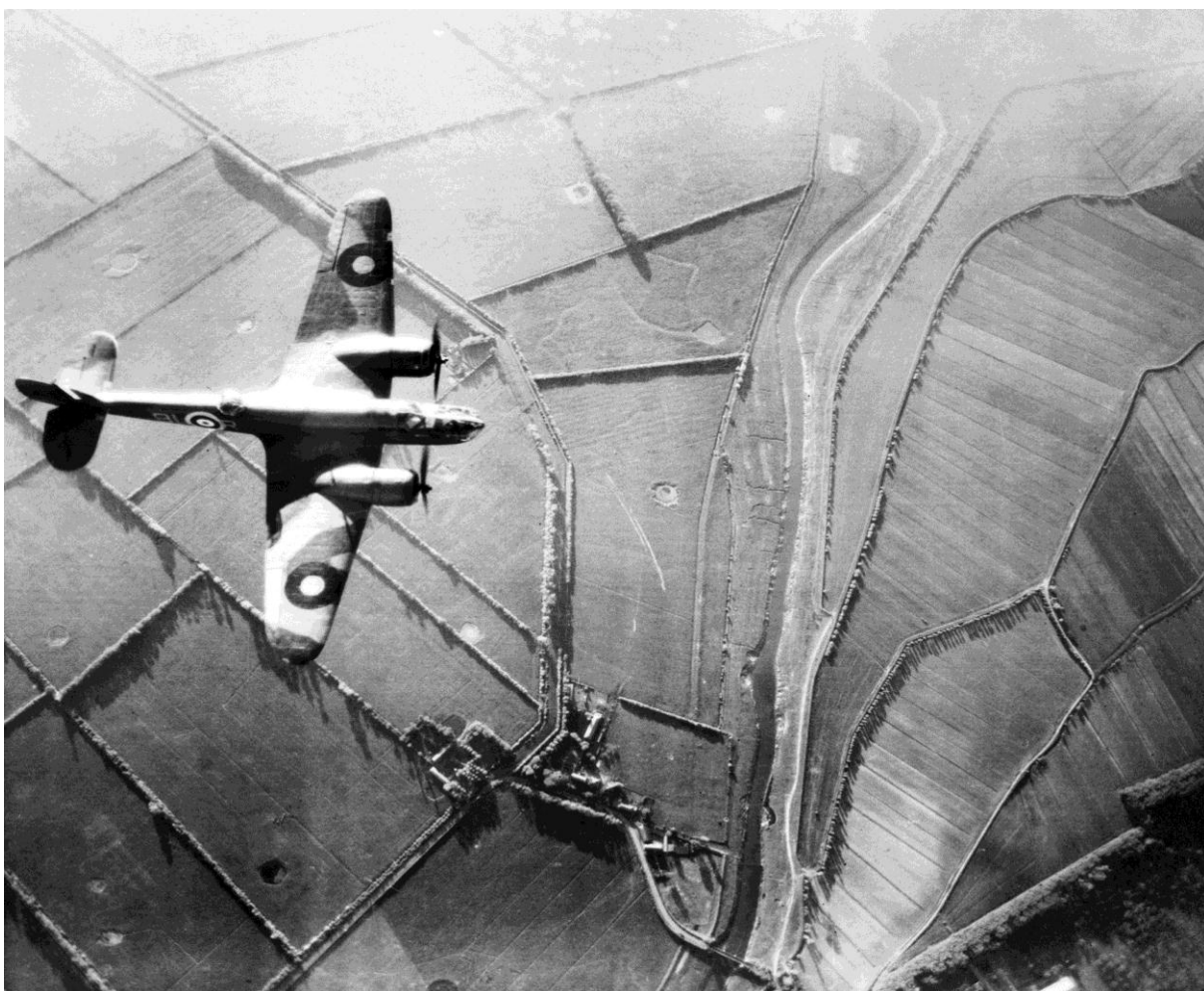


Figure 31. Aerial view from the vertical angle

⁷⁶² Ibid.

⁷⁶³ Hauser (2008) op cit writes about the use of archaeologists in WWI who were employed in reading aerial photographs, and Adey (2010a&b) op cit has discussed the use of geographers in WWII in this role.



Figure 32. Aerial view on the oblique angle

It was instructed:

To examine a vertical photograph, place it with the shadows falling towards you and with the light in front of you. If this is not done a mound may appear as a hollow and vice versa ... A landscape in an air photograph is made up of a series of tones ranging from black to white. The contrast between these tones is deliberately exaggerated by the photographer so that objects almost invisible to the naked eye may by heightened contrast become visible on the photograph.⁷⁶⁴

The CD&TC training film, *Air View*, emphasised this point and the importance of grasping the craft of concealment by revealing from the aerial view the distinctiveness of careless tracks made by two soldiers who unthinkingly had taken a short cut across grass rather than fitting with the contours of the field boundary. The white line of their path was reflected into the lens of the camera disclosing the position of their battalion to the enemy. Such careless actions, it claims,

...could cost the lives of many. It's up to you.⁷⁶⁵

⁷⁶⁴ Lectures and Training Synopsis of Lecture 3 (May 1943) Interpretation of air photographs and what they reveal - IWM 86/50/3/3.

⁷⁶⁵ Film, *Air View*, op cit.

This did not, however, solve which perspective to direct camouflage schemes and technology towards. The vertical would *most* probably be the angle that aerial reconnaissance photographer would fly over territory, but the bomber's view would *always* be from the oblique angle.⁷⁶⁶ The geometry of bombing was something the camoufleurs were required to become closely acquainted. They learnt that a bomb does not fall vertically, instead its flight path traces a parabolic curve as it acquires some of the forward momentum of the plane, so when it is released it travels horizontally before falling vertically. Therefore, a bomb must leave the aeroplane while it is still some distance from its target, and so crucially the bomber must identify the target from a range of several miles.⁷⁶⁷ The camoufleurs realised that a dialogue between these two angles and disruption between the two aerial perspectives of the camera (vertical) and bomber (oblique) were necessary. The bombers' reliance on the military intelligence passed on from the aerial interpreter could be interrupted and upset, thus creating a crucial moment of delay in the bomber's action.

Although it was near impossible for the camoufleurs to conceal perfectly the military's presence or important military installations from view, they could design to create doubt. The camoufleurs realised that they could not confuse the glass lens, but importantly they *could* attempt to confuse the fallible human eye of the aerial photographer who operated the crucial click of the camera. If the aerial photographer had captured valuable intelligence, camouflage could be designed to interrupt and confuse the relationship between the aerial interpreter and the bomber. The camouflages were told:

It is one thing for the air photograph interpreter, sitting at ease with his feet up and a glass of beer by his side to discover all about you, but the bomber who comes primed with the information he has elucidated will not be in the same happy position. He will only have seconds to pick out on the ground that which may take quite a long time to discover on the photographs.⁷⁶⁸

The human eye of the bomber works less systematically than the technological lens of the camera, and at a less leisurely pace than the interpreter, thus creating space for a crucial moment of delay in action; the camoufleurs were to invent ways to create doubt in this moment of indecision. To achieve this end, they were to become masters in trickery and deception, by concealing and disrupting the background pattern, and by anticipating the differing eyes of the aerial photographer and the bomber. Thus, camouflage was developed to exploit the fallible human optic through an understanding of angular geography.

⁷⁶⁶ Camouflage Lecture Notes - IWM 86/50/3/2u.

⁷⁶⁷ Ibid.

⁷⁶⁸ Booklet: Camouflage Spring 1942 op cit.

From examining the training conducted by the CD&TC, camouflage at the beginning of WWII can be seen as a craft of erasure rather than a technology of location.⁷⁶⁹ For the WWII photographic interpreters potential targets or sites of suspicion viewed through the stereoscope were spatially and imaginatively distant, images of enemy territory and the enemy 'other'. For the camoufleurs, on the contrary, the valuable reference point on the map, the vulnerable mark or target on the black and white photograph, was *not* known through a process of dislocation. Geographically, the location that required the camoufleurs' defensive remodelling or cosmetic make-under would be spatially near and represented a site bound up with material and emotional lives. The aerial photograph can be considered as the beginning of what Gregory⁷⁷⁰ has detailed in twenty-first century warfare as 'optical detachment', where technology such as Unmanned Aerial Vehicles (UAVs) can create a disjuncture between the eye, the action and the target.⁷⁷¹ Similarly in WWII, where the aerial photograph allowed information on the earth's surface to be collected, documented and examined at a safe distance, the aerial interpreters of WWII, like the UAV operators, were connected to their battlefields through a process of dislocation.

As well as a different relationship with site and target, space also acquired a distinct relationship for the camoufleurs. Space, for them, was a cubic medium with which to work; it created and enabled a continual dialogue between earth and sky, from and through the vertical and a spectrum of oblique angles. Although not separate from the spatial experiences of the reconnaissance pilot, the photographic interpreter and the bomber' what rendered the camoufleurs relationship with space distinct was the continuous splicing of eye and body that developing camouflage technology demanded. While the camoufleurs worked on camouflage designs, their eyes had to remain skyward as their bodies transformed the ground through concealing technology. Adey has recently discussed how the aeroplane developed new ways of understanding time and space, and camouflage in WWII, through an entwined relationship with the aeroplane, appears to have achieved this too. It can be seen that the camoufleurs training at the CD&TC, sought to ground the aerial view through a close study and understandings of an aerial and an angular geography of textured landscapes, whilst also aiming liberate the ground from the panoptic aerial gaze through concealing camouflage. The camoufleurs exemplify Adey's claims there is a reciprocal relationship between earth and air,⁷⁷² but whereas Adey explains how distinctions such as above and below, air and ground,

⁷⁶⁹ Kaplan, C. (2006b) op cit.

⁷⁷⁰ Gregory, D. (2007a&b) op cit.

⁷⁷¹ Gregory (2007a) Ibid. UAVs operate remotely and allow distant targets to be isolated with surgical precision, the battle-space becomes de-corporealised and reduced to 'an array of points'.

⁷⁷² Adey, P. (2010) op cit. p.5.

observer and observed, have all served as separations creating spaces,⁷⁷³ for the camoufleurs, such separations were never distinct. The aerial geography of WWII can therefore be understood through consideration of the camoufleurs' complex concealment and creation, of and with, space. Military training on the importance of the aerial view transformed the disparate camouflage experts who all depended upon their skilled and trained eyes, in this respect they became united in an earnest passion for their craft.

Therefore, a deep understanding of the geometry of bombing, and the craft of concealment, shows how there are important degrees of separation between the aerial view directly on the vertical and one on an oblique angle. The camoufleurs' knowledge of the aerial view was also knowledge countering and undermining this view, and therefore their concern with hit or miss could not itself be 'hit or miss' in its understanding:

It is no idle predilection for joy rides that lures the camoufleur into the air. Failure to appreciate the peculiar characteristics of the airman's view of the world below him under all conditions makes Camouflage absolutely impossible.⁷⁷⁴

FARNHAM: THE SPACE OF THE SPECIALIST

The camouflage school ensured that the camoufleurs put these newly acquired and honed skills into practice. Full scale experiments became emblematic of camouflage training and experimentation at the CD&TC. This practice would continue throughout the war and was of wider importance than just the training of camoufleurs, since the military and the War Office would at times observe these trials, calculating their potential for success:

MEMORANDUM

From: Commandant,
CD&TC RE.
FARNHAM CASTLE, Surrey
TO: DWV
The War Office
31 May 43
Report on Camouflage Display Practice Camp held at Tarrant Gunville
between 10 and 17 May 43.

INTENTION

An attempt was made to suggest false defensive strength in a rear fortress area some 10 miles behind the forward localities. The display

⁷⁷³ Ibid.

⁷⁷⁴ Trevelyan, J. (1944) op cit. p.4.

included Inf positions, Tank harbours, Field Bty position, RE Dump and AA sites.

The first priority was considered to be the deception of the enemy interpreter of vertical photographs, but on certain special sites consideration was also given to deceiving the low visual recce pilot. It was hoped that at any considerable height the visual impression would be impressive and true.

GENERAL CRITICISMS

The art of creating false tracks and mess is a very difficult one. The design of false tracks calls for great imagination and a sense of drawing in a new medium and on a vast scale. Specialist personnel should be trained in this branch of display...

CONCLUSION

The camp was an invaluable lesson to all who took part in it, and an immense amount has been learnt. It is hoped that a further experiment of this kind may be tried in about three months time, using unskilled labour, such as Pioneer units, directed by trained camouflage personnel.⁷⁷⁵

This report of an experiment into camouflage display demonstrates that the aerial view dominated the design and execution of camouflage schemes, but also that such experiments played a greater role than simply allowing camoufleurs to practice their schemes to scale. The CD&TC experiments were used to justify the system and practice of the school and, in particular, its employment of 'specialist personnel'. Although the military had evidently been keen to hire the services of experts for inventing and developing military camouflage, there was still a need on-going to validate this decision. The expert camoufleurs were required to demonstrate that their skills were necessary to the execution of effective military camouflage, not only through developing camouflage technologies, but also in their particular skill at directing and implementing schemes. The camoufleurs at Farnham thereby experimented with knowledge, practices and fieldcraft, all the while demonstrating their individual yet collective specific use to the military. To this end, the Farnham Castle Great Hall became the stage on which to showcase to visiting and inspecting military top brass camouflage models and technologies that the camouflage specialists had invented.⁷⁷⁶

The CD&TC, camouflage and the camoufleurs nurtured the role of the military specialist and bemoaned the folly of the Army for their seeming witlessness in all matters camouflage. Cott, for example, wrote to Kerr of his frustration at being met with ignorance, and also the extraordinary schemes that were done in the name of camouflage, but not by a specialist:

⁷⁷⁵ Memorandum reporting on camouflage display, 31st May 1943 IWM 86/50/3/2541/1.

⁷⁷⁶ Guided tour of Farnham Castle.

I heard a good story the other day from the Aldershot Command. A trench had been painted in a puzzling manner - one side, made of concrete, was "camouflaged" with the usual khaki and green stripes, and the other side, made of brick, was left bright red. Enquiries revealed that this extraordinary example of stupidity was developed to an Army Order to the effect that all concrete was to be camouflaged with paint! Another thing one occasionally hears is the wonderful argument, "We're here to fight not to hide"⁷⁷⁷.

Similarly, McIntosh Patrick, in an address on camouflage to military personnel, opened by critiquing the general attitude towards the subject which the camoufleurs had inherited from WWI:

The camoufleurs are forever railing that such a mysterious name has been chosen for their special job. The comic (perhaps pitiful would be a better description) manifestations of its power to overcome reason and common-sense were taken as evidence of the choice of this curious word had been a great mistake. Nothing was too blatantly far-fetched if it was called "camouflage". There was justification for this low opinion of the word, but they were voices crying in the wilderness. "Camouflage was common-sense and good soldiering" they said, but that was rather begging the question because common-sense is uncommon and good soldiering more so than camouflage.⁷⁷⁸

The camoufleurs felt under continuous pressure to justify their presence and prove their benefit to the war effort through developing a technology which bewildered and bemused many within and out-with the military. They found themselves perceived as an amusing, flamboyant bunch, as Trevelyan explained:

This role, half-clown, half-magician, was one that I found camouflage officers were more or less expected to fill.⁷⁷⁹

This attitude was one that the camoufleurs never entirely shook off throughout the war, and one which they embraced and endured depending on personality and situation. But the military, in particular Beddington and Buckley, had achieved much by the end of the CD&TC's initial six-week training course at Farnham Castle. Of the thirty camouflage trainees comprising the group in October 1940, the remainder of the war would see them scattered across different theatres of war from North Africa and Norway to Italy and Sicily, and on the Home Front too. Some, like Trevelyan and McIntosh Patrick, would spend much of their time in Britain becoming key figures in the instructing team at the CD&TC, training new cohorts of camouflage officers and continuing to configure novel camouflage designs and schemes. The fate of Cott, Maskelyne and Sykes amongst many others would lie in the battlefields of North Africa where they would soon make their presence felt in camouflage

⁷⁷⁷ Letter Cott to Kerr, 26th October 1940 op cit.

⁷⁷⁸ Ms notes and course - DG GMA A64/1/16/4/3.

⁷⁷⁹ Trevelyan, J. (1957) op cit. p.130.

technique and intent during a new Desert War, in the process greatly altering the future nature and direction of military camouflage.

As for the CD&TC, it remained a focal point for the assimilation, testing and circulation of camouflage knowledge and techniques throughout the war. Buckley ensured that the CD&TC was in contact with the camoufleurs spread across the different global battlefields, collecting reports on camouflage techniques from temporal, desert, snow and jungle climes, and distributing the information pooled at Farnham to his Camouflage Officers. Hence:

Dear Pavitt,

Photographs

We are trying to prepare sets of lantern slides to be sent to Camouflage Officers to sweeten their lectures. Let me know if there is any particular subject on which you would like slides⁷⁸⁰

Buckley remained a kindly supervisor in camouflage long after his charges had left, and for those who were not accustomed to military life he was a source of support, as Trevelyan's letters reveal. It appears that after three years the war took its toll on Trevelyan, and it is clear from the letters the Buckley sent him during a period of hospitalisation that he was a close friend of Trevelyan's as well as a respected superior:

Don't bother about the bloody army if you don't feel like it and can't stand the sight of scores of soldiers. It's very easy not to be able to stand them ... It's not so much the people themselves but the Ogre they represent ... When I have been on leave after 7 days home to put on a uniform and go back, the sight of a soldier glooms me.⁷⁸¹

The social ties forged at Farnham kept the dispersed camoufleurs close to one another, and to the school. They would often send reports or photographs schemes from the different terrains in which they were operating to aid the likes of Buckley in shaping lectures on emergent camouflage techniques and for further testing. The CD&TC in turn would send camouflage officers to different theatres of war to inspect the advances in camouflage. On their return, training could be updated, and innovations tried and tested. These trips were also a time for the camoufleurs to catch up with one another, and Trevelyan's diary records his meetings with Cott, Maskelyne and Sykes on an official camouflage inspection tour to North Africa.⁷⁸² As a result, the camouflage training at the CD&TC although still focusing on the core lessons in camouflage such as the importance of siting, tone, texture and shadow elimination, was continually under a process of review and modification. The CD&TC's

⁷⁸⁰ Letter Buckley to Pavitt, 11 September 1940 CD&TC - IWM 86/50/3/4/2.

⁷⁸¹ Letter Buckley to Trevelyan, 24th March 1942 – TWL/ JOT 27/17.

⁷⁸² Trevelyan, J. (1942) *African Diary* unpublished – TWL/JOT 58/1.

experiments were analysing the effectiveness of new schemes for use in varied terrains and attempting to establish if camouflage schemes were mobile from one geographical location to another. By the end of the war, this work had resulted in a large corpus of technical publications and texts:

PARTICULARS OF WAR-TIME PAMPHLETS AND FILMS

PAMPHLETS

Selection from CD&TC

Unit Construction Equipment
Camouflage Devices Prefabricated in the United Kingdom
Dummy Landing Craft
Concealment Aspect of Beach Group Work
Camouflage in Jungle Warfare
Collected Information on Enemy Methods
Notes for Camouflage Instructors
Camouflage Display Photographs
Synopsis of Lectures
Mobile Dummy Stuart Tank

TRAINING POSTERS

Net Garnishing Patterns Sheets
Personal Concealment
A.F.V. Concealment
Concealment of Weapon Slits
M.T. parking - Air View
Artillery Nets
Camouflage Reminders;
A Bad behaviour
B Snails Tails leave Trails
C A Good Sailor makes a Bad Target
D Clouds have Eyes
E Better This than This
F In the Face of the Enemy Keep Yours Dark

TRAINING FILMS

Camouflage - All Arms.
Camouflage - Air View.
Camouflage Fieldcraft - Prepare for Battle.
Concealment (Air View) of Wheeled Vehicles.
Group Concealment (Air View) of Wheeled Vehicles.⁷⁸³

The instructors at Farnham, such as Trevelyan and McIntosh Patrick, would provide lectures, articles and booklets tracing the history and periods of technological innovation in military camouflage throughout the war, with as much flare as was allowed to them.⁷⁸⁴

⁷⁸³ Wiseman, D.J.C. (1953) op cit. Appendix XVII Particulars of War-time pamphlets and films.

⁷⁸⁴ McIntosh Patrick TACTICAL DECEPTION, n.d. - DG GMA A64/1/16/4/3 & Trevelyan (1944) op cit.

Jokes, wisecracks, and anecdotes! The object of them is of course not to teach, but to keep the audience awake and whilst they are waiting for the next crack, perhaps they may take in something.⁷⁸⁵

Military pamphlets do not belong to the class of literature which the critics describe as good entertainment.⁷⁸⁶

That, however, is perhaps some rather harsh self-criticism as the camoufleurs tried in their training literature to capture attention and imagination, whilst educating:

A GUN IN THE BUSH IS WORTH TWO IN A FIELD ⁷⁸⁷

This varied cast of camoufleurs, whether from a military, artistic, scientific or theatrical background, were writing camouflage's biography and history at the CD&TC, as well as informing it. The CD&TC at Farnham Castle had not centralised all camouflage in the British military, but it did work to standardise and synthesise camouflage technologies and knowledge. In the last few months of the war, the military began to assess the impact and legacy of the CD&TC, and a revealing document ran as follows:

LETTER

From A.W. Lambert The War Office

To Supreme Allied Commander Mediterranean Theatre, Commander-in-Chief 21 Army Group, Home Forces, Middle East, Persia and Iraq, 11 Army Group etc.

4 September 1944

Sir,

I am commanded by the Army Council to inform you that the question of camouflage training in the Army has recently been under review. Up to the beginning of the war little study of this subject has been made within normal training of the Army; since it started camouflage experiment and training has been handled by a comparatively small number of specialists. It is only recently that, through the continued efforts of these specialists, it has become possible to produce a reasonably sound distribution of knowledge throughout the Army.

Such is the importance attached to training in camouflage that it has been decided it must become an integral part of the basic training of all ranks of the Army from the earliest stage. Further, the necessary staff appointments must in the future be held by staff officers who have been specially trained in camouflage and not, as has of necessity been the case, by experts in camouflage who in many cases lack military background and staff training.

It is proposed, therefore, gradually to replace camouflage officers, as and when vacancies occur, with General Staff Officers who have been specially trained in camouflage. These, however, will not be available

⁷⁸⁵ McIntosh Patrick handwritten notes on lecturing, n.d – DG GMA A64/1/16/7/2.

⁷⁸⁶Booklet: "Backgrounds" Spring 1942 op cit.

⁷⁸⁷ BOOKLET: CONCEALMENT OF A TROOP IN ACTION NOV 1941 – DA GMA A64/1/16/2/1.

in the immediate future. These General Staff Officers will act as camouflage advisers to formation commanders both as regards the operational and training aspects of camouflage within the formation.

Separate instruction will be issued in due course to those concerned, implementing the decision that camouflage is to be an integral part of the training of all ranks.⁷⁸⁸

The CD&TC had apparently proved camouflage's worth to military practice and training, but, once the military had amassed the knowledge and learned the skills required, its leaders became active in disbanding the 'curious collection' and replacing them with specially trained military personnel. Ever orderly and largely unsentimental, the military operated in a skilful and expert manner to incorporate and translate knowledges and skills in the practice of military camouflage.

CONCLUSION

The military and the pioneer Camouflage Officers in the CD&TC at Farnham had learned much from their period of experimentation in camouflage, incorporating and capitalising upon distinct knowledges and at times divergent personalities. Farnham Castle seems to have created an exceptional dialogic site for military training; it allowed collaboration and camouflage to flourish. The military acted dynamically to pool these seemingly disparate professionals, encouraging them to co-produce through a positive engagement with one another. All involved seemingly had a keen awareness of the skills needed to be harnessed, and also importantly those that the military needed to instil so as most effectively exploit specialists' various potentials. The importance of the aerial view through vertical and oblique angles was key to this training process. Through a study of the angular geographies of the aerial the camoufleurs became adept at working with space in its cubic dimensions, and to-ing and fro-ing seamlessly between earth and sky, physically and imaginatively, led them to appreciate the geometry of bombing in order to develop the craft of concealment.

As a result, camouflage became a truly interdisciplinary cyborg technology and practice, where all disciplines involved were altered throughout training and experimentation. By studying the personal experiences and relations running between some of the camoufleurs on the inaugural course at the CD&TC (notably Cott, Trevelyan, Penrose, Maskelyne and McIntosh Patrick), it has been shown how the process of mutual transformation and mangling of knowledges operated on an individual as well as disciplinary level. Cott was seemingly liberated through

⁷⁸⁸ Letter in box 'Camouflage Training in the UK – Policy' - NA WO 32/11043/13C.

his experience at Farnham as he found his biological knowledge on camouflage to be appreciated, adopted or adapted by artists such as Trevelyan and McIntosh Patrick. Buckley offers a more intimate insight into the role of the military in navigating and incorporating such diverse individuals and professions, revealing that, for the camoufleurs, there was after all no one homogenous official military response to their craft; although beyond the confines of Farnham this experience could be at times difficult.

Farnham therefore discloses the complex relationships involved in the development of military camouflage between and across the military, artists, scientists and performers who were enrolled in its innovation. The CD&TCs history from the first course and throughout the war can be seen to be one of accumulation, transformation and dissemination of knowledges and practices. By considering how camouflage was practised at Farnham, through ‘social *and* material processes (subjects, objects and relations)’ which ‘become seamlessly entwined within a complex set of associations’,⁷⁸⁹ the mutually transformative effect on all knowledges and bodies active within the network can begin to be traced. As a result, camouflage became a technology that was continually in the process of emergence and becoming as the camoufleurs continued to work and devise new approaches to the varied geographic and military settings in which they found themselves employed.

The first class of camouflage trainees at the CD&TC at Farnham was perhaps the most notable of any that would pass through the ancient halls and grounds of the castle. They were prolific in their innovation and ingenuity. As they left Farnham after six weeks of official camouflage training, boarding the train back to London and leaving the small provincial station, the picturesque town and Farnham Castle, now the “official” home of British camouflage, the camoufleurs were expectant of what was to come in the war and their possible role in the design of battlefields. Some, like Cott were now eager to test their camouflage skills in action, as he explained to Kerr:

I gather that I am possibly to be recalled to Farnham eventually to act as an instructor on the regular staff on this establishment. In some respects I should prefer to go off to Egypt or elsewhere overseas for a more varied experience, but once in the army I imagine one has very little say in these matters - “orders is orders”.⁷⁹⁰

Indeed, Cott and many others who had been with him at Farnham were to be sent to Egypt where they were to have a ‘varied experience’ which would dramatically alter camouflage training at the CD&TC, the camoufleurs, camouflage intent, the military and even the very

⁷⁸⁹ Murdoch, J. (1998) op cit. p359.

⁷⁹⁰ Letter Cott to Kerr 26th October 1940 op cit.

direction of the war. One of the greatest legacies of the CD&TC, meanwhile, was that it began to undermine the mysterious and comical image of camouflage by proving, as Penrose remarked in the Home Guard Manual, that:

Camouflage is no mystery and no joke. It is a matter of life and death - of victory or defeat.⁷⁹¹

⁷⁹¹ Penrose, R. (1940) Home Guard Manual of Camouflage, p.30.

THE ABC OF CAMOUFLAGE: R-T

R is for Regularity, huts in a row,
or guns equidistant, are certain to show

S stands for Siting, for Spoil and for Scrims
three covers two but on one Sink or Swim.

T is for Tracks, which will photography light,
and disclose your activities: keep them from sight.

Chapter 8.

Fleurs on the Offensive: Redesigning the Desert in WWII



OBSERVING WAR IN THE DESERT

Desert Warfare

A universe of space, infinite sands,
Unbroken line to mark off cloudless blue.
A shimmering heat that plucks the very life
Of withered thorns which strive and stretch out shoots
Groping in vain to take hold of life.
The desert, mighty, void of hope, immense,
Disturbed from tortured sleep by sound of war,
Her barren bosom throbs with life once more.
Across her brow come men and guns to wrest
From foeman's grasp another sterile stretch.
And so the game is played on age-old sands.
Shades of Caesars of a bygone day,
Their might decayed, great triumphs turned to dust.
Soon, as with them, shall our deeds grow obscure,
Our victories unimportant, efforts vain
Defaced by time. Once more the desert reigns,
Our warfare but a phase, long, long forgot.⁷⁹²

The desert has been described as possessing 'a stern beauty which kindles awe',⁷⁹³ as 'a stage on which wind and sand are actors and dancers, with everything else the backdrop'.⁷⁹⁴ As so often with the study of camouflage it is the backdrop that draws the eye, demanding attention and scrutiny. Conjure up for a moment, a stretch of Egyptian desert, study the environment of sand, adjust to the landscape's mauvish atmosphere created by the interplay of sand, wind and sun, squint against the harsh, bright white light and peer more intently into the background to observe, on this patch of desert, a group of soldiers. The men struggle under the sun's dazzling brightness and searing heat, elongated shadows bathed with reflected light stretching across the granular, arid terrain. The focus of the soldiers' attention and labour is a military refuse dump through which they are picking their way, scavenging for materials suitable for modification and transformation. The efforts are scrutinised by Chief Instructor of the British Military's Middle East Camouflage School, Dr Hugh Cott. Whilst watching the training exercise, taking notes and assessing the progress of his camouflage charges, a hot, dry wind picks up. Sensing a change in the atmosphere Cott closes his notebook. Light objects begin to lift and swirl, abandoned petrol cans are sent bowling across the gritty surface, and a cloud of yellow dust rises, filling the air. The sky dims to a sombre orange. Cott is aware that his group of camouflage trainees will soon be invisible as whipping clouds of cloying sand, smother and penetrate eyes, ears and even the individual pages of his now closed notebook. He knows that 'playing with sand can be serious'.⁷⁹⁵ After months in the desert, he is well

⁷⁹² Harker, G. Singalman (1944) Desert Warfare. In Verses by the Eighth Army (eds.) *Poems from the Desert*.

⁷⁹³ Cornish, V. (1943) *The Beauties of Scenery; A Geographical Study*, p.49.

⁷⁹⁴ Welland, M. (2009) *Sand: A Journey through Science and Imagination*, p.141.

⁷⁹⁵ Ibid p.30.

acquainted with the intimate geographies of sand, sky and wind, disclosing the violent storm blowing in (figure 33).



Figure 33. WWII sandstorm

In WWII, the desert environment and its specific ecological traits altered the nature of battle. This process in turn actively transformed the desert, as the military, and in particular the camoufleurs, redesigned the desert to function successfully in the prosecution of warfare. Through the lives of those who were involved in the production of WWII desert camouflage, this chapter tells about both the militarisation of desert space and the militarisation of knowledge through technological development. It will focus on the shift in camouflage from defensive concealment to offensive display through the use of elaborate deception schemes. The Desert War witnessed a crucial blurring of camouflage and military deception, as camouflage became subsumed into battle plans as part of aggressive strategy. Never before had the term ‘visual warfare’, instead of camouflage, seemed more appropriate. And, through the nature and character of the schemes that the desert camoufleurs planned and executed,

never before had the term camouflage so lived up to its ambiguous, mischievous and unsettling name.

ADJUSTING TO THE DESERT

The North African Campaign, popularly known as the Desert War, was waged from June 1940 when Italy declared war on France and Britain until Allied success in May 1943. From 10th June 1940, a strip of desert 1,400 miles long stretching from Tripoli in Libya in the west, to Alexandria in Egypt in the east, was to be converted from a seemingly vast space devoid of much (human or other) life, into a site of conflict and violence. British and Commonwealth soldiers fought the Italian and German armies, and approximately a million men, drawn together from over ten different countries⁷⁹⁶ lived and fought in this battlefield. Over 50,000 were never to return.⁷⁹⁷ For two years the desert was the only theatre of war in which the British were directly engaged with the German military, and so this remote environment enlarged in the geographic imagination of the British public. For morale, the desert became a prime focus of popular optimism, and the campaign's significance to the greater outcome of WWII outgrew any potential impact that victory in the Middle East could realistically achieve. Not only was the desert populated by soldiers and the paraphernalia of battle, but the Desert War also drew throngs of reporters primed to capture the action. In scenes reminiscent of *Scoop*, Waugh's satire of the media in war, journalists in pursuit of news stories from the Eighth Army were to generate a legion of heroes and celebrities. As Bungay explains, the press tales of the Desert War enter into the British imagination and fighting became personalised as 'The Desert Rats' of the British Army versus 'The Desert Fox', Rommel's forces; producing more household names and legends than did any other campaign in WWII.⁷⁹⁸

It was not only through journalism that the Eighth Army's campaign in the desert caught the public attention at home; for the desert also came to be known through official magazines which recorded and mapped the tactics, events and fighting.⁷⁹⁹ The desert shifted in a short space of time from a distant unknown space to part of the WWII British psyche. Farish's research on the U.S. Cold War geopolitics explores not only sites of military presences, but also the importance of psychological warfare in an attempt to engineer the public's attitudes,

⁷⁹⁶ Bungay, S. (2002) op cit.

⁷⁹⁷ Ibid p.2.

⁷⁹⁸ Bungay, S. (2002) op cit. p.2.

⁷⁹⁹ Magazine, (1943) *The Battle of Egypt; The Official Record in pictures and map.*

emotions and behaviour towards a perceived enemy, to generate support for the nation's aims.⁸⁰⁰ In WWII, for the British military and government, the desert served as a site which could be dressed to embody the character and the destiny of the war; the stoical, upbeat "Tommy" pitched against the disorganised ill-equipped Italians, but also the well-organised German troops. The desert became a tool for positive propaganda in the psychological war waged by the British military, and therefore so did the associated military technologies, such as camouflage, which inhabited it.

For example, in 1943 the triumph of the Eighth Army was immortalised in the Oscar winning documentary, *Desert Victory*, a film compiled of footage produced by the Army and RAF film and Photographic Units. The British conquest as portrayed here is not only over enemy armies, it is a victory over the desert itself. The film begins:

The Western Desert is a place fit only for war ... Thousands of square miles are nothing but sand and stone ... Water doesn't exist until you bore deep into the earth. You bath in your shaving-mug. Flies have the tenacity of bulldogs. Bruises turn rapidly to desert sores ... When the hot *khamsin* wind brings its sandstorms, life can be intolerable. The Arabs say that after five days of it, murder can be excused.⁸⁰¹

Imaginatively, the film creates a terrain which fulfilled a geopolitical purpose. The desert became a significant military ecology and an object of British geopolitics in WWII, just as it came to embody British military prowess and technological ingenuity.

The desert was further immortalised through the poetry penned by British soldiers, often evoking a strong sense of their visceral embodied experiences of living and fighting in the desert. Thus:

Extract from **The Desert**

The silence of vast spaces, where even,
The wind is soundless from the lack of any
Obstacle to vent its opposition on
Parched earth, whose sterile dust the burning winds,
In choking clouds with aimless fury, sweep
Across vast treeless plains without intent.⁸⁰²

Extract from **Battle Interlude**

Imagined crunch of boot on sand;
Like crazed, hypnotic tyrant
This savagery of sound.⁸⁰³

⁸⁰⁰ Farish, M. (2007) Targeting the Inner Landscape. In Gregory, D. & Pred, A. (ed.) *Violent Geographies*, p.256.

⁸⁰¹ Hodson, J. (1943) script of *Desert Victory*.

⁸⁰² Lieutenant M. St J. Wilmoth (1944) *The Desert*, op cit.

⁸⁰³ Clener, I. (1944) *Battle Interlude* op cit. p.9.

Extract from **There was the Richness...**

And now our endless plains of barren sorrow,
This cruel nothingness of sterile sand.
The ridges rich with dead, the dead who squandered
Their joyful spirits in a joyless land.⁸⁰⁴

These extracts from the soldiers' poems convey that, to the British Army's Western Desert Force,⁸⁰⁵ the desert initially seemed an alien, near lunar landscape, an unnerving expansive battlefield. Gilbert explains that action in the desert, 'to the hundreds of thousands of men of the Western Desert Force, which would later be designated as the Eighth Army, comprised a series of long, drawn-out campaigns punctuated by bewildering and bloody engagements'.⁸⁰⁶ In those prolonged periods of calm tinged with the menace of anticipated battle, the soldiers began to adjust to their desert setting. The desert environment posed numerous problems for the British soldier accustomed to the damp, cool conditions that characterised the British Isles.

On arrival, soldiers underwent training to prepare them for this change. Major R D Nicholson, who arrived in the desert in 1942, attended many of the training courses designed to help him adjust to his new and unfamiliar military posting. Nicholson jotted down in an army-issue notepad transcripts acquired from many of the courses attended; one of the first entries is a scribbled list of suggestions about how to focus the mind and acclimatise to the desert:

Mental Readjustment

1. Mind over matter and converse
2. "Resignation" - cease to struggle
3. Rage against injustice
4. Degeneration of character, hot climates, self respect
5. Depression - irritation, loneliness, sees insults where none exist
6. Thoughts in the past - English Countryside - get out of it, go sick - testing time, flies, heat. Men have gone mad.
7. For new soldier emerged from training. Peacetime behind and ahead. Do not look backwards, too often or forwards too longingly. PRESENT, get on with the job.
8. Past explorers - their difficulties never threw up their hands - guts!
9. Mental guts - moping
10. Remedy - physical health diaries
11. Sense of humour.⁸⁰⁷

⁸⁰⁴ Barnard, E. (1944) *There was the Richness...* op cit. p.11.

⁸⁰⁵ In 1941 the Western Desert Force, part of the Middle East Command would be renamed the Eighth Army when Auchinleck replaced Wavell as Commander in Chief Middle East in September, at the same time as when British and Commonwealth forces were reinforced. Later Montgomery would replace Auchinleck as Commander in Chief Middle East. Gilbert, A. (1992) *The Imperial War Museum Book of the Desert War 1940-1943*.

⁸⁰⁶ Ibid.

⁸⁰⁷ Private papers of Major R D Nicholson - IWM 82/2/1.

It appears that the military feared that the stress of the desert environment, a seemingly ‘other’ terrain, could lead to a degeneration of the controlled and trained military mind and body. A final note by Nicholson made under ‘Mental Readjustment’ succinctly condenses military attitudes towards the process of adjustment for the British soldiers of the Eighth Army. Nicholson had simply written:

Stop thinking of oneself.⁸⁰⁸

For many soldiers in the predominately volunteer Eighth Army,⁸⁰⁹ the desert would not have been an easy environment to which to adapt, and such bravado was probably required. On arrival in the Middle East, they were met with searing heat that climbed to over 40C in the shade,⁸¹⁰ and then endured the plummeting temperatures of cloudless chilly nights. The gritty sand was a particular environmental adversary. It invaded everything: food, clothes, tents, equipment, machinery and bodies. It chaffed, clogged, stuck and blistered. At times it was whipped into furious sandstorms which engulfed camps and rearranged the topology of the land around them. What was once familiar would suddenly be rendered unfamiliar, over and over again.

Another hardship for the desert soldiers was the rationing of essential resources due to the isolated nature of the army’s position. British forces were dispersed across the desert, so supplies had to cover long distances under threat of attack from enemy bombers who patrolled known supply routes. Water became the most precious and sought after ration:

Colonel Fryer’s Water Supply Lecture

It is possible to exist for short periods of up to a fortnight on ½ gallon and this is often the standard ration.⁸¹¹

In practice, water rationing led to each soldier being issued with approximately four to six pints of water a day.⁸¹² Half would be allocated to the cookhouse and the remainder was for drinking and cleaning. Soldiers became very resourceful in stretching this limited supply. The water was chlorinated and foul-tasting, so instead of being drunk neat, it was consumed in the most quintessential of British ways, as tea. Then, what little liquid might be left over was used to clean teeth, shave perform a quick ‘cats lick’ (a wash of the essential body parts), while the remainder of this well-recycled mixture would finally be deposited into the radiators of

⁸⁰⁸ Ibid.

⁸⁰⁹ Gilbert, A, (1992) op cit.

⁸¹⁰ Bungay, S. (2002) op cit.p.69.

⁸¹¹ Private papers of Major R D Nicholson, op cit.

⁸¹² Ibid.

trucks.⁸¹³ Alongside the heat and perpetual thirst, another problem that beset military life in the desert was the flies, which arrived alongside the men. Attracted to moistness of sweat and other bodily fluids, swarms of flies clung to the bodies of the soldiers, dead and alive; therefore diseases were rife and spread swiftly amongst the troops.⁸¹⁴ The cumulative effect of these environmental conditions meant that even the mundane elements of military life in the desert were a challenge for the British soldier.

However, soldiers' lives in the desert should not be entirely conceived of as a hot, hellish ordeal. The desert was the place which came to define the character of the Eighth Army, and the soldiers were proud of their adjustment to the battlefield. The terrain became inscribed on to their bodies, fostering and exhibiting their sense of belonging to the environment. Sand-worn knees and tanned faces were badges of honour, testaments of endurance and adaptation;⁸¹⁵ like explorers the body for the desert soldier was a 'recording instrument' and proof of first-hand witnessing.⁸¹⁶ The climate of the desert and its remoteness from the military "top brass" back in Britain meant that military dress and conventions were often flouted. Even Montgomery publicly defied regulations by sewing the badge denoting his rank next to the badge of the Royal Tank Regiment on his beret. He claimed that this was to ensure soldiers of the Eighth Army would recognise and identify with him, but it riled higher ranking military officers.⁸¹⁷ Hard though it may have been to live in, the desert-scape of North Africa played a part in fostering great pride amongst the soldiers in WWII. Julian Trevelyan, on a visit to the desert, reflected on the comradeship that appeared to be nurtured in the desert, and also on demarcations of rank and race that seem to have been eroded:

There is a sort of good humour and camaraderie that makes one think a little sometimes of what has been told of the Spanish Republican Army. The stupidest prejudices and class stupidities seem to drop off once we are in the desert.⁸¹⁸

In the British military of the WWII desert, there were troops from across the Commonwealth, meaning that nationalities and religions were required to rub along, work, live and fight together, although Trevelyan's view should not lead to a romanticism of British military relations in the desert. A quick glance through the structuring of labour in the execution of

⁸¹³ Ibid.

⁸¹⁴ Bungay, S. (2002) op cit. p.69.

⁸¹⁵ Ibid.

⁸¹⁶ Livingstone, D. (2003) op cit. pp.74-76.

⁸¹⁷ Ibid.

⁸¹⁸ Trevelyan, J. (1942) *African Diary* op cit. p.12.

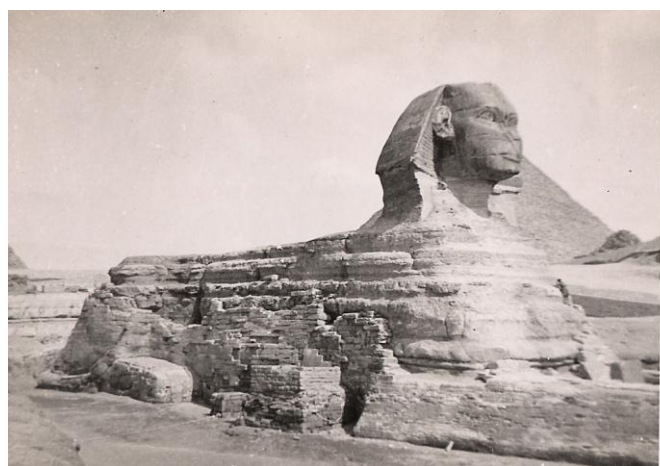
camouflage schemes reveals how a racial hierarchy seems to have prevailed. Indian Forces being predominantly the source of labour for the hard graft in such schemes.⁸¹⁹

For troops, as well as spawning a sense of pride and belonging the desert could also be an enjoyable and comparatively safe posting. In a landscape that demanded resourcefulness to survive, the soldiers indeed became resourceful in finding entertainment. Leave often be spent in Cairo (figure 34), taking in the historic sights (figure 35), as well as the night life. Boxing matches, volleyball tournaments and even the occasional hunting trip served to pass time enjoyably, while they waited for action.



Figure 34. Relaxing on leave

The desert's open nature, and arid bareness, which deprived the landscape of much vegetation, meant that, despite dunes and undulations, there were few places for a sniper to lie in wait. The physical geography of the desert hence impacted upon the material practicalities and, thereby, the character of fighting; at times serving to make it a less dangerous battlefield than others. In the Middle East the horizon stretched far and broad, and movement could be



easily spied from a distance. Death in the desert did not creep up on you; it was heralded by the booming canons of battle. Bungay suggests in WWII, a 'global conflict unprecedented in its comprehensive awfulness, the desert was a nice bit of war'.⁸²⁰

Figure 35. The Spinx

⁸¹⁹ Report on Camouflage Policy and Progress in M.E.F. Nov.41-Aug.42 – NA WO 201/2022.

⁸²⁰ Bungay, S. (2002) op cit. p.94.

This process of assimilation into ‘desert life’ experienced by British soldiers in WWII can perhaps be read as one of tension between the physical demands of operating in such a hot and dusty environment and the relative ease of war in this particular battlefield, except during moments of bloody conflict. Also, it was characterised by tension between the significance placed on the Desert War on the home front, its imaginative geography, and the isolation and distance felt by the Eighth Army from the home front. Furthermore, from an overview of desert life in WWII what appear were new habits of being and patterns of thought emerging among the ranks of the army indelibly shaped by their place and posting in WWII. It became clear that the desert terrain as a theatre of battle would have to be won through strategy and the effective use of technologies: and camouflage was to be one such technology, helping to determine the outcome of fighting in the desert. Hence, the desert also proved most decisive in shaping the camoufleurs, their craft and camouflage technology in WWII.

CAMOUFLAGE ARRIVES IN THE DESERT

Fresh from camouflage training at the CD&TC, Farnham Castle, the first camoufleurs arrived in the desert on New Year’s Day 1941.⁸²¹ The four professional camoufleurs in question were the film maker Geoffrey Barkas, who led the team, and three artists, John Hutton, P.E. Phillips and Blair Hughes-Stanton.⁸²² This first desert camouflage team was charged with the responsibility of setting up a camouflage unit in the Middle East and exploring the potential implementation of camouflage schemes and technologies in the desert. On initial inspection, it appeared that the desert was unlike anything that the camoufleurs had experienced or practised for at Farnham. The light and softly varied tones and shifting granular surface were in sharp contrast to the lush, thriving green and brown tones and diverse ecologies of Europe; yet, the overall task was the same, to conceal the military’s signatures and to deceive the enemy.

An important period of surveying the desert was initiated. Before even attempting to play with possible camouflage designs and technologies, Barkas and his team did what any experts practised in camouflage would do, they became the eyes of their enemy reconnaissance team and flew over the battlefield.⁸²³ From this experience of aerially observing the desert, Barkas and his team made three significant discoveries for the development of desert camouflage. First, although the desert terrain could to a certain extent be characterised by its openness and its exposing capabilities, it would still be possible to conceal *some* elements of military

⁸²¹ Rankin, N. (2008) op cit. p.455.

⁸²² Barkas, G. (1952), *The Camouflage Story (From Aintree to Alamein)*.

⁸²³ Ibid.

presence. Second, stationary equipment, such as artillery, and vehicles, such as tanks, could be disguised to fool the reconnaissance aircraft. Third, Barkas realised that the desert was an environment ripe for the staging of deception, from canvas aircraft to inflatable tanks. It was clear that camouflage could become an offensive technology borne of desert-based practices, but it was up to the camoufleurs to explore desert terrain by calling upon traditional geographical knowledge and to think through the redesign of the environment for military behaviour. From this initial experience of observing the desert from above, and beginning to appreciate the diversity of the landscape, the camoufleurs, started to experiment with desert camouflage designs through trial and error.

An important revelation for the camoufleurs was that the terrain was not the homogenous surface first supposed. Instead, there were patterns and differences to discern. To differentiate between these patterns and to explain the possibilities of concealment in the desert, the camoufleurs drew on a simile of the desert surface as a delicate material or clothing fabric:

Like any other delicate fabric the surface of the earth is easily marked, spotted or torn. Whether or not the spots, marks and tears on a frock or a suit are easily conspicuous depends largely on the colour or tone of the material, whether it has a pattern or not, and how the marks lie in relation to the pattern.⁸²⁴

In the desert, it transpired that from the air five distinguishable patterns could be identified. The first was 'plain velvet' (figure 36), which a training booklet rather poetically described as being the typical piece of bare sandy desert, looking not unlike a 'delicate fawn velvet', with no pattern or a very faint one 'like the veins in a leaf or a river with its tributaries'.⁸²⁵ The second pattern was 'velvet with a stronger pattern' (figure 37), with stark sinewy veins cast by shadows of uneven and numerous sandhills. The third and most ambiguous pattern was 'another desert pattern' (figure 38), which saw occasional dark streaks snake down the smooth pale tones of the desert, these being shadows cast by clumps of camel grass and scrub. The fourth pattern was more specific and identified as 'wadi pattern' (figure 39) and finally the fifth, the 'polka dot pattern' (figure 40), was caused by the scatterings of thorns on a level or gently rolling desert plain.⁸²⁶ These patterns revealed the desert to have varied, arguably subtler textures than the camoufleurs were used to observing.

⁸²⁴ Concealment in the Field No.1 G.H.Q Middle East – IWM K80/451 p.13.

⁸²⁵ Ibid.

⁸²⁶ Ibid pp.13-15.



Figure 36. Plain Velvet

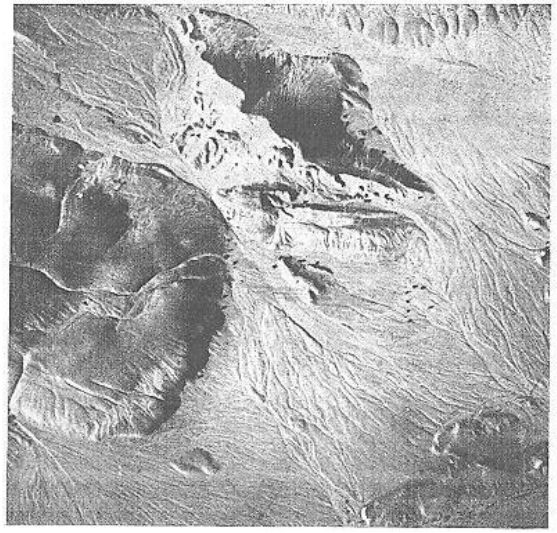


Figure 37. Velvet with some pattern

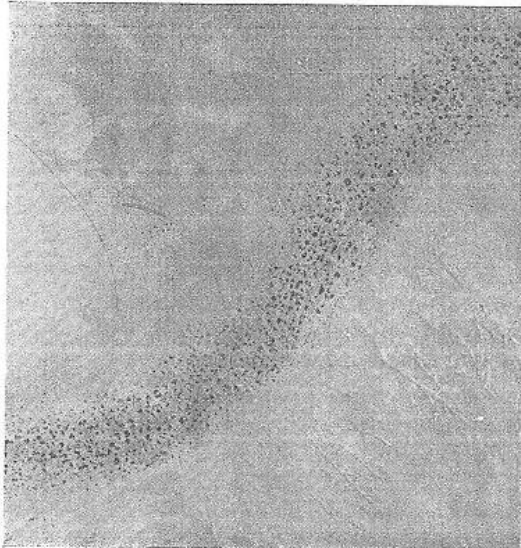


Figure 38. Another desert pattern



Figure 39. Wadi pattern

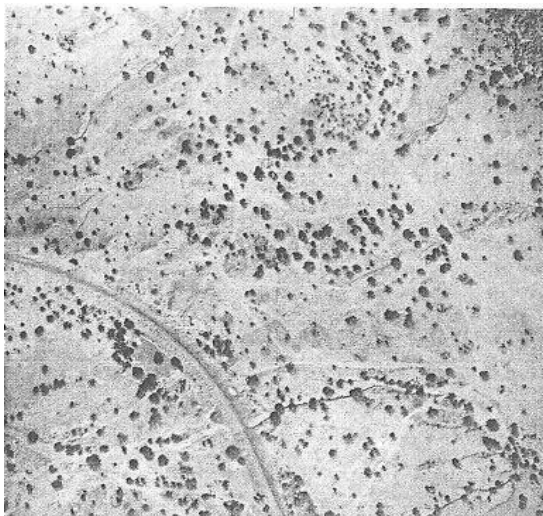


Figure 40. Polka dot pattern

From the air, the camoufleurs had begun to decipher the tonal range of the desert background, although concealment would be trickery and its potentials more limited than in the temperate environments they had been trained. It was not, however, impossible. From the air it was also observable that the desert was a very dangerous landscape in comparison to, say, the British countryside given its open and comparatively smooth surface. To the Western eye of the British military man, the desert terrain exposed soldiers' presence and movements to the enemy for the simple reason that anything added to the desert was inherently conspicuous, likely to cast shadows stretching across quite homogenous terrain, easily captured on aerial cameras and exposed on film. Thus, the vertical geopolitics of the desert became a central consideration for the work of the camoufleurs. Weizman explains that the network of observation which operates across and through vertical and horizontal planes acts to 'iron out the folded surface and flatten the terrain. From the air, everything can be watched'.⁸²⁷ The technologies of vertical surveillance and attack were, in WWII and continuing today, an attempt to achieve the full spectrum of dominance. Weizman suggests that researchers should consider a 'fully three-dimensional view of space-time' with the result being, Graham explains, of placing 'network centric warfare into the context of verticalisation'.⁸²⁸ In WWII, desert camoufleurs were similarly challenged, and were duly called upon to consider the spaces and politics of the military through three-dimensional relationships with the vertical. They needed to design on a large scale a range of misleading visions a spatially dispersed network of deceptions spanning various sites, together depicting one convincing picture of military activity. To mislead the enemy and the technologies of the aeroplane and camera, it seemed that the desert campaign would require that the camoufleurs engage politically, aesthetically and theatrically with their surroundings, to produce camouflage which would exact an ingenious and calculating cruelty.

THE SCRAPPY ART OF CAMOUFLAGE

With every change in the character and pattern of the terrain we experimented with our own vehicles or with any others whom we could induce to play, trying different methods of preparing and rigging nets, photographing and studying the results at different distances and in different angles of light, generally learning our job over again in these strange new surroundings.⁸²⁹

⁸²⁷ Weizman, E. (2002) Control in the air *www.opendemocracy.net*.

⁸²⁸ Graham, S. (2004) op cit.

⁸²⁹ Barkas, G. (1952) op cit. p.91.

Soon enough, Cott, Maskelyne and Sykes, amongst other camoufleurs from the CD&TC, made the sixty-five day journey from Britain to join Barkas and his team in the effort to develop effective desert camouflage. The camoufleurs quickly found that the military supply of equipment was in the main ineffective for the desert terrain. Cott sent photographs to Kerr to demonstrate how ill-prepared and ill-equipped they were. Nets issued to soldiers rendered their positions more conspicuous as greens and browns advertised to the skies their presence, creating stark tonal contrasts of dark shades on pale dusty yellows (figure 41). As a result, the camoufleurs realised they would have to work with, rather than against, the shades, tones and textures of their surrounding ecology. Experiments with lightly coloured materials such as hessian and white calico were trialled to test whether they would be more suited to concealment. As a result, the greens, browns and blacks of European camouflage were replaced with a more varied and soft palette, including pinks, yellows and velvety greens.⁸³⁰ The strong sunlight in the desert often necessitated a high percentage of white to be incorporated into designs. For example, the desert camoufleurs established, through trial and error, that the colour blend for garnished camouflage nets was required to be 25% pink, 25% undyed hessian and 50% white.⁸³¹ Through improvisation, it was also discovered that colours too yellowish or beige that ostensibly mimicked the desert sandy tones were nonetheless ineffective for blending and concealment because:



Figure 41. The inadequacies of standard-issue camouflage - H.B. Cott

In the Middle East, light colours were required in desert areas, the colours initially used for vehicles being light stone and Portland stone. The former was found to be too white and the latter too yellow. The

⁸³⁰ Aubry, M. (2004) Military: Counterfeit Camouflage. In Newman, A. & Blechman, H. (eds.) *Disruptive Pattern Material; An Encyclopedia of Camouflage* p.205.

⁸³¹ Wiseman, D.J.C. (1953) op cit. p.175.

Desert has a mauvish atmosphere close to the ground; the colour finally found most suitable was known as "Desert Pink Z.1".⁸³²

To conduct these experiments required the camoufleurs to invent their own paints, as the supplies from Europe were not appropriate, and so they mixed 'Camcolour' paint which came in the following desert-inspired shades – milk, cream, sand, buff, pink, terracotta, chocolate and light green.⁸³³ To develop the paint, only locally sourced materials were used because of their ready availability and suitability for camouflage schemes in the immediate environment, and also because of the lengthy delay in waiting for appropriate supplies to be produced in and then transported from Britain to the desert. An information sheet instructing on the production and use of Camcolour reveals:

Ingredients

Slaked lime, filler, finely ground coloured earths or pigments and ordinary salt, all ground together and mixed in exact portions according to formulae. All ingredients, except the pigments for green paints are found in Egypt.⁸³⁴

With the use of paints and nets garnishes in fitting tones for military equipment, the problem of concealment had been as fully resolved as the camoufleurs could achieve, but effective siting posed a further problem. Training at Farnham had taught the camoufleurs to conceal by siting vehicles, equipment or artillery within the shadows of the surrounding landscape, such as trees, hedges or civilian buildings, like farmhouses. In the desert this was not possible because villages were widely dispersed, and, although some sites had scrubland, this was little aid for concealing large or concentrated quantities of military equipment. Therefore, it was realised that if you could not merge beside or blend into a structure, or exploit surrounding 'living camouflage',⁸³⁵ the only option left was to hunker down within the sand (figure 42). Just as the use of 'living camouflage' and siting within cast shadows required upkeep and maintenance (by replacing tired foliage or moving throughout the day to keep within cast shadows), sand-nestling concealment also required considerable maintenance. Frequent sandstorms would disrupt or destroy the camoufleurs' efforts by smothering painted and netted surfaces in a thick layer of grit and dust.⁸³⁶ Although the environment in which they were working was aesthetically different to the practice grounds at Farnham, the virtues that the camoufleurs had learned and brought to the desert, such as ingenuity, versatility and

⁸³² Ibid p.15.

⁸³³ Camouflage Information Sheet No. 8 Camcolour – IWM 83.9(1).0/5.

⁸³⁴ Ibid.

⁸³⁵ 'Living camouflage' was the use of trees, bushes and grasses either by hiding within their shadow or using their foliage for net garnishing. IWM 86/50/3/9.

⁸³⁶ Goodden, H. (2007) op cit. p.113.

improvisation, permitted them to apply this expertise to their new landscape, leading to interesting results.

Having quickly appreciated that conventional means of concealment had limited effect in the Middle East, the camoufleurs also realised that, if concealment alone would not work, they would indeed need to deceive by other means:

After concealment, disguise. When all true hiding places had been filled there would still be an enormous number of significant units left out in the open.⁸³⁷



Figure 42. Sand nestling camouflage - H.B. Cott

The camoufleurs began to concentrate on other innovative methods of camouflage, and hence, the shift from concentrating efforts on concealing camouflage to developing aggressive deceptive camouflage for the offensive:

In the Middle East our salvation lay in deception - trying to keep Rommel guessing - and Jerry has paid sincere if unwilling tribute to our skill.⁸³⁸

Disguise and deception were nevertheless relatively new concepts for camouflage in the British military.⁸³⁹ Camouflage training had in general been practised as a defensive

⁸³⁷ Barkas, G. (1952) op cit. p.95.

⁸³⁸ Ms notes and course - DG GMA A64/1/16/4/3.

⁸³⁹ Wiseman, D. (1953) op cit. p.38. Deception and dummies had been used successfully by Lord Allenby before the Battle of Megiddo in Palestine in September, 1918, when divisions were moved without being noticed from the air due to dispersal and use of dummies. However, such a grand deceptive scheme was until 1941 an exception.

technology, and this shift to camouflage as offensive visual warfare, as part of deception, had not been anticipated until arrival in the desert. General Wavell explained the shift underway:

...possibly because the British man is normally simple and straightforward, more probably because our military training is stereotyped and unimaginative, deception of the enemy does not seem to come naturally to us.⁸⁴⁰

The initial reluctance to engage with deceptive means of warfare was possible also due to camouflage's uneasy fit within military regulations, the so-called articles of war,⁸⁴¹ but warfare had changed, which meant that the modern soldier needed to change too:

To an old soldier, the idea of hiding from your enemy and the use of deception may possibly be repulsive. He may feel it is not brave and not cricket. But that matters very little to our enemies, who are ruthlessly exploiting every means of deception.⁸⁴²

After an initially slow response to the adoption of offensive deception, camouflage experimentation continued and soon its range of possibilities captured the imagination of the camoufleurs. Forbes has explored the employment of deception in human history, suggesting that such schemes often have their parallels in nature. As he explains, 'when the Trojans led the Horse into their city, unsuspecting that it was packed with Greek soldiers, they were at one with the ant, who fooled by deceptive chemical odours, carry caterpillars of some blue butterflies into their nest and feed them in preference of their own larvae'.⁸⁴³ The desert camoufleurs drew on their own skills in art and science, as well as the training that they had received at the CD&TC, and began to explore how - just as in nature, animals sometimes lie about their strength and capabilities (consider again the eyespots on some butterflies) - then so too could and *should* humans in warfare learn to lie by misdirection and displays of false strength. The camoufleurs had assessed the aerial geography of their battlefield, and realised that the desert had obvious advantages for display, and therefore this weakness could be converted into a strength. Barkas was aware that the ability to deceive through the combination of revealing and well-staged display, alongside limited concealment, could have a huge impact on the intention, consequence and use of military camouflage:

⁸⁴⁰ Ibid.

⁸⁴¹ The articles of war are the regulations drawn to govern the military's conduct. Camouflage, as it became more offensive, began to disrupt traditional conventions of conduct due to the sense of deceptive visual warfare being a morally dubious form of warfare. This sentiment is reflected in how camouflage practitioners defended this change in their training literature, such as Wiseman, D.J.C. (1953) op cit. & McIntosh Patrick (n.d) TACTICAL DECEPTION- DG GMA A64/1/16/4/3/1.

⁸⁴² Ibid p.4.

⁸⁴³ Forbes, P. (2009) op cit. p.3.

It was the possibility of an aggressive, ambushing use of camouflage as part of the plan of battle which excited and appealed to me the most.⁸⁴⁴

The camoufleurs recognised that the enemy would have to be tricked by decoys instead, and dummies depicting all elements of military technology and life⁸⁴⁵ became *the* camouflage tool of choice (figure 43). The skill of an effective dummy, it was discovered, lay in making it appear to be the genuine article; therefore, it had to appear lively, yet not too overt and visible from the aerial view. In other words, the enemy still had to think that some effort had been made to camouflage and hide; if the dummy was too starkly visible the enemy would most likely 'smell a rat'. So, when constructing a dummy, it would be sited in the same manner as a real piece of military equipment and with some inadequate concealing camouflage. It was hoped that dummies would tease the enemy aerial observer into believing they were spying on something that the British *hoped* was invisible. In the desert, military life began to be replicated by a cast of phantoms; and, for Barkas, the desert was transformed from landscape to stage set:

Figure 43. Dummy tank



⁸⁴⁴ Barkas, G. (1952) op cit. p.92.

⁸⁴⁵ Hartcup, G. (1979) *Camouflage; A History of Concealment and Deception in War*, p.96.

It would be a film production on a grand scale; a job for men who studied the air view, the behaviour of the fighting army, and the right way to dress the set.⁸⁴⁶

To achieve such ambitious plans required the full spectrum of skills and professions that the camoufleurs represented. A designer, such as Sykes, could understand and undermine perspective and angles from the air view. The scientist, Cott, could bring biological knowledge drawn from expert examples in nature. And the entertainer and magician, Maskelyne, could finesse the particular positioning of props. All combined for the large-scale sleight of hand that was to be attempted. Maskelyne, in his characteristically extravagant style, began to explore the potential scale of dummy use in the desert, and in a letter home he did little to underplay his contribution to desert camouflage:

I handle all ideas and innovations for the Middle East.⁸⁴⁷

This was most definitely a grand and unfounded boast, but Maskelyne did attempt some ambitious deceptive camouflage schemes, such as creating a dummy airfield to screen a real airfield.⁸⁴⁸ After completing this scheme of deception, he spent nights camping nearby the site waiting for bombers to attack. After a bombing run, he would rush out to set up stage pieces representing the effects of bomb damage on a genuine airfield:⁸⁴⁹

When they had gone we examined the wreckage to see whether we could do a quick repair job with the aid of big set-pieces representing genuine bomb-damage that we always kept ready. The Italians would send snoopers overhead in the next twenty-four hours to take photographs, and unless these looked realistic too, they would know they had been diddled.⁸⁵⁰

One elaborate deception scheme was hence for the bomber at night, while the other was for the aerial reconnaissance that would fly past the next day to inspect. Such elaborate deception did not always deceive for long, however, and for Maskelyne discovery came only a week after the first bombing run. One night as he hurried to dress the set after a bombing raid Maskelyne was disconcerted to find that dummy bombs painted with poorly spelt expletives had been dropped on his dummy airfield!⁸⁵¹ His attempt at deception disclosed that camouflage schemes in the desert required meticulous planning, pain-staking execution

⁸⁴⁶ Barkas, G. (1952) op cit. p.96.

⁸⁴⁷ Letter Maskelyne to family friends 10th September 1942 – IWM 3635.

⁸⁴⁸ By what means Maskelyne managed to execute this scheme he gives little information. Apparently he was only given two trucks and their crews, spades, water and the rest he ‘supplied by magic’. Maskelyne, J. (1949) op cit. p.78.

⁸⁴⁹ As well as engineering a fake airfield, Maskelyne also had to engineer fake bomb damage, because no or poor-quality ‘dummy’ airfield bomb damage on a fly-over would reveal to the enemy they had been duped and wasted their bombs on military scrap.

⁸⁵⁰ Ibid.

⁸⁵¹ Ibid.

creative ingenuity, with at times a slapstick quality.⁸⁵² The complexity of deception schemes, as the technology became more offensive, sees camouflage reach almost farcical levels and the 'comedic' is clearly evident, yet deception in war has distinctly *un*funny aims and outcomes.

Maskelyne's scheme was not an exception; such dummy sites began to colonise the desert, and the faked signatures of military life blended with the genuine. Other schemes proved more successful, the most notable being a dummy railhead designed by Sykes. In October 1941, Camouflage Officers had been asked to devise a camouflage scheme for the Desert Railhead at Misheifa that was due to operate from the 19th November, as part of 'Operation Crusader' which was an attempt to relieve the siege of Tobruk.⁸⁵³ This task was delegated to Sykes, who Barkas felt was the right candidate for the job because:

...there was no one more likely than Stephen Sykes (then working in Palestine and Syria) to make a go of this assignment. He was young, keen and a glutton for work.⁸⁵⁴

In assessing the task he had been set, Sykes was quick to acknowledge that concealment of the railhead was out of the question:

Although I had not yet visited the railhead I knew that any idea of hiding it was ridiculous. Finding my voice at last, I said; 'The only thing I can suggest, Sir, is to make a decoy railhead'. He [Brigadier Robertson] was clearly somewhat taken with the idea.⁸⁵⁵

The decoy railhead became known as 'depot 2' and Sykes hoped it would achieve two objectives: first, the on-going work on the dummy railhead would deceive the enemy into thinking that the British were not yet prepared for an attack; second, by making the dummy appear as a tank delivery spur, it would be of tactical interest to enemy intelligence and draw attention away from the real railhead. In good camouflage practice, the first task for Sykes was to fly over the real railway, and also the immediate area where his decoy would be situated, to discover the characteristic features that should be imitated and staged. Sykes realised that the relevant list of characteristics was extensive, revealing the level of effort, foresight and planning that such exercises in camouflage entailed:

Obviously we would have to construct everything we wished them to see - locomotives, box trucks, tank delivery trucks, tanks, dumps, AA defences, installation buildings, track - in fact, all the associated features

⁸⁵² Maskelyne's scheme offers the sense of specialised teams on either side battling one another through elaborate contests of 'cleverness' or 'cunning'. Such camouflage spectacles and the way in which the camoufleurs recall their execution can at times seem almost divorced from the reality of war.

⁸⁵³ Report on Camouflage Policy and Progress in M.E.F. Nov.41-Aug.42 - NA WO 201/2022.

⁸⁵⁴ Barkas, G. (1952) *op cit.* p.136.

⁸⁵⁵ Sykes, S. (1990) *Deceivers Ever; Memoirs of a camouflage officer 1939-1945* p.42.

which a glance at the real railhead (the size of large village) would reveal.⁸⁵⁶

After this initial survey and inventory, Sykes and his team set about building a six-mile dummy extension of track and necessary railway paraphernalia.⁸⁵⁷ In a matter of weeks, the dummy railhead was ready and all that was left for Sykes was to lie in wait to see if the enemy would be fooled by his scheme:

I think that camouflage men must be among the few otherwise sane beings who yearn to be bombed. Sykes and his companions, their camp withdrawn to a discreet but hardly safe distance, spent the next few days and nights gazing up at the sky, cursing all hostile aircraft which passed over and left them unmolested. The thing became an obsession. They thought of nothing but dummies.⁸⁵⁸

These hours of nervous anticipation were not in vain. From the 28th November, the enemy began to bomb the dummy railhead and continued to do so for the next three nights, before it was then machine gunned on several occasions in December. After the 18th December, no other attacks were carried out on the decoy, but neither were there any on the real railhead. It was calculated that in total over a hundred bombs were dropped on the dummy, approximately half of the total load dropped on the whole area.⁸⁵⁹

The size and scale of the dummy railhead exposed the eerie and unnerving aesthetic aspects of deceptive camouflage. Trevelyan recalled coming upon the railhead as he journeyed across the desert one evening at dusk. More used to seeing burnt-out, abandoned trucks and aircraft on the desert planes, he depicted his ghostly encounter with the railhead in his diary:

The dummy railhead looks very spectacular in the evening light. No living man is here. But dummy men are grubbing in dummy swill-tanks, and dummy lorries are uploading tanks, while a dummy engine puffs dummy smoke in the eyes of a possible enemy.⁸⁶⁰

The official military assessment of Sykes' camouflage scheme was that it had been successful in attracting enemy attacks away from the genuine operating railhead:

But for depot 2 it would have probably all have been dropped on Desert Railhead Misheifa.⁸⁶¹

⁸⁵⁶ Ibid p.43.

⁸⁵⁷ Barkas, G. (1952) op cit. p.144.

⁸⁵⁸ Ibid p.146.

⁸⁵⁹ Report on Camouflage Policy and Progress in M.E.F. Nov.41-Aug.42, op cit.

⁸⁶⁰ Ibid p.14. This description of encountering the dummy railhead also appears in Trevelyan's 1947 memoir *Indigo Days*.

⁸⁶¹ Report on Camouflage Policy and Progress in M.E.F. Nov.41-Aug.42 op cit.

This evaluation appeared to be confirmed by a captured German map where ‘depot 2’ had indeed been interpreted by enemy aerial reconnaissance as being the real terminus of the Desert Railway.⁸⁶²

For the desert camoufleurs, the foray into deception through the use of decoys, dummies, misdirection and displays of false strength had injected vigour into camouflage invention. That said, the British were not alone in realising the potential in the desert for deceptive and decoy camouflage schemes, as military intelligence revealed:

CAMOUFLAGE INTELLIGENCE REPORT NO.9

DEC 1942

Extracts from INTELLIGENCE Summaries and other sources.

Issued by D. (Camouflage) G.H.Q M.E.F.

DUMMIES

ENEMY METHODS

It has been observed that, during his retreat from ALAMEIN, the enemy has often erected dummy guns in commanding positions before vacating these sites. They have obviously been placed in hope of impeding our advance to some degree. All these guns have been made of scrap material picked up on and around the battlefield, but despite this many of them have proved to be convincing devices, which deceived from comparatively short distances. Barrels have been made usually of telegraph poles cut from the road, though tent poles have been used in some instances. Shields have been made of any scrap material, though usually they have been found to be made of fabric, supported by sticks, and giving a “badly-camouflaged” outline.⁸⁶³

The above intelligence report on German camouflage, and reconsidering Sykes’ dummy railhead, it is evident that camoufleurs, disconnected from a steady and reliable flow of supplies,⁸⁶⁴ necessarily became highly inventive in their use of scrap, when redesigning the desertscape to lie. In the British military, the desert camoufleurs attempted to solve this supply problem by exploiting the materials to which they had ready access:

We therefore knew that we must ransack the countries of the Middle East before asking for anything to be sent from Britain.⁸⁶⁵

Therefore, the camoufleurs began to forage for scrap material which could be crafted into dummy features. For example, in Sykes’ scheme, dummy rails were made from old 4-gallon petrol cans.⁸⁶⁶ Improvisation, salvaging, bartering and creativity became skills vital to desert camouflage, as the military acknowledged:

⁸⁶² Ibid.

⁸⁶³ Camouflage Intelligence Report No.9 December 1942 – IWM 86/50/3/6.

⁸⁶⁴ Cruikshank, C. (1979) *Deception in World War II* p.21.

⁸⁶⁵ Barkas, G. (1952) op cit. 97.

⁸⁶⁶ Report on Camouflage Policy and Progress in M.E.F. Nov.41-Aug.42 op cit.

Improvised devices were made up in the field from such immediately available material as stakes, pickets, wire, sand-bags, hessian, old tarpaulin, salvage of all sorts, or any locally available material ... During operations in the Western Desert in 1941-1942, large numbers of dummy 25-pr. Guns were built from wood, canvas (for the gun shield), cardboard ammunition containers (for the barrel) and spare or unserviceable tyres for the wheels.⁸⁶⁷

Since camouflage practised on this scale and for deceptive purpose had not been foreseen, the camoufleurs found they were not fully equipped to implement such large and intricate designs as Sykes' railhead and Maskelyne's airfield. The recycling of military scrap and locally sourced materials was hence to become emblematic of desert camouflage. Desert camouflage's reclaimed nature not only reflected its material construction, but also its biography as a reclaimed skill. In the desert, camouflage was materially and historically emerging as a reclaimed craft; the science and art of military camouflage in the desert began to be influenced, shaped and transformed, visually and tactically, through its incursion into the dust and heat of the Middle East.

New forms of deceptive camouflage were beginning to be produced, distant both from camouflage's original military intention of concealment and from the training grounds of Farnham. In particular, Sykes' success drew attention from across the military, in the Middle East Forces (M.E.F) and at home, to the potential use of camouflage as a strategic and tactical technology. The dummy desert railway awoke the military to the potential offensive use of deceiving camouflage, the benefits of including it in the forming of battle plans and more broadly, the new science of camouflage. Camouflage in the desert as a hybrid knowledge and practice, and cyborg technology, revealed that knowledge - scientific, military, artistic or an enmeshing of multiple knowledges - was dynamic and transformative, 'shaped by the local environments in which its practitioners carry out their tasks'.⁸⁶⁸ Hence, as military camouflage in the desert became a hybrid, shaped and transformed by the aesthetics and environmental demands of place, the knowledges and skills of its diverse camoufleurs were called into action. Taussig has considered such connections between art, science and violence, and explores how best to conceive of this strange negotiation of knowledge production.⁸⁶⁹ 'One of the strangest things about war whether ancient or postmodern' he observes 'is that as a pumped-out, puffed-up "science", it reeks of craft and witchcraft'.⁸⁷⁰ Taussig suggests that research does not often linger on the interaction of art with the military, as it does science, because there is a sense of something 'creepy' about the use of art in warfare, as a weapon to kill. Yet, some

⁸⁶⁷ Wiseman, D.J.C. (1953) op cit. p.98.

⁸⁶⁸ Naylor, S. (2005) op cit.p.2.

⁸⁶⁹ Taussig, M. (2008) *Zoology, Magic, and Surrealism in the War on Terror*, *Critical Inquiry* 34 pp.99-116.

⁸⁷⁰ *Ibid* p.115.

practices in war, such as torture, can work to transform acts of seemingly meaningless violence into art, spectacle and display, in which regard consider the photographs that were released in 2004 of the abuse of prisoners in Abu Ghraib.⁸⁷¹ The practitioner who operates in this role which meshes art, science and violence during war, Taussig explains, is ‘an artistic fellow who works on the aesthetic level of war where child’s play and horror form a unit’.⁸⁷² He draws on the example of camouflage, and in particular the method of “dazzle”,⁸⁷³ to reveal this mix of play and horror naming this practice the ‘sacred-aesthetic-playful’.⁸⁷⁴ Since all methods of camouflage, like dazzle, engage with adaptive colour, form and pattern perception to trick the eye and mind, the learned camouflage practitioner must employ these aesthetics to transform the violence and horror of war into an effective art. The desert produced the opportunity for camouflage to combine inventive art with meticulous science as it became part of deception, but also thereby a far from innocent actor in the history of conflict and violence.

BLENDING CAMOUFLAGE INTO DESERT DECEPTION

With the development in the Middle East from 1941 onwards of visual deception involving the display of dummy formations, installations, and mock activities, combined with the concealment of real deployments by various methods of hiding and disguise, the responsibility for “camouflage” planning for the purpose of deceptions rested with the operations staffs. Thenceforward, the camouflage staff organisation was situated in the General Staff at higher formations, at first closely linked with, and ultimately as part of the deception planning staffs.⁸⁷⁵

After Italy’s declaration of war in 1940, General Wavell, Commander in Chief, Middle East, began a dangerous game of bluff in the desert. His aim was to persuade the Italians that the British forces were stronger and better equipped than they actually were. Wavell ensured that he drew on those servicemen who had a grounded understanding of the battlefield terrain; one such was Major Ralph Bagnold.⁸⁷⁶ Bagnold had previously been posted to Egypt by the British military during the interwar period, and the desert immediately captured his imagination through its ‘strange aura induced by the physical presence of the remote past and

⁸⁷¹ The ethics of the of seeing and the framing of images of torture at Abu Ghraib has been discussed by Butler in Butler, J. (2007) *Torture and the Ethics of Photography*, *Environment and Planning D*, 25(6) pp.951-966.

⁸⁷² Ibid p.104.

⁸⁷³ Dazzle’ is a technique drawn from animals such as giraffes and zebras, and their adaptive colorations and patterns which distract the eye, so whole objects appear broken, and the boundaries between object and background become disrupted.

⁸⁷⁴ Taussig, M. (2008) op cit. p.112.

⁸⁷⁵ Wiseman, D. (1953) op cit. p.3.

⁸⁷⁶ Rankin, N. (2008) op cit. p.447.

also great, bare, trackless expanses'.⁸⁷⁷ It was while in North Africa in 1926 that Bagnold carried out his initial field work on the desert and sand dunes.⁸⁷⁸ This research instigated a long-term and detailed study into the physical structure of sands, and the relationship between dune surface flow and strong winds, which he published as *Physics of Wind Blown Sand and Desert Dunes* in 1941. This text was the most comprehensive study of the characteristics of the desert terrain,⁸⁷⁹ and it remains 'a masterpiece of scientific enquiry and analysis'.⁸⁸⁰ It also drew Wavell's attention to Bagnold, whom he felt was perfectly placed to be recruited on to a 'small, specially equipped force having an almost unheard-of range of self-contained action'.⁸⁸¹ This force became the infamous Long Range Desert Group (LRDG) who caused 'logistical havoc behind enemy lines' by operating in the interior of Libya. Their method of operation was to read the desert for signs of enemy offensive action, and to raid enemy camps.⁸⁸² By acquiring Bagnold's knowledge of the area, Wavell began to calculate what other skills were required for desert warfare. Lieutenant Colonel Dudley Clarke was duly picked by Wavell in order to organise and direct deception in the desert. Clarke seemed a 'conventional enough colonel', not eccentric, but importantly he was 'original' and 'quietly calculating'.⁸⁸³ Clarke had previous experience of war, having served in the Royal Flying Corps in WWI, and from 1937 he had served under Wavell in Palestine. Wavell was impressed by Clarke, who had thrived well under Wavell's command to employ guerrilla tactics in order to quell anti-imperial struggles.⁸⁸⁴ Clarke immediately set about putting together a secret team, known as 'A' Force, which:

...was a small "hush-hush" force operating under the operational and deception staffs and there was no link, to begin with, between this and "camouflage". Gradually camouflage was drawn in.⁸⁸⁵

This small mobile force began to explore the multiple and varied methods that could be employed and combined to create effective deception in the desert.⁸⁸⁶ To Clarke's mind, this was a grand system of psychological war. Deception in WWII was hence:

A war of wits - of fantasy and imagination - fought out on an almost private basis between the supreme heads of Hitler's Intelligence (and

⁸⁷⁷ Bagnold, R. (1990) *Sand, Wind and War: Memoirs of a Desert Explorer* p.51.

⁸⁷⁸ Goudie, A. (2004) Bagnold, Ralph Alger, *The Oxford Dictionary of National Biography*.

⁸⁷⁹ Bagnold, R. (1941) *Physics of Wind Blown Sand and Desert Dunes*.

⁸⁸⁰ Welland, M. (2009) op cit. p.149

⁸⁸¹ Bagnold, R. (1990) op cit. p.123.

⁸⁸² Ibid p.124.

⁸⁸³ Rankin, N. (2008) op cit. p.255.

⁸⁸⁴ Ibid pp.258-267.

⁸⁸⁵ Wiseman, D.J.C. (1953) op cit. p.39.

⁸⁸⁶ Ibid p.150 & Rankin, N. (2009) op cit. p.449-453.

Mussolini's) and a small band of men and women - British, American and French.⁸⁸⁷

Camouflage was one element which eventually contributed to this overall plan of deception and it was understood that such visual warfare, as offensive camouflage, could work alongside other forms of sensory deception. One such other form of deception, which proved most useful, was the use of bogus wireless transmissions:

There is no doubt that the use of wireless can be of major importance in conveying a required picture to the enemy intelligence service. Although on occasion, wireless may be sufficient in itself to create the desired impression, its true role is that of a background.⁸⁸⁸

Bogus wireless transmission was used, as well as wireless silences, to confuse the enemy as to the British military's intentions, and to create 'cover' by more than material and physical means. Radio silences often denoted the calm before the storm of an attack, and therefore silences could be employed to toy with enemy intelligence and to divert attention to areas where, in fact, very little activity was taking place. Thus:

Intermittent periods of wireless silence and activity can be arranged to provide cover for troop movements. In operations a silence may also be used for deception by carefully co-ordinated "errors".⁸⁸⁹

Just as the camoufleurs began to experiment with different technologies and methods of deceptive visual warfare, so too were the potentials of aural and sonic methods of deception tried and tested. Sonic deception was arguably the background to deceptive camouflage's foreground:

Sound deception can be used most effectively to confirm, in the mind of the enemy commander, the information which he has already received as a result of visual deception.⁸⁹⁰

Sonic deception included the use of battle noise simulators which would represent rifle, machine gun and mortar fire, and also grenade sound effects.⁸⁹¹ Used alongside visual camouflage in battle the military hoped that sonic deception could be used to create an elaborate stage set, from which the enemy would believe that they were wandering into the grounds of a stronger and mightier adversary. It would be a majestic trick of the senses, a psychological attack on the eyes and ears. Indeed:

⁸⁸⁷ Rankin, N. (2009) op cit. p.454. The quote from Clarke's 1953 proposal for a book, *The Secret War*, which he was not granted official permission to write or publish.

⁸⁸⁸ Memorandum on Some Aspects of Wireless Deception – NA WO 32/17802/2.

⁸⁸⁹ Letter from Sgd T J Fielding to Lt Commander H. Davenport – NA WO 32/1/17802/3.

⁸⁹⁰ Sonic Warfare and General Deception, 21 April 1942 – July 1945 – NA WO193/227.

⁸⁹¹ Wiseman, D.(1953) op cit. p.110.

Visual and sonic are natural partners. Sonic is essentially a short term, short range form of deception which may often have to be used side by side with Camouflage, and would frequently come as a last minute embellishment of camouflage schemes which had been in progress for days or weeks previously.⁸⁹²

Camouflage in WWII was hence one element of deception; however, it was distinct due to its visuality, which was vital in creating a believable picture of activity for the enemy:

They [the camoufleurs] served the needs of and became handmaidens of the deception planners with whom they were brought into close correspondence.⁸⁹³

From Clarke's plans, it is clear that the British military had grand ambitions for deception in the Desert War. To what extent the camoufleurs knew about the use of other deceptive schemes operating around and alongside them is unclear, since camouflage never officially became part of formal large-scale deception plans, as this military assessment of camouflage in the desert suggests:

Deception and camouflage organisations developed unilaterally, and later tended to merge - although not to the extent that camouflage staff officers were taken into full confidence over deception plans as a whole.⁸⁹⁴

Nonetheless, as the intent of camouflage in the desert shifted from concealing to predominately deception, the camoufleurs realised that they would need to train soldiers in the new uses and designs of military camouflage technology.

DESERT CAMOUFLAGE TRAINING

The military desired to transform the desert into a lying landscape and this required that soldiers had a close understanding of and relationship with their battlefield environment. However, the task of developing new camouflage training in the Middle East specifically focusing on the desert characteristics was not easy. The camoufleurs bemoaned that the attitude and perception with which they were met from military personnel was of camouflage as an affair solely for specialists, performed through ingenious tricks by which conspicuous objects could be made to disappear by magic. But camouflage was no act of magic, it was a fieldcraft developed through a keen awareness of backgrounds and visual perception, designed

⁸⁹² Camouflage Lessons of 1939-45 (A paper for the information of those responsible for high level decisions on post-war policy, organisation and doctrine). Buff folder containing memos and letters about Barkas drafting this paper. Writings under Chapter 2, 'Basic Operational Doctrine - NA WO 32/11512.

⁸⁹³ Wiseman, D.(1953) op cit. p.4.

⁸⁹⁴ Ibid p.165.

in relation to the soldiers' material lives, the desert surface and the aerial view. Therefore, a new integrated approach to camouflage training in the battlefield was developed in the desert to instil into the troops of the Eighth Army the vital undertaking of concealing and deceiving the enemy. The main four functions of the camouflage branch in the Middle East were duly defined as:

Technical advice, planning and supervision of every kind of practical camouflage scheme
Technical advice, research and co-ordination of camouflage material supply and distribution.
Design, development and co-ordination of manufacture of "special" devices and equipment.
Training.⁸⁹⁵

Training became essential as soldiers sent to the desert were unprepared to conceal and protect themselves in this terrain. To fulfil the objective of training several means of camouflage instruction were developed in the Middle East. These included the publication of training pamphlets, information sheets and instruction photographs which were distributed to all Camouflage Training Units, and wider if possible.⁸⁹⁶ Camouflage training publications covered a broad range of camouflage techniques and technologies, including instructions on how to construct improvised tanks, concealment nets, dummy aircraft and decoy fires⁸⁹⁷ (see How-to-Guide no.2 p.249). Camouflage Training Units were also authorised on a scale of one per Command and, when possible, these units would enrol soldiers on camouflage training courses.⁸⁹⁸ However, the main vehicles for training in the desert were the Middle East Camouflage School and the Mobile Lecture Unit.

The Middle East Camouflage School opened in December 1941 at Helwan, roughly twenty miles from the British military's M.E.F. HQ in Cairo. The military boasted that the school was well equipped with accommodation, equipment and training facilities:

It includes a Demonstration and Development Ground some 2,500 yards by 1,500 yards with examples of almost every kind of field camouflage characteristic of forward areas.⁸⁹⁹

However, Barkas' recollection of the school was not quite as favourable:

It sprawled untidily and with that horrid air of impermanence over a whale-back ridge in a system of sandhills.⁹⁰⁰

⁸⁹⁵ Camouflage General 10; Operational Camouflage October 1942 – IWM 90/2334 p.2.

⁸⁹⁶ Report on camouflage policy and progress in M.E.F, Nov.41-Aug.42 op cit.

⁸⁹⁷ Middle East Force Headquarter 1942, Camouflage Information Sheets No.1-33, op cit.

⁸⁹⁸ Report on camouflage policy and progress in M.E.F, Nov.41-Aug.42 op cit.

⁸⁹⁹ Ibid.

⁹⁰⁰ Barkas, G. (1952) op cit. p.153.

It seems that the school's appearance mirrored its teaching in the scrappy art of camouflage. Yet, despite its underwhelming appearance, the school effectively ran three different camouflage courses aimed at different ranking military personnel with varying levels of involvement in the planning, execution and maintenance of camouflage schemes.⁹⁰¹ Cott was established as the Chief Instructor at the Camouflage School, and Barkas explains why his expertise made him especially suited for the post:

Captain H. B. Cott, the well-known naturalist and author of a standard work on the protective patterning and behaviour of animals, birds and insects was our Chief Instructor. His distinguished University experience coupled with several months of practical work with a Corps in the Western Desert made this appointment peculiarly his.⁹⁰²

At the M.E.F Camouflage School, the demonstration grounds were used for testing and photographing concealment schemes, dummy prototypes and methods of display that the camoufleurs used.



Figure 44. Practising camouflage

The courses were typically nine days long and were taught through a mixture of lectures, demonstrations and assessed practicals. A typical day at the M.E.F. Camouflage School

⁹⁰¹ Report on camouflage policy and progress in M.E.F, Nov.41-Aug.42 op cit.

⁹⁰² Ibid.

How-to-Guide no.2:

"HOW-TO-GUIDE" FOR IMPROVISED DUMMY TANK BUILDING

General

Rough and ready "Tanks" for dummy schemes where factory-made "Tanks" are NOT available but where split-cane beds, hurdles, pliable rods, etc. ARE available. These have been successfully made and used in quantity in the Western Desert.

Materials

Split cane Hurdles	Type A	No.18
	Type B	No.9
Split Cane Beds		No. 8
Hessian		Sq.Yds.150
Round 3/8" or any pliable rod for bending into hoops		Ft. Run 45
String or Twine		Lbs. 2
Wire Binding		Ft. Run250
Chicken Wire		Ft. Run 37
4-gal. Petrol Cans		No.2
Cardboard Cartons (Petrol)		No.2

Construction

SIDES make two panels out of hurdles, overlapped and lashed. Set them up vertical and parallel, 6'6" apart, reinforce with two "A" type hurdles. BODY use "A" type hurdles make characteristic sloping or vertical plans of the Matilda Body and Deck.

TURRET use "B" type hurdles cut to make a rectangle and make a deck of two "A" type hurdles for turret to stand. For larger tapered turret shape two hoops of M.S. rod base 4' 10" diam, top 4' 0" diam. Height 2'6", use cross-bracing as required so to keep shape. Smaller turret 2'0" diam 6" height.

GUNS, roll chicken wire into tubes of 4" and 1" diameter, gun-housing made of petrol cans and wired to turret.

COVERING double thickness of hessian cut to shape and stitched to all component units of "Tank". Only the ends, outer side of the tracks and top portion of main body not masked by the sides, will be covered.

ASSEMBLY put turrets and gun in place and wire to deck of turret platform. Put track and bogies units in place and wire to sides. Join edges of turret platform to edges of track and bogie unit with strips of hessian cut to shape, and secure.

Portability

Two men can carry any single component of the "Tank". Eight men can easily manhandle the assembled "Tank" over limited distances.

started at 08.30 hours and finished at 17.10, except on Saturdays, when the trainees were given a half day off. Lectures covered a range of topics including the basics of camouflage training such as colour resemblance, siting and disruption, and more specific training on photographic interpretation and the erection of dummies. The demonstrations focused on the practicalities of executing camouflage (figure 44), specifically giving instruction on different camouflage materials and devices.⁹⁰³ Cott led the course and took many of the lectures, such as 'Painting of M.T. and A.F.V.s'⁹⁰⁴ and 'Aerodrome and Aircraft', although predominantly he led the sections which examined biological camouflage and its transferable application to military knowledge. Therefore, Cott also taught 'Colour Resemblance' and 'Disruption and Disguise in Nature and in War'. At times, he was given leave from teaching to go on detachment for special duty to aid in camouflage designs and technologies in forward positions.⁹⁰⁵ One student of the MEF camouflage course, Bob Thwaites, recalled his initial impression of Cott:

Our first acquaintance with our instructor was not encouraging. We had been told he was one of Britain's most eminent naturalists and appeared to have been dragged protesting from a twitcher's hide, bundled into a captain's uniform made by a blind tailor and posted to Maadi.⁹⁰⁶

Although on preliminary encounter Cott may have seemed an underwhelming tutor, he soon impressed upon his students the need to understand biological camouflage before effectively applying military camouflage. This passion for biological camouflage led him to become a well-known and distinct character amongst the desert camoufleurs. *The Fortnightly Fleur*, a magazine distributed across the desert with the hope of maintaining cohesion, identity and belonging amongst the motley crew of camoufleurs,⁹⁰⁷ reveals how Cott's dedication to biological camouflage placed him as a figure of affectionate fun amongst the other camoufleurs (figure 45).

DUMB ANIMALS

You will observe below these words
A curious group of beasts and birds,
To wit (to-whoo) the Stinking Owl,
The Goonah, the three Guinea Fowl,
The lesser Throstled Snot.

Their sense of Camouflage is small:
The wonder is they live at all.

Observe the owl. It plumage see,
Grows lighter UPWARDS gradually,
Thus emphasising, undismayed,

⁹⁰³ Middle East Camouflage School War Diary – NA WO 8/7110.

⁹⁰⁴ M.T. means Motor Transport and A.F.V. means Armoured Fighting Vehicle.

⁹⁰⁵ Middle East Camouflage School War Diary op cit.

⁹⁰⁶ The papers of Sergeant Bob Thwaites – IWM 5/46/1.

⁹⁰⁷ Sykes, S.(1990) op cit.

TELL-TALE effects of light and shade.
A pity is it not?

The Fowl's as bad: a mimic true
He'll mimic me or even you
Or Captain Cott - or anyone
Not for protection but for FUN!
Which I think it is not

The Little Goonah in your room
(Or anywhere) will fast assume
Whatever hue opposes most
The place where he takes up his post
Or make a sporting shot.

Nor amongst the shadowed stems to hide
Are Snots with stripes and spots supplied
In Spotless Stripeless lands they dwell
And think that Stripes and Spots look well,
An emptyheaded lot.

These creatures group with that strange brute
The Contra-countershaded Newt.
Their origin is in dispute
Some people think they constitute
Nature's reply to Cott.⁹⁰⁸

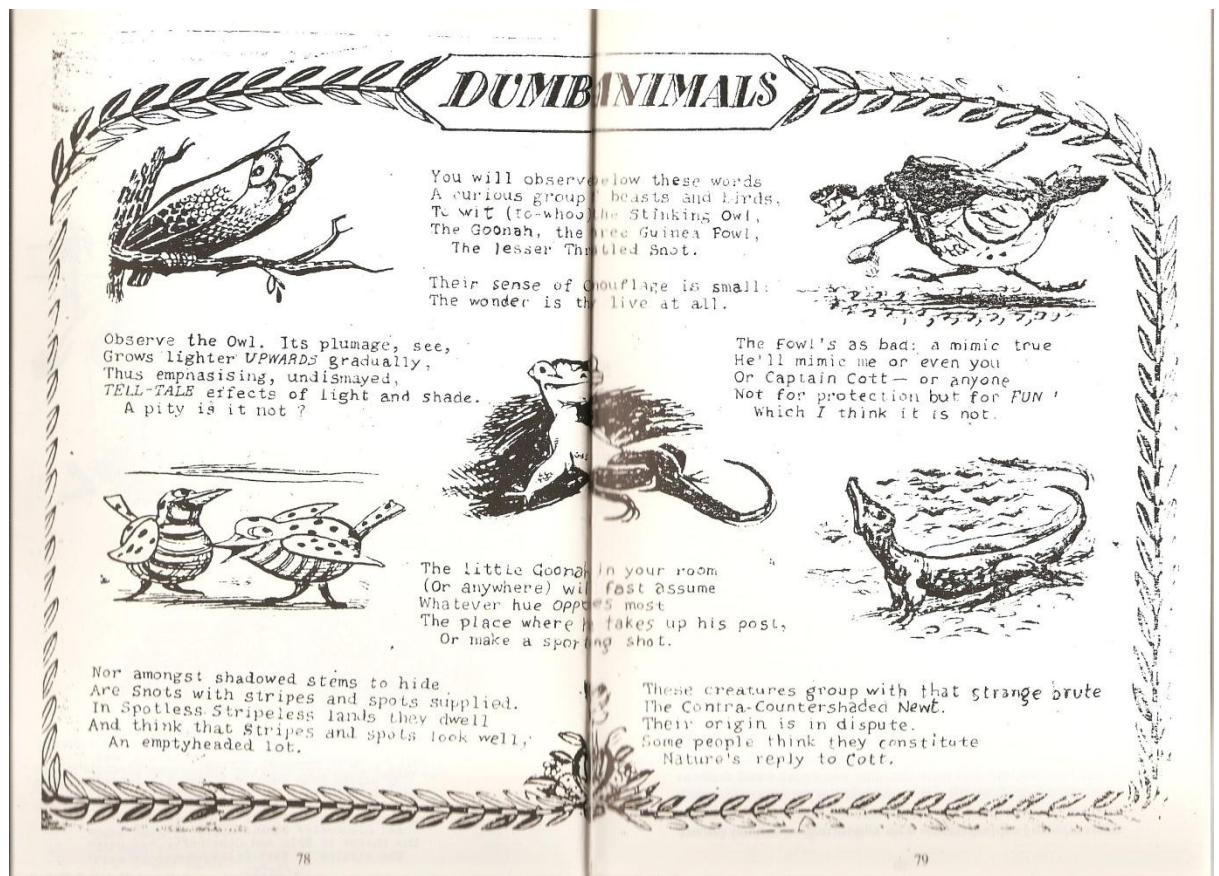


Figure 45. The Fortnightly Fleur

⁹⁰⁸ Edition of the *Fortnightly Fleur*, n.d. cited Sykes, S. (1990) op cit. pp.78-79.

The gently comedic mixture of illustration and poetry was typical of the character and style of *The Fortnightly Fleur*. This particular issue disclosed that Cott seems to have figured as a curious character to many of the soldiers who passed through the Helwan camouflage school; it gently pokes fun, while speaking of admiration for the man and his knowledge.

Cott's fervour for biological camouflage led him to continue his zoological studies whilst in the desert.

The remarkable resemblance borne by most desert animals to the colour of their surroundings is a well-known fact. Uniform or lightly variegated tints of ochre, buff, cinnamon or sandy-grey are characteristic of such creatures. This type of coloration prevails in all groups of animals which inhabit the desert; and is widely spread over the world in any desert of the five continents.⁹⁰⁹

Trevelyan recalled visiting Cott at the desert Camouflage School, observing his dedication to zoological fieldwork whilst fulfilling military duties:

He seems rather lost in this wilderness of sand and little Army huts. In some of them you find petrol cans which you would expect were there as waste-paper baskets, but when you look inside you find snakes, beetles and lizards, kept there by Cott.⁹¹⁰

Despite this seemingly peculiar dedication to the biological, Cott did ensure that camouflage trainees became accustomed to desert camouflage, and he stressed the importance of creativity and ingenuity when designing and employing camouflage schemes and technologies. One of Cott's practical demonstrations was to escort a group of soldiers to the military refuse dump to show them how to transform scrap into useful camouflage materials.⁹¹¹ The camouflage course appears to have emphasised that camouflage was not simply a case of applying Camcolour onto a piece of artillery, or erecting a net or dummy and then relaxing, assuming invisibility in the eyes of the enemy. Rather, camouflage was indeed a serious fieldcraft:

By the time the course ended we were a bemused group of men. Some who thought they'd scrounged themselves a cushy break from active service, now looked at the world with different eyes and a new mentality through observing and making instant decisions; using, perhaps for the first time, a form of lateral thinking.⁹¹²

⁹⁰⁹ Cott, H. (1946) The Edibility of birds; Illustrated by Five Years' Experiments and Observation (1941-1946) on the Food Preferences of the Hornet, Cat and Man, and Considered with Special Reference to the Theories of Adaptive Coloration, *Proceedings of the Zoological Society*, 166, p.498.

⁹¹⁰ Trevelyan, J. (1957) op cit. p.154.

⁹¹¹ Forbes, P. (2009) op cit. p.157.

⁹¹² The papers of Sergeant Bob Thwaites op cit.

Camouflage instruction in the desert was a combination of military, scientific and artistic study, cut through with a theatrical design, to serve in the innovation of the most guileful of technologies.

While Cott was stationed at the Camouflage School, fellow Camouflage Officer Maskelyne (figure 46) was working on the Mobile Lecture Unit, or ‘travelling circus’⁹¹³ as fondly it came to be known. The unit visited different Commands, giving a series of lectures accompanied by illustrative lantern slides and models. Another element of the ‘travelling circus’ was to conduct field demonstrations to Commands and Formations for units at rest, which had not been accessible to the M.E.F. Camouflage School.⁹¹⁴ The military deemed the Mobile Lecture Unit as the most valuable of training methods, since its peripatetic nature led it to reach many thousands of troops.⁹¹⁵ Maskelyne recalled that, amongst the teaching aids showing the highly effective concealing and deceiving features of birds and fish against their natural surroundings, as well as other displays which demonstrated camouflage in battle, one particular model which proved to be particularly popular with the troops showed:

A lace-curtained window behind which a negress was doing the hair of a Victorian girl in white petticoats. The model was to demonstrate a fact that troops easily forget that any light-coloured objects show through a camouflage net unless it is darkened. In the model, the negress in her back dress is almost invisible behind the white, but the white woman in her white clothing is easily seen.⁹¹⁶



Figure 38. Jasper Maskelyne

Maskelyne presumed that this specific model’s success was due to it showing an alluring scene which was distant from the experiences of battle and war; in which respect, at times the entertaining and light-hearted nature of desert camouflage arguably provided some welcome relief.

By considering the Camouflage School and ‘travelling circus’, it appears that camouflage training and development was as inventive and creative in the Middle East as it had been in Farnham. The pioneer CD&TC Camouflage

⁹¹³ Report on camouflage policy and progress in M.E.F, Nov.41-Aug.42 op cit.

⁹¹⁴ Ibid.

⁹¹⁵ Ibid & Wiseman, D.(1953) op cit. p.148.

⁹¹⁶ Maskelyne, J. (1949) op cit. p.118.

Officers in the desert were transferring the skills and camouflage training that they had received at Farnham, incorporating them into the specifics demanded by the desert terrain. The structure of desert camouflage training, the development of new camouflage technologies, and the incorporating of camouflage as visual warfare into wider tactics of deception: all of this began to gain the notice of the military authorities in Britain. The innovative camouflage developments taking place in the distant environment of the desert demanded inspection, so the CD&TC at Farnham decided to send one of its camouflage instructors, Trevelyan, to the desert to investigate.

CAMOUFLAGE SNOOPING

In 1942, the Surrealist artist and camoufleur Julian Trevelyan passed through Glasgow streets of 'sordid tenements',⁹¹⁷ boarded an overcrowded ship soon to disembark for North Africa. Trevelyan's mission was one borne of intrigue and rumour: new methods of camouflage were being developed in the desert battlefields, methods that deceived by sleight of hand, rather than solely concealed. He was hence sent by the CD&TC to conduct some 'camouflage snooping'.⁹¹⁸ Trevelyan's war diary records the journey, and also his personal experiences of camouflage re-design and re-deployment:

Reports from the war in the desert were coming in. There on the flat featureless background, concealment from the air was almost a impossibility. Vast armies of men and machines with their attendant litter, tracks, dust and shadows could not be hid; protection from air attack through dispersals became the rule, and apart from certain elementary measures of concealment, camouflage concentrated its attention on its other and more offensive purpose, sometimes known as Deception.⁹¹⁹

Trevelyan felt fortunate to be entrusted with this task,⁹²⁰ but he did find the journey to Egypt long and arduous:

My cabin is more than usually nasty, no water, and the distant smell of lavatories. My three companions and myself if we all undress together fill the room with pink flesh so that one cannot breathe ... At first anyone that will talk is a friend in the hostile world ... The ship's complement is 3000, and 4,800 about are crowded aboard. We get the impression that nobody quite knows how many there are. (In fact they don't. Later in the voyage an aircraftsman was washed overboard probably

⁹¹⁷ Trevelyan, J. (1942) op cit. p.1.

⁹¹⁸ Ibid.

⁹¹⁹ Trevelyan, J. (1944) Camouflage, *Architectural Review* op cit.

⁹²⁰ Interview with Trevelyan op cit..

during the storm. It was a week before anyone noticed that he was missing).⁹²¹

On arrival in Egypt, Trevelyan spent the next four weeks being driven across the desert to witness the full array of 'surreal' mirages and strange hoaxes that the British military had to offer; including Sykes' dummy railhead, amongst many other camouflage schemes, such as an unconvincing dummy brigade.⁹²²

We go forward to some tanks dressed up as lorries, and to some old lorries dressed up as tanks.⁹²³

Trevelyan paid a visit to fellow pioneer Farnham trainee, Cott, at the Camouflage School where he was disappointed to note, apart from Cott and another camoufleur from Farnham, the unfriendliness of the barrack-room, with an atmosphere that felt to Trevelyan almost 'prodigious'.⁹²⁴ Overall, Trevelyan enjoyed his month 'snooping' on camouflage in the desert and, on his return to the CD&TC at Farnham, he was welcomed as:

something of a hero. I spent many hours telling the camouflage staff about what I had seen.⁹²⁵

Trevelyan's information was then put into practice in the grounds and workshops of Farnham, and the school's lectures and training information were accordingly updated. It was by now widely known in the British military that, in the desert (figure 47):

...gigantic hoaxes, for they were nothing more, are occupying today the best brains of Camouflage.⁹²⁶

At Farnham, they particularly began to assess desert camouflage technologies to see whether their offensive potentials could be transferred to different environments. At the CD&TC, they were aware that desert camouflage had captured the imaginations of those remote from the whipping sprays of sand and the hot dry air. The deceiving camouflage founded in the desert would indeed subsequently encroach on warfare throughout the different theatres, altering the physical and imaginative geography of battlefields. Therefore, it was necessary to learn as much as possible about the effective use and production of dummies and decoys. McIntosh Patrick, an instructor at Farnham, was quick to realise that dummies, like previous fashionable camouflage technologies such as garnished nets and pillboxes,⁹²⁷ could be misused

⁹²¹ Trevelyan, J. (1942) op cit. p.1.

⁹²² Ibid p.14.

⁹²³ Ibid.

⁹²⁴ Ibid p.12.

⁹²⁵ Trevelyan, J. (1957) op cit. p.177.

⁹²⁶ Trevelyan, J. (1944) op cit.

⁹²⁷ Ms notes and course, *Tactical Deception* op cit.

if their purpose and technique of design and siting were not carefully followed. He warned his trainees:

Dummies" bid fair to oust all rivals as the popular concept and Farnham, recognise that another 'talismán', has found it necessary to restate the Aims and Methods of Operational Camouflage.

Indiscriminate sticking up of dummies is just as futile as painting blobs on buildings and wrapping a net around a vehicle to cause it to vanish.⁹²⁸

Despite its potentials to be misused, the particularities of offensive camouflage did prove to be most useful in the desert and beyond; and so arguably war opened a rather darker chapter in the historical biography of camouflage.

CAMOUFLAGE BECOMES THE DESERT TRICKSTER

During November 1941, and the mounting and execution of 'Operation Crusader', camouflage was successfully employed for three different ends; protective, tactical and offensive.⁹²⁹ Sykes' dummy railhead was an example of tactical camouflage in this operation. Tactical camouflage was demonstrated at Bardia with a feigned attack, which was staged by the use of dummy tanks in a display of false strength. The use of offensive camouflage was employed to create the impression before the advance that an Armoured Division was moving into a forward area, whilst masking the possibility that an attack was imminent. The latter required great planning and execution, and the scheme took 150 men under camouflage supervision for eight hours to give the impression of a fully functioning and inhabited camp. It required, amongst other dummy equipment, 126 tents, 72 latrines, 63 cookhouses and 288 vehicles, with a continual maintenance party to suggest plausible signs of life, such as lighting fires, airing blankets, changing the position of (dummy) vehicles and the creating of tracks.⁹³⁰ This use of offensive camouflage was not to suggest the false movement of real troops, nor to create the impression of the movement of false troops, but instead was the stage management and supervision of everything that the military intended the enemy to observe. Not only did camouflage hide and deceive, it also began to lure the enemy into taking note of the British

⁹²⁸ Ibid.

⁹²⁹ Report on Operation Camouflage in the Western Desert, Aug-Dec 42 – NA WO 201/2024 Serial No. 38416/CAM.

⁹³⁰ Ibid.

military, but in a fashion such that the wrong conclusions would be drawn, and so the enemy would become vulnerable to attack from unexpected directions.⁹³¹



Figure 47. Dummy tank

From these efforts in ‘Operation Crusader’, camouflage began to take on the spirit of the trickster in the desert. Throughout WWII, camouflage had found it hard to cast aside its character as a surreal military convention, inherited from WWI. To the public it was seen as an intriguing and comic technology and its slapstick qualities seemed to jar with the serious nature of the military and war.⁹³² This echoes Radin’s on reactions to the character of the trickster in American Indian mythology: ‘it is difficult to say whether the audience is laughing at him, at the tricks he plays on others or at the implications his behaviour and activities have for them’.⁹³³ The nervous laughter provoked by the trickster captures the reception of many to deceptive camouflage. In the desert, it seemed that the technology had transgressed into absurdity and the camoufleurs transformed into undermining minstrels. Hyde describes the trickster as ‘the mythic embodiment of ambiguity and ambivalence, doubleness and duplicity, contradiction and paradox’.⁹³⁴ Camouflage had the ability to unnerve and amuse, and the tricks that the camoufleurs engineered in the desert served further to perpetuate this perception.

The desert, with its heat shimmers suggestive of an oasis of water, had always been known as a place of mirages duping desperate people, and in war the camoufleur’s exploited this rich

⁹³¹ Report on camouflage policy and progress in M.E.F, Nov.41-Aug.42 op cit.

⁹³² Trevelyan, J. (1944) Camouflage, op cit.; BOOKLET: CAMOUFLAGE SPRING 1942 op cit.

⁹³³ Radin, P. (1956) *The Trickster: A study in American Indian Mythology*, p.x.

⁹³⁴ Hyde, L. (1998) *Trickster Makes This World; Mischief, myth and art* p.7.

cultural imagery. Dummy infantries inhabited dummy camps, which were equipped with all the signs of a genuine inhabited site, camouflage could also visually reduce the threat of military presences through designs such as sunshields,⁹³⁵ whereby a tank would appear to the aerial camera as a mere truck.⁹³⁶ This meant that large concentrations could gather without inviting the aerial interpreter's suspicion that an attack was imminent. These skills and techniques used in camouflage redesigned the desert environment to function successfully in the prosecution of warfare. It became a place of multiple mirages, where the eye and camera captured images that lied, overlooked what was there, and even at times were double-bluffed. The idea of the trickster and camouflage are further entwined when we note Radin's explanation that the 'trickster is at one and the same time creator and destroyer, giver and negator ... he knows neither good nor evil yet he is responsible for both'.⁹³⁷ Desert camouflage in WWII was perhaps a trickster, playing with the aesthetics and articles of war, because, although never directly or actively violent, camouflage enabled and constrained violence. Mischievous and deadly, theatrical and comical, but yet at its best unnoticed, it was truly art, science, magic and military conjoined. Camouflage may have invited laughter, but in the desert it was humour tinged with nervous anxiety.

Firstly, there were nerves for its executors as they found it difficult to gauge how effective a camouflage plan had been:

It is seldom possible to strike a balance of profit and loss on camouflage. The results of installation camouflage can rarely be assessed. Decoy schemes and decoy fires are sometimes calculable by counting the craters of bombs wasted on them. Schemes of offensive camouflage are by their nature more likely to pay tangible dividends but it is not always possible to attribute this or that gain positively to this or that operation.⁹³⁸

However, camouflage could also unnerve when it did prove successful. For example, the offensiveness of the camouflage deployed in 'Operation Crusader' was assessed by the military as follows:

The only evidence is from our own troops and is offered for its entertainment value. While one of the dummy Battalions was being erected near Mena the Officer Commanding a nearby Battalion of a newly arrived Division approached the NCO i/c Working Party and asked to be directed to the HQ of the camp in order to introduce himself to his "new neighbour". And while maintenance was being carried out on a special "Brigade" two signallers who had been laying cable in the vicinity for some hours

⁹³⁵ Sunshields were light, detachable canvas frames of trucks that could be quickly fitted over tanks. CD&TC R.E, Notes for the Information of Camouflage Officers- IWM 91/2/1.

⁹³⁶ Ibid.

⁹³⁷ Radin, P. (1956) op cit. p.1.

⁹³⁸ Report on Operation Camouflage in the Western Desert, Aug-Dec 42 op cit.

approached the “cookhouse” and demanded a cup of tea. Whether they were given a dummy cup of imaginary tea is not known.⁹³⁹

If through the shimmering heat this mere stage set could prove such a convincing mirage that soldiers were duped at such close range, this was comical when the scheme’s effectiveness was displayed in your ranks. Yet, ‘the comic, like magic, brings about a sudden and rationally inexplicable shift in the sense of reality’;⁹⁴⁰ and such amusing camouflage schemes did also imply that you could be easily fooled by the enemy, with much more serious consequences.⁹⁴¹ Therefore, the laughter provoked by camouflage was permeated with unease, as the ‘shadow of ridicule remains ... Laughter can hurt and divide. It can have its victims’.⁹⁴² Camouflage was a fraud and a forger and, like the folkloric trickster who is relentless in deconstructing society’s binary oppositions,⁹⁴³ military desert camouflage was both enemy and ally: it saved and it killed. Deceiving and offensive camouflage, at times amusing and unnerving, guileful and deadly, was remaking the desert through the process of militarisation.

THE MILITARISATION OF DESERT SPACE

The arrival of General Montgomery to the desert on the 13th August 1942 (at a point when the German Army had the British on the defensive) heralded a change in the character of fighting in the Eighth Army, which induced intensification in the use of offensive camouflage. Montgomery replaced Field Marshall Auchinleck, who Churchill had dismissed whilst growing impatient for decisive action in the desert.⁹⁴⁴ The first order issued by Montgomery was to the effect that there would be no retreat, and hence no more plans for an evacuation or work on defences behind the Alamein Line.⁹⁴⁵ Instead, the Eighth Army was going to prepare to attack. Before the British military had time to prepare fully for this action, the Germans attacked on the 30th and 31st August. A British military report on the enemy’s efforts concluded:

The attempt was a costly and decisive failure.

⁹³⁹ Ibid.

⁹⁴⁰ Berger, P. (1997) *Redeeming Laughter: The Comic Dimension to Human Experience*, p.117.

⁹⁴¹ James McIntosh Patrick at the CD&TC wrote a paper *Camouflage in other Theatres of War*, in which he synthesised all the information which had been gathered by the British military, on enemy and allied camouflage, in battles. It included descriptions of ingenious Russian sniper camouflage, the Polish use of misdirection and the Japanese’s outstanding use of natural cover to conceal weapons and ambushes to deadly effect. DG A64/1/16/3/1/15.

⁹⁴² Bilig, M. (2006) *Laughter and Ridicule: Towards a Social Critique of Humour* p.121.

⁹⁴³ Lynch, J. (2008) *Deception and Detection in Eighteenth-century Britain* p.3.

⁹⁴⁴ Rankin, N. (2008) op cit. p.520.

⁹⁴⁵ Report on Battle for Egypt and Advance to Mareth Jan-March 1943 – NA WO 201/592.

The attack was of course smashed first and foremost by the fighting qualities of the whole EIGHTH ARMY and the ROYAL AIR FORCE, by the excellence of their leadership and by long careful planning and provision in the logistics of desert warfare. But it is also true that the enemy had allowed himself to be deceived ...

The first few days of September saw the last enemy attempt at offensive action. The initiative passed into British hands and from one day to the next the defensive deception gave way to the offensive deception "BERTRAM", which was the name given to EIGHTH ARMY'S cover plan for mounting the Battle of Egypt.⁹⁴⁶

Over seven weeks throughout September and into October, the camoufleurs were set to work to develop and put into action the grand deceptive battle plan 'Bertram'. The camoufleurs ensured that every effort was made to deceive the enemy into thinking that an attack would take place to synchronise with the passage of a Malta convoy in November⁹⁴⁷ (the British were in fact preparing to attack prior to the convoy) and from a different position. The camoufleurs were set three tasks to fulfil in plan "Bertram":

- (i) Concealing our intention of breaking through in the NORTH
- (ii) Giving the impression that the main thrust would come in the SOUTH
- (iii) Confusing the enemy as to the weight and probably date of the attack.⁹⁴⁸

The camoufleurs realised that, although activities in preparation for an attack could not be entirely hidden, their full scale and timetable could be hushed by a significant volume of military equipment being hidden or disguised. Enemy aerial reconnaissance would record increased activity, but, attention could be drawn to the south and photographic interpreters could be fooled into concluding that the south would be the frontline of attack. Their proposal for the use of deception camouflage for the Battle of Egypt was hence as follows:

- (i) In the NORTH. Accept the limitations. Economise as much as possible the physical resources employed on camouflage. Ensure the most careful camouflage planning and supervision to conceal the significant parts of preparatory work and concentration, with the object of withholding scale and state of completion from the enemy. Concentrate on detailed siting and arrangements for Dumps and the axis Tracks so that they made the best of any natural aids to concealment. Concealment of AFV's and Guns.
- (ii) In the SOUTH. Go all out for active deception by dummies and put all available resources into it. The proposal called for a plan whereby the enemy, having seen gradual increase of strength in the North, would be suddenly confronted at the latest possible date with the appearance in the SOUTH of a considerable striking force and the main associated features thereof. A large new "Headquarters", at least two "Armd Bde Groups", all available real MT which could be drafted into the area. "A"

⁹⁴⁶ Report on Operation Camouflage in the Western Desert, Aug-Dec 42 op cit.

⁹⁴⁷ Report on Battle for Egypt and Advance to Mareth Jan-March 1943 op cit.

⁹⁴⁸ Report on Operation Camouflage in the Western Desert, Aug-Dec 42 op cit.

Force Tank Units, significant tracks very rapidly and conspicuously graded by special arrangements, and so on.⁹⁴⁹

To achieve effective concealment in the north and deliberate display in the south the camoufleurs drew on the previous experiences and experiments in the desert. They explained to military authorities that to ensure success, Camouflage Staff Officers were to be made fully aware of the planned deception operation. Also, they demanded access to air facilities and aerial photographs of the areas requiring their plans, so they could acquire vital knowledge of the geography and terrain (figure 48).⁹⁵⁰ From such precise planning, the camoufleurs realised the scale of the project that they had been assigned, and Barkas requested not only all the available trained camouflage personnel (the CD&TC were working hard back in Britain to train the officers to meet the demand)⁹⁵¹ but also an additional 1,200 men to prepare and to erect the proposed dummy schemes.⁹⁵² In the north the camoufleurs worked to conceal dumps containing several thousand tons of ammunition, along with guns, and also worked to conceal ten Corps in their final positions. This concealment work was all aimed at the air photograph and therefore disrupting or fooling the gathering of enemy intelligence. In the south, a dummy pipeline (ostensibly for the supply of water) was installed to give the impression of an intended movement of troops to the south, a movement also implied by the staging of dummy formations, artillery and equipment, including vehicles and tanks. This camouflage activity was complemented by other schemes of deception, such as wireless activity.⁹⁵³ When plan “Bertram” had been finished, the Eighth Army had practised deception on a scale unparalleled in military history.⁹⁵⁴

On the 23rd October, when planning and preparation had been completed and the troops were primed for action, the Eighth Army attacked (figure 49). Within two weeks, by the 4th November, the enemy was in full retreat:

The battle of Egypt was over and the pursuit was on.⁹⁵⁵

⁹⁴⁹ Ibid.

⁹⁵⁰ It appears that Barkas, who headed camouflage in the desert, felt that the camoufleurs were restricted in their work due to limited access to air facilities, and it is suggested that this was a problem not only experienced in the desert but by camoufleurs in all theatres. Report on Operation Camouflage in Western Desert Aug-Dec 42 op cit.

⁹⁵¹ Colonel Buckley wrote to Major Pavitt, complaining: ‘The Middle East is consuming some more Camouflage Officers’ – IWM 86/50/3/4.

⁹⁵² Report on Operation Camouflage in the Western Desert, Aug-Dec 42 op cit.

⁹⁵³ Ibid.

⁹⁵⁴ Ibid.

⁹⁵⁵ Report on Battle for Egypt and Advance to Mareth Jan-March 194, op cit.



Figure 48. Flying over the desert

The British military began to analyse the various elements of the plan which had led to its successful execution, and it was concluded that deception had aided the battle:

There can be no doubt that this deception plan was highly successful. General VON THOMA after his capture, stated that he alone of the German High Command thought that our attack would be delivered in the NORTH.⁹⁵⁶

Intelligence gathered from captured enemy documents and prisoners of war revealed that the enemy had been tricked by the phantoms in the desert. It was only at the final moments before attack that the Germans began to suspect activity in the North, but even then aerial intelligence had not realised its full significance. The camoufleurs had proved the value of their fieldcraft to battle, but, it was still felt that during 'Bertram' camouflage had not been provided with sufficient resources. In particular, the issue of limited access to aircraft remained a contentious point:

Air photos and facilities. Facilities were inadequate, as they always have been. This was again due to shortage of photographic aircraft for operational reasons. Air photographs of our own areas would make concealment plans more certain, and records of our own schemes would not only have instructive value but also might enable large dummy schemes to

⁹⁵⁶ Ibid.

be carried out more economically in future. This is a long-vexed question.⁹⁵⁷



Figure 49. Into battle

Despite residual tensions and issues, deception and, in particular, camouflage had - by contributing to victory in the Battle of Egypt - been recognised as a vital component in the formation of battle plans. Gratitude and congratulations were declared in the House of Commons in a speech by Winston Churchill, who said:

It is perfectly justifiable to deceive the enemy,⁹⁵⁸

and that in part success had been achieved by:

⁹⁵⁷ Ibid.

⁹⁵⁸ Ibid & Haswell, J. (1985) *The Tangled Web: The art of Tactical and Strategic Deception* p.112.

...a marvellous system of camouflage which had achieved complete tactical surprise and had signalled the end of the beginning of the war.⁹⁵⁹

Even in victory there was a lingering sense that somehow it was not 'proper' to win wars by deception rather than by straightforward physical superiority. Offensive camouflage did not fit easily within military regulations, or the articles of war. Ambiguous, camouflage flourished by undermining ethics and trust in war, and by responding and altering to the demands of the battlefield environment, it was more akin to an 'art' of war.⁹⁶⁰

The Battle of Egypt proved to be one of the decisive moments for British military camouflage, and hence was to inform camouflage throughout the remainder of the war. Yet, the battle lasted less than three weeks and victory in the desert came at a heavy price (figure 50): enemy losses and injured were claimed to total 61,000, yet allied losses went unmentioned in military reports and in the media. During the campaign, the military had been active to embrace the theatrical and the violent in the redesign of the desert as a theatre of war, and through camouflage the military had designed a space that further industrialised death.

The desert in WWII can be seen to have undergone transformation through war; as Gregory and Pred explain, 'the sheer physicality of landscapes can become saturated with political violence'.⁹⁶¹ Camouflage in the desert was duly praised for its offensive capabilities, its ability to lure and set traps, and it was one of the technologies that rendered the desert dangerous, surreal and disconcerting. But, as time passed the slog of camouflage and the impact of war for some camoufleurs was to become difficult to bear. Maskelyne, the performer, entertainer and magician became increasingly cynical and disillusioned by his work and his environment:

I found myself believing that I was involved in some sort of endless nightmare ... wearing dusty khaki, deprived of the pleasures and attractions of a civilized life; somewhere, we believed, the guns were booming, but one forgot how and why.⁹⁶²

The desert was a terrain occupied by military technology and weaponry, and clearly became an ecology penetrated by violence and conflict. The camoufleurs had a close, embedded relationship the desert in the process of altering its character and appearance. As discussed earlier geographers have already explored how some environments can become defined by military activities. Farish has studied the US military's reworking of the cold dry Arctic landscape during the Cold War,⁹⁶³ and Clayton has examined how hot tropical climes can

⁹⁵⁹ Ibid.

⁹⁶⁰ Sun Tzu & Minford, J. (2008) *The Art of War*.

⁹⁶¹ Gregory, D. & Pred, A. (2007) Introduction op cit. p.4.

⁹⁶² Maskelyne, J (1949) op cit. p.94.

⁹⁶³ Farish, M. (2006) op cit.



Figure 50. The aftermath

become geographical imagined and known through military incursions.⁹⁶⁴ Both Farish and Clayton have considered the intimate relationship that the military demands with its battlefields, since their geographies need to be known, researched and anticipated. In turn, these sites are altered and reshaped to be understood through the military's incursion into them. In WWII, the camoufleurs worked to transform the desert physically, imaginatively and psychologically. The desert created conditions of safety for the allied soldier, a trap for the enemy and contributed to the public's imagination of the desert as battlefield, studied and utilised like the Arctic and subverted like the tropics. Akin to the work of Clayton and Farish, the study of desert camouflage reveals how knowledges are enrolled by the military to recreate spaces to become sites of military geographies. The hot wet jungle of the tropics, the cold dry ice of the Arctic and the hot arid sand of the desert were all transformed by violence and military intrusion, but then so too were military technologies such as camouflage altered by these spaces of conflict.

The interweaving of the desert, the military and the camoufleurs certainly did result in changes for the technology of camouflage. Considering Pickering's 'mangle' as the breach of disciplinary boundaries through the 'performance of a heterogeneous assemblage of human and nonhumans',⁹⁶⁵ science, art, militarism and the geography of the desert became knotted

⁹⁶⁴ Clayton, D. (2007) op cit.

⁹⁶⁵ Pickering, A. (1995a) op cit. p.21.

together in a process of mutual transformation. Notably, the desert had demanded a departure, at least in part, from camouflage as concealment; to camouflage as deception and the camoufleurs had, through their ‘scrappy’ situated practices, enrolled and blurred diverse human and nonhuman knowledges and materials into a complex network seeking to achieve this outcome. Also, the individuals whose military life in WWII was dedicated to camouflage can be seen uncover the lasting effects of the ‘mangle’ of technology, war, science, art and militarism, as the biography of Cott reveals.

DESERT CAMOUFLAGE AND THE MILITARISM OF KNOWLEDGE

In the autumn of 1941 I happened to be preparing some bird-skins at Beni Suef, Middle Egypt, a casual observation led to what has proved a somewhat fruitful and little explored line of enquiry.⁹⁶⁶

Life at the MEF Camouflage School, as revealed earlier, allowed Cott to continue zoological fieldwork. This is not particularly unusual as the British military had often encouraged what was regarded to be healthy and useful leisure activities. As Greer explains, such pursuits perpetuate a specific masculinity which ‘endorsed restraint, respectability, and moral considerations surrounding the military body’.⁹⁶⁷ Cott spent his service in the MEF Camouflage School dividing time between military camouflage and fieldwork, and as a result the direction of his research took a quite peculiar turn. Livingstone suggests that the sensory experience of sites of science, the ‘different suite of optical, acoustic, and olfactory experiences’,⁹⁶⁸ in other words the local specifics of place, can inform the resulting research. For Cott, the influence of the desert environment paired with the military setting led to his experimentation on the edibility of different (and usually in the West ‘inedible’) bird flesh. One day, as he was preparing bird skins to be sent to the British Museum:⁹⁶⁹

A palm dove (*Streptopelia senegalensis*) and a pied kingfisher (*Ceryle rudis*) had been skinned and the carcasses thrown aside. Hornets were very plentiful in the garden where I was working and soon collected on the meat; but they were seen to concentrate their visits on one carcass, leaving the other almost neglected. Closer inspection showed that it was the dove that was receiving their attentions: with the kingfisher they would have little to do.⁹⁷⁰

⁹⁶⁶ Cott, H.B (1945) The Edibility of Birds, *Nature*, 156.

⁹⁶⁷ Greer, K. (2009) op cit. p.32.

⁹⁶⁸ Livingstone, D. (2003) op cit. p.18.

⁹⁶⁹ Dorothy Bates explains that, throughout the war, Cott had been sending to her at the British Museum zoological specimens which he had acquired during fieldwork whilst in the military. Bate, D. (1945), Notes on Small Mammals from the Lebanon Mountains, Syria, *Annals and Magazine of Natural History*, 2 vol.xii, p.141.

⁹⁷⁰ Ibid.

This led Cott to begin to prepare a new theory that would come to inform much of his research throughout the 1940s and 1950s. Cott hypothesised that there was a negative relationship between the edibility of a bird's flesh and the colour of its plumage, such that the brighter the feathers the less tasty the meat. Thus:

While I was serving in the Middle East Command. The initial investigation of the relative edibility of the flesh of some forty species of birds was later extended by a comparison of the food preferences of the cat and man, with those of the hornet.

These various experiments and observations show that there is a correlation between the coloration of birds and their liability to attack by enemies. I have attempted to determine the bearing of this mass of evidence upon the theories of adaptive coloration, with special reference to the theory of warning colours as applied to birds.⁹⁷¹

Both his initial foray into to this area of research and the sites of his fieldwork were heavily influenced by Cott's military timetable and postings, which meant that at times these sites were often places dominated by social and political, as well as biological lives. His science was hence simultaneously constrained and enabled by the military and Desert War. Again:

Experimental sites were selected in areas already frequented by hornets.

- (1) Beni Suef, in a garden
- (2) Mountain Training Warfare Centre, at a pond near the camp
- (3) The third and last group of tests was made on the banks of the Nile in Cairo, opposite the Semiramis Hotel - at that time occupied by G.H.Q., M.E.F. Decaying fruit, faeces, and other rubbish left by natives on the narrow promenade at the water's edge provided an attraction for scavenging hornets, and here again, although late in the season, an adequate supply of insects was soon available for experimental work. It may perhaps be added that the sight of an officer standing by the hour in such insanitary surroundings, with apparently nothing better to do than arrange little pieces of meat on the pavement and watch them, note-book and watch in hand, while the brown and yellow hornets busied themselves in the neighbourhood, was an evident source of perplexity to R.A.S.C. drivers waiting in the nearby car-park, to military police, and to some inquisitive idlers!⁹⁷²

On his return to Cambridge and university life after the war, Cott continued this experiment and also widened it to include other nonhuman and human tasters. The methodology of his experiment was as follows:

The method of palatability-assessment was standardised as follows. The skinned bodies of adult birds were cooked in a frying pan, without the addition of fat or condiment: only pectoral muscle was tasted.

Each sample, identified by a number but not named, was awarded a mark for general palatability on a scale ranging from 9.0 (excellent) to 2.0

⁹⁷¹ Cott, H. (1946) *The Edibility of birds*, op cit. pp.373-374.

⁹⁷² Ibid.

(inedible) by each member of the panel: comments on texture and flavour of the flesh were also recorded.⁹⁷³

As this research progressed, Cott extended it again to include not only the edibility of bird flesh, but also the edibility of bird eggs, based upon a similar hypothesis that increased cryptic colouration meant increased palability. A wide range of bird eggs were consumed by the Egg Panel of Cambridge, and these again were a mix of human and nonhuman testers. The research was carried out on his pet cats Bessie and Sailor, ferrets, hedgehogs and the Fellows of Selwyn College. For the cats, ferrets and hedgehogs, the birds' eggs were served raw and beaten. Cott's methodology appears simultaneously meticulous and slightly absurd, as this description on the taste test of hedgehogs reveals:

In every experiment the hedgehog is offered a clear choice as between two egg-samples of two species. The egg was given raw in a petri dish - the yolk and white having been mixed with a glass stirring rod. By this procedure, other attributes of the egg which might operate as disturbing factors - such as size and shell-coloration - were eliminated; while at the same time the contents being freely exposed, disseminated their individual odours. All eggs offered were new-laid and in fresh condition, the material having been kept between the time of collection and use in cold storage at 0C ...

In the course of 332 experiments carried out, four hedgehogs were used. As a means of comparing their records in later pages, the animals may here be introduced by their names - "Pickles", "Joey", "Evelyn" and "Roy" ...

In those groups of experiments where three individuals took part, out of a total of fifteen cases, no fewer than nine showed unanimity, e.g. Groups 1, 9, 10, 11, 22, 48, 49, 57 and 60; three gave near-agreement; while in each of the three remaining cases one hedgehog dissented from the choice of his colleagues - the individual in each of these instances being "Pickles", e.g. Groups 3, 34 and 44.⁹⁷⁴

From reading through Cott's notes on this particular set of experiments into the edibility of birds eggs for hedgehogs, he brings scientific rigour, as well as what appears to be a developed sense of the comic in science. Considering accounts from former colleagues and students on Cott's character, this appears to sit at odds with his upright and serious manner.

For the Fellows of Selwyn College, the eggs were scrambled over a steam bath, without seasoning, so not to alter the particular and often peculiar taste of the eggs. The group found that the eggs of Puffins were somewhat rubbery, the Domestic Goose's tough, chestnutty and dry, the Oyster-Catcher's aromatic and oniony with a herb like taste, rather like sage, and the

⁹⁷³ Cott, H. & Benson, C. (1970) The Palability of Birds, Mainly Based upon Observations of Tasting Panel in Zambia, p.357.

⁹⁷⁴ Cott, H. (1953) The Palability of the eggs of Birds: Illustrated by experiment on the food preferences of the Ferret (*Putorius Furo*) and Cat (*Felis Catus*); with notes on other egg-eating carnivore, *Proceedings of the Zoological Society of London* 124 (1) pp.20-31.

Magpie's were mushy, strongly nutty and with a slightly bitter after-taste.⁹⁷⁵ This experimental science led Cott to publish in lifestyle as well as scientific publications seeing pieces in the likes of *Food and Wine*. The foray into coloration and palatability was not the only alteration to occur in Cott's scientific work after service in WWII military camouflage, for Cott continued to embrace the interdisciplinary nature of research inspired by his desert experiences. By narrowing the focus again on Cott, we can see the effects of camouflage and the Desert War on an individual as well as on military knowledge and technology, and these lasting effects were not confined to Cott.

CONCLUSION

The Desert War and camouflage's role in it had other more unsettling but equally long-lasting consequences on the lives of those involved in the campaign, as Maskelyne disclosed:

More and more, as I did this secret work, I felt disgust and hatred for war and all it stood for. On the one hand, human gallantry and courage and inventiveness at its peak; on the other, human waste and cruelty and cunning, pitiless and senseless as in some monster nightmare.⁹⁷⁶

Bourke has commented that for the historian the study of war is chiefly a mediation on the struggle for territory, conquest and the retention or extension of power. But, for the soldier present and active in the battlefield, war is the lawful and sanctioned killing of other people.⁹⁷⁷ In the twentieth century, mechanisation and technological developments, such as the aeroplane and camouflage, massively transformed the battlefield. Whilst technology helped to facilitate battle, it did not disconnect soldiers from the corporeal and bloody consequences of fighting, and Bourke explains that the technology 'did very little to reduce the awareness that dead human beings were the end product'.⁹⁷⁸ The spectre of death haunted some of those who had served in the Desert War, and near the end of his life Montgomery is reported to have said:

I can't have very long to go now. I've got to go to meet God - and explain all those men I killed at Alamein.⁹⁷⁹

It is important to heed Bourke's concern that the historian can be tied up with the large-scale specifics of power struggles and the broader social and political contexts, whilst the intimacies

⁹⁷⁵ Cott, H. (1954) Ibid.

⁹⁷⁶ Maskelyne, J (1949) op cit. p.94.

⁹⁷⁷ Bourke, J. (1999) op cit.

⁹⁷⁸ Ibid p.xviii.

⁹⁷⁹ Cited in Bungay, S. (2002) op cit. p.237.

of war, the embodied experience of the soldier and the lasting effects on people, places and knowledges, remain mute. By considering the biography of a military technology such as camouflage, through and beside partial and fragmentary biographies of those who contributed to its development, it is hoped that a little of the embodied experience of warfare can be recovered and drawn in to the grander narrative of conflict. The individuals whose military life in WWII was dedicated to camouflage can witness to the effects of the 'mangle' of technology, war, science, art and militarism.

Whereas the focus in relevant scholarship to date has usually alighted on the contribution of science to militarism or the entangling of art with science and the military,⁹⁸⁰ these entanglings fall short when considering the specifics of military camouflage in WWII. Woodward's provocation - to engage critically with the issues of morality and power that pervade the spatial expression of militarism - means placing at the heart of military geography research the socio-materialism of military activities.⁹⁸¹ The material presences and the social relations created across space allow scope for attention to military influence in shaping civilian space in diffuse and sometimes seemingly unapparent ways. Desert camouflage was an important material presence within this battlefield ecology, and it was a technology borne through social, political and interdisciplinary relations across the different contributors and components of its development. The focus of critical military geography is hence not only the description of military control and authority, but also an explanation of their roots and mechanisms of maintenance. Woodward goes on to suggest that, in an attempt to achieve this critical engagement and explanation, attention should be given to the small, mundane and seemingly unremarkable aspects of military activities, as it is 'often the seemingly prosaic things, the things that lurk at the edge of the big picture, which can tell us much about how systems operate'.⁹⁸² The ordinary and small can have the possibility of making the whole more visceral and tangible, and it is hoped that drawing out the experiences of several of the camoufleurs operating in or with the desert can go towards achieving this end. Military camouflage during WWII prompts a narrative where the mutually transformative engagement with a military technology not only encompasses a dialogue of the military with science and art, but also draws in the even more unlikely worlds of magic, theatre and comedy to participate in the attempted prevention and perpetuation of violence, all in an ultimately unsettling relationship. This animated and lively geography of the desert camoufleurs, fused military technology and military ecology, hopes to draw attention to the influence and lasting effects of militarism in

⁹⁸⁰ Barnes, T. & Farish, (2006), op cit; Farish, M. (2006) op cit; Pickering, A. (1995a&b) op cit.

⁹⁸¹ Woodward, R. (2004) op cit & Woodward, R. (2005) op cit.

⁹⁸² Woodward, R. (2005) op cit. p.713.

the development and dissemination of knowledge. It also hopes to expose jarring and conflicting lives and relationships integral to technological development and knowledge production, as bound into the effective desert camouflage demanded in the prosecution of desert warfare. Additionally, desert camouflage's move to the offensive can be seen to entwine Pickering's WWII regime⁹⁸³ with Taussig's critique of the enrolment of art in war to produce a mix of play and horror,⁹⁸⁴ as well as stirring in the jarring quality of comedy in acts of violence. The desert became a space known through conflict and, therefore, in the history and geography of camouflage it is not enough to pay tribute to the ingenuity of art and science, we must also engage meaningfully with issues of violence, conflict and the far reaching and lasting effects of the militarism of knowledge.

⁹⁸³ Pickering, A. (1995a&1995b) op cit.

⁹⁸⁴ Taussig, M. (2008) op cit.

THE ABC OF CAMOUFLAGE: U-X

U is the Use you make of a road already existing, to carry your load.

V is for Vehicles, always dispersed and parked in the shade by the Camouflaged-versed.

W for Waste. Please do not forget Scrim is hard to replace, and so is a net.

X X.P.M., Which photograph dark, so is useful for hiding a track or blastmark.

Chapter 9.

Conclusion

This thesis in to the cultural-historical geography of camouflage - from ‘dazzle’ in WWI to the desert in WWII - has traced the biography of a military technology from nature into the battlefield, through the sites, spacings, environments and networks in which camouflage developed. The lives - human and nonhuman - that have been touched upon throughout this study have been narrated in the hope of accounting for the life of a technology viscerally and critically. This camouflage biography concludes at the end of the Desert War, a decisive moment for camouflage when the military in WWII took possession of a military technology and craft which led to superior deception. Knowledges of art and science became irrevocably altered through this engagement, as did those who had been involved, which seems an apt point to conclude this narrative and to reflect upon what this approach to camouflage has revealed. It is evident where this study into camouflage has intersected with the work of Barnes and Farish,⁹⁸⁵ who also employ Pickering’s mangle⁹⁸⁶ to explore the spatialities and process of entanglement between the military and science that contributed to the military-industrial complex. However, this project camouflage has extended this work to include the role of art in militarism, and thus, it is a study into the military-artistic-scientific complex involved in the development of camouflage.

Utilising this approach has revealed the diverse specialists that the military drew upon who collaborated to innovate camouflage technology, and the subsequent transformation of knowledges and practices enrolled in this process. Further, adopting this approach has allowed this camouflage biography to explore some unsettling aspects of the technology’s character that have, thus far, been absent from its history. As has been discussed throughout, camouflage, due to its seemingly peculiar visual qualities and odd practices was seen by some of the military, the public and the technology’s historians as benign, passive, even at times comical. Yet, by studying camouflage from the perspective of its practitioners has allowed for a different narrative of camouflage to be told, one which exposes a darker history of aggression, violence and death. This side of camouflage which, as the desert chapter revealed, was one that the camoufleurs and the military were keen to exploit. Therefore, this study into

⁹⁸⁵Barnes, T. & Farish, M. (2006) op cit.

⁹⁸⁶ Pickering, A. (1995a&b) op cit.

the cultural-historical geography of camouflage has revealed that although military technologies can bring a stirring of excitement, a quickening of the pulse, through their ingenious designs, their capacity to aid victory and their enrolment in games of derring do, issues of morality and ethics which such technologies raise should not linger unacknowledged or unexamined. Exposing the violence of a seemingly benign military technology, such as camouflage, allows for important histories and stories to be narrated which can contextualise wider issues and contemporary states of violence, and the pervasiveness of the militarism.



Figure 51. Hugh Cott

In this vein, it is acknowledged that the life-path of camouflage did not cease on the desert plains, for camouflage continued and continues to be utilised in war - altering battlefields and terrains. It is the once entangled and again dispersed narratives of the WWII camoufleurs and camouflage that will now be revisited to reflect upon what this biography of camouflage has

revealed. Therefore, this concluding chapter will consider the afterlives and lasting effects on the disciplines, science and art, and lives of those who were enrolled in camouflage, as a means to consider the lasting consequences of WWII camouflage for those who contributed to it, while more broadly highlighting the impact of camouflage on knowledge, war and culture. Further, it will consider the lasting effects on the military and consider why this historical project has a particular and important resonance with contemporary conflict and military technologies. It will then discuss what in particular a geographical approach has contributed to this thesis and to wider understandings of the militarism of knowledge and technological development. This chapter will then pose a series of questions that this thesis has raised considering where there is yet work to be done. Finally, it will consider the ever evolving life-path of camouflage in contemporary conflicts.

AFTERLIVES IN SCIENCE

First, to revisit Cott's (figure 51) trail in camouflage's life-path. Sagarin and Taylor have commented that 'breaking down disciplinary barriers often requires a radical departure from one's traditional role'.⁹⁸⁷ Cott's approach to science suggests that, for him at least, disciplinary barriers had always been porous boundaries and this was further extended after his camouflage experiences in WWII. On his return to university life after the war Cott went on to become involved in an interdisciplinary conference on *Aspects of Form: a symposium on form in nature and art*,⁹⁸⁸ which saw him again work alongside and engage with a variety of disciplines. The symposium explored whether perception is essentially a pattern-selecting and pattern-making function and it drew an international group of diverse specialists, such as Ernest Gombrich an Austrian art historian, William Grey Walter an American neurophysiologist and roboticist, Konrad Lorenz founder of ethology and Nobel prize winner, British astronomer C.C.L. Gregory and Scottish industrial engineer Lancelot Law Whyte, as well as Cott. Of late there has been renewed interest in this issue of pattern and form in nature, as recently Rothenberg has explored the role of aesthetics in evolution, connecting sexual selection, art and science, themes explored in the symposium on form in 1951.⁹⁸⁹ It has been suggested that such research 'could have major consequences for our whole culture'⁹⁹⁰ not only because it draws attention to the connections between art, science and beauty, but also, because it can be extended towards disrupting the binary between nature and technology, as nanoscience has revealed that nature at the nano-scale is comparable to high technology and architecture.⁹⁹¹ Yet again, Cott's openness to engage in interdisciplinary research and knowledge production seems to have drawn him to an intriguing and potentially important area of study. Therefore, Cott's experiences of military camouflage, which had a lasting influence on his approach to science, in turn has had a lasting influence on scientific knowledge, this echoes Livingstone's suggestion to demonstrate the influence of 'discernible political or social typography' in the production of scientific knowledge.⁹⁹² Cott reveals the entangled nature of knowledge production, not least because he was enlisted in the production of military camouflage due to his expertise in biological camouflage, which in turn was used to transform camouflage and improve its effectiveness. It can then be seen that in turn

⁹⁸⁷ Sagarin, R.D. & Taylor, T. (2008) *Natural Security; A Darwinian Approach to a Dangerous World* p.4.

⁹⁸⁸ Whyte, L. (1951) *Aspects of form: A symposium on form in nature and art*.

⁹⁸⁹ Rothenberg, D. (2011) *Survival of the Beautiful*.

⁹⁹⁰ Forbes, P. (2012) *Survival of the Beautiful* by David Rothenberg – Review, *The Guardian* 10th February 2012.

⁹⁹¹ Ibid.

⁹⁹² Livingstone, D. (2003) op cit. p.12.

developments in military camouflage altered and informed the future of Cott's zoological research, as also briefly remarked towards the close of the previous chapter, and this continues to resonate in contemporary scientific research.

Importantly, after the war Cott also employed some of the artists with whom he had served in the camouflage division to help him design museum artwork and dioramas for the University of Cambridge's Zoology Museum. Cott used the dioramas, depicting scenes of 'typical' bird species found along the British coast, as teaching aids during the post-war period of fieldtrip austerity (figure 52). Wonders has explored how natural history dioramas convey unspoken messages that animals are not merely distributed according to zoogeographical provinces, but can also be thought of as belonging to national territories, contributing to and enrolled in depictions of national identity.⁹⁹³ In this vein Cott's coastal diorama also offers a more



Figure 52. Coastal diorama Cambridge Zoology Museum

complex and melancholic construction of British identity and memory. Closer inspection reveals other signs of life on the beach: a tangled, rusted piece of barbed wire, an empty artillery box, a lone army-issued boot washed onto the strand. This beach, a little stretch of England's coastline, is strewn with remnants of war (figure 53). Cott's dioramas were not only communicating a vision of Britishness through instructive biological images, they also reveal the intrusion of militarism into landscape, art, science and memory in post-war Britain. A

⁹⁹³ Wonders, K. (2003) Habitat Dioramas and the Issue of Nativeness, *Landscape Research*, 28 (1) pp.89-100.

former colleague of Cott's recalled that the museum's commissioning of this diorama by artists was instrumental in keeping together Cott's 'gang of mates' for about two or three years after the war. He went on to add that these dioramas, and the friendships of which they were born, were 'the real fruits of war'.⁹⁹⁴ The diorama is still on display in the museum, serving as an intriguing object from which to study Cott and his camouflage experiences. For all that Cott's overall archive is rich with detail on his science and his camouflage experimentation, it is in the main mute on his embodied and emotional responses. Perhaps his coastal diorama is the closest he allowed himself for the expression of the lasting effects of conflict on him, the scientist, artist, camoufleur and man.

CAMOUFLAGE ABSENCES IN THE ARCHIVE

Figure 53. Artillery box in coastal diorama

It would be useful at this point to step back for a moment and reflect upon the absences in camouflage's archive and to consider how these have shaped this history of camouflage. As the methodology chapter discussed, historical geographers, dealing with biography continually negotiate the missing coupled with the present in the



archive; these absences in historical life-writing are not unexpected and their acknowledgement can raise interesting issues. Cameron eloquently observes that, '[p]eople always are more than we know'.⁹⁹⁵ She comments on the complexities in life-writing and biography of negotiating between claims of ownership over lives and 'the social life of stories' and ponders that, '[f]or archivists, respect might just mean treating papers with delicacy and clean fingers, but when the papers lead us, as they inevitably do, to living stories, messy history, is there a time when giving respect might mean leaving certain papers and people alone?'.⁹⁹⁶ Reflections on the absences in camouflage's history reveal a tension in the archive; it is full of the past, yet there is never enough present to satisfy. Steedman has pointed out

⁹⁹⁴ Interview with Ken Joyce, op cit.

⁹⁹⁵ Cameron, L. (2009) Arthur Tansley and psychoanalysis *The Tansley Trust of the New Phytologist*

⁹⁹⁶ Cameron, L. (2001) Oral History in the Freud Archives: Incidents, Ethics, and Relations, *Historical Geography* 29 pp.38.

that, '[i]n actual Archives, though the bundles may be mountainous, there isn't in fact, very much there. The Archive is not potentially made up of everything ... and it is not the fathomless and timeless place in which nothing goes away'.⁹⁹⁷ Yet, so often, the inverse can feel true when conducting research, although the archive does not contain everything, it can amass rather a lot. Diaries, manuscripts, letters, maps, photographs, ledgers, journals, committee minutes, memos and films to name but a few, which are stored and stuffed into envelopes and folders, which are boxed and bundled, until a pencil filled request form, or an electronic order retrieves them for contemporary historical reimagining. For the researcher, this volume of "stuff", that the archive possesses, can be tiresome in nature. There are duplicates and drafts, which are edited and re-edited, memos which circulate, resurfacing in folder after folder. There are exchanges that span years and exchanges on these exchanges. The task, therefore, is to somehow sift through to seek, sort and order history's remnants into a narrative. Yet it will always be a narrative interspersed with absences, haunted by that what is gone and cannot be retrieved.

One such absence in this camouflage narrative is the experience of enacting camouflage. The fear of being exposed if camouflage did not work, of the bloodletting that camouflage would cause, of falling foul of camouflage technology, these experiences were never found in camouflage's archive, although they were sought. For example, the gaps in Cott's scientific biography, and in particular the absence of his personal experience of camouflage and conflict reveal this difficulty in searching for the embodied history of camouflage. In relation to Cott's WWII experiences there are no detailed records of exactly what schemes he undertook, or his personal reflections of WWII. Frustratingly, there were momentary glimpses of Cott's personal experiences of conflict, but these were too fleeting or were unsubstantiated to be included in this study. This is revealed in a conversation with a former colleague of Cott's who reported that there had been an incident in Ireland when Cott was serving with the British military in 1919-1920. Cott had been involved in an attack, one from which he was lucky to escape with his life, but that some of his fellow soldiers were not. This piece of information was rounded off with the comment that Cott had only mentioned this once near his retirement and no details of the incident were given, or at least they were not remembered.⁹⁹⁸ How this experience impacted upon Cott and shaped his attitude to conflict remains a mystery. Similarly, Trevelyan's experiences of camouflage in WWII could also possibly offer insight into the embodied experiences of enacting camouflage. He had a spell

⁹⁹⁷ Steedman, C. (1998) The space of memory: in an archive, *History of the Human Sciences* 11 p67.

⁹⁹⁸ Conversation with Ken Joyce, op cit.

in hospital in 1942 and the letters prior to this admission were increasingly desperate in tone as he begged to be stationed closer to home.⁹⁹⁹ Was this hospitalisation due to the mental rigours of war, or were they an ongoing health issue which war had exacerbated? This information is missing, and thus any connections between camouflage, violence and Trevelyan's health would be mere speculations.

Thus, the archival fragments I found that perhaps allude to personal and embodied experiences of camouflage and conflict were scraps in isolation; unsubstantiated and unable to be placed within a wider constellation of archival material or in camouflage's life-path. There is the temptation to read the influence of camouflage and conflict into such personal experiences, but such sensitive and personal material requires careful consideration before it is included. This suggests that biography and life-writing in cultural and historical geography is a process of picking over what remains, picking out what seems to matter, and questioning what appears to be missing, culminating in the construction of new sets of stories that are not unproblematic. Whatever the intentions of the researcher, it clear is that the *re-presenting* of a life is part of a continuous *resurfacing* of the past,¹⁰⁰⁰ and when these stories attempt to narrate personal experiences of traumatic events, such as conflict, sensitivity needs to be employed. The desire to draw close and account for the experiences of technological development in conflict must be tempered with a respect for the lives that are at the centre of the narrative. As a consequence for this study into the biography of camouflage due to what is absent from the archive and what is too sensitive and unsubstantiated to be used, camouflage's biography still remains a little bloodless. For all the violence in which camouflage was involved, the enactment of the technology and the experience of being tricked by camouflage are to an extent absent. Perhaps, the aim to draw close to historically distant embodied experiences will always only partially be fulfilled.

There is another absence in camouflage's archive that needs to be recognised, the absence of enemy or allied uses of camouflage. In WWI, as discussed in Solomon's short biography, the British military had initially looked to the French Army and its use and structure of camouflage for guidance, but this appears to have been an exception. During the interwar period, when the British military did little to develop camouflage, efforts to study other militaries' camouflage initiatives and to synthesis this information appears to have been conducted by individuals with an interest in the matter who were outside of the military, such

⁹⁹⁹ Letters from Buckley to Trevelyan 1942 - JOT 27/11-17

¹⁰⁰⁰Atkins, Antony, (1998) *Textual Biography: Writing the Lives of Books*. In Gould, Warwick and Staley, Thomas (eds.) *Writing the lives of Writers* p.38

as Kerr.¹⁰⁰¹ In WWII, the isolated approach in the British military to camouflage innovation appears to have continued as there is no evidence from the archive that the British were systematically gathering intelligence on enemy camouflage or collaborating or sharing initiatives with allied forces. At most from the archival records there were occasional mentions in battle reports that the Germans were, similarly to the British, using scrap materials from which to make ad hoc dummies.¹⁰⁰² At the CD&TC, McIntosh Patrick in one lecture provided a few examples of enemy camouflage that had outwitted the British, but these were offered more as tales of caution rather than as a serious study of enemy camouflage or how the British could respond to enemy innovations.¹⁰⁰³ However, a 1953 report that reflected upon WWII British camouflage hints that issues of deception were kept closely guarded, and thus are perhaps deliberately missing from the archive:

For reasons of security the policy and control of deception ... have been kept extremely secret during this war. Great pains have been taken to try and conceal the bare fact that deception was being planned and co-ordinated on any appreciable scale. For the greater part of the war there has been a controlling body within the War Cabinet Offices and special, highly secret, branches of the General Staff to plan deception on the higher HQs of active theatres.¹⁰⁰⁴

The extent to which the British Military were aware of enemy and allied deception was perhaps quite extensive but there is no material evidence to corroborate this suggestion. However, it does appear from studying the camoufleurs knowledge of enemy and allied camouflage (from reading their lectures, personal diaries, memoirs and letters) knowledge on other militaries' uses of camouflage was not actively sought and thus this is an absence in camouflage's biography that is worthy of reflection.

Therefore, by acknowledging the absences the archival methodology employed in this study reveals the shortcomings and missing elements of this thesis. However, as the close study of Cott and his science has shown although aspects of his camouflage story remain absent it is still possible to study something of the militarism of culture that camouflage development in WWII. Cott provided an example of how his science was altered due to his entanglement with different disciplines, people, knowledges and the military, and other camoufleurs offer different and complementary insights into the diffuse nature of camouflage and the militarism of culture.

¹⁰⁰¹ Letters from Kerr to the *Nautical Magazine* 1920-1924 – GU DC6/606-612.

¹⁰⁰² Report on Camouflage Policy and Progress in M.E.F. Nov.41-Aug.42 – op cit.

¹⁰⁰³ Camouflage: MS Notes for Lectures – DG A64/1/16/3/15

¹⁰⁰⁴ Camouflage Lessons of 1939-45 (A paper for the information of those responsible for high level decisions on post-war policy, organisation and doctrine) p.35 – NA WO/32/11512.

AFTERLIVES IN ART

Suggestions of personal changes due to being enrolled in WWII military camouflage can more explicitly be explored by considering the fragmentary-mobile biographies of some other camoufleurs after the war, as crucial alterations and shifts in their work and personal lives can also be traced. In an interview given over thirty years after WWII, Trevelyan reflected upon the changes in his painting throughout the war, as he began increasingly to depict imaginary harbours and African scenes, marking a shift from an observational to an escapist painter. Before the war, Trevelyan's method had been to watch people and then paint their lives as he had observed them: children going to school or men drinking in pubs. As the interview progressed, Trevelyan revealed that throughout the war he had painted the military and conflict, but that these observations were private, his personal diary of the war. Trevelyan concluded that, by the end of the war, the art movement with which he had been associated before the war, Surrealism, was rendered dead by the declaration of victory.¹⁰⁰⁵ He explains that for some the war had disrupted the Surrealist movement, but for others, such as himself, it had finished it.

Penrose, on the other hand, found that in some ways the terror of war lent clarity to the intentions of art and the human need to produce it:

It was the noise of the bombardment at night. It was so overwhelming I felt it was the relentless work of demons, so to make them less terrifying I tried to see them as a group of musicians. They seemed less threatening that way. The art of primitive man always seemed to me to have been doing just that - converting hideous intangible fears into art that might still frighten us, but we can see it and touch it so it becomes more understandable.¹⁰⁰⁶

The experience of artists such as Trevelyan and Penrose in WWII further reveal that observations about the mutual transformation of militarism and science, as explored by Barnes, Farish and Pickering,¹⁰⁰⁷ apply not only to science but can also include the involvement of art in war.

Furthermore, conflict, war and the military continue to draw interest, critique and challenge from artists. For example, images of the desert and war continue to infiltrate culture awareness. Paul Seawright, in a recent exhibition in *Desert Stories* at the Belfast Print Workshop, takes inspiration from the satellite photographs contained in the Weapons of Mass

¹⁰⁰⁵ Interview with Trevelyan, op cit.

¹⁰⁰⁶ Penrose, A. (2001) *Ronald Penrose the friendly surrealist*, p101.

¹⁰⁰⁷Barnes, T. & Farish, M. (2006) op cit. & Pickering, A. (1995a&b) op cit.

Destruction Dossier. Seawright's art is arguably similar to the intentions of the camoufleurs, since it aims to reveal by exposing aerial photography as an unreliable medium. Within images of conflict there are multiple narratives, 'often contradictory and always containing a fictional trace'.¹⁰⁰⁸ Seawright is just one example of how artists have responded to contemporary conflicts, and his work is indicative of a longer tradition of artists documenting and scrutinising military engagements.¹⁰⁰⁹ More broadly, art has interrogated militarism and the work of Trevor Paglen, as a geographer in many contexts, has drawn upon military symbols and installations to produce artistic and written studies of contemporary militarism and violence.¹⁰¹⁰ Paglen offers an insight into the negotiation of artistic practice and scholarly study that is currently taking place in geography and the humanities which seeks novel engagements in order to address politics and militarism in innovative ways.¹⁰¹¹ The connections between geography, military and art have been studied by geographers, in the historical¹⁰¹² and contemporary context. Recently, Graham and Gregory have considered art as a means of interrogating military and militarism.¹⁰¹³ In reference to the city, Graham discusses that art can revert spaces that have come to be known as 'verticalized targets viewed on maps' through military engagements, to emerge as 'fully lived places, seen and inhabited from the ground' a process which allows 'the bodies and voices of the living, as well as the bodies of the dead' to become 'central to the frame'.¹⁰¹⁴ This work suggests that there is a utility in taking seriously artists' responses to war and conflict, and hence why looking to the response of artists who served in conflict, such as those enrolled who developed camouflage, can be illuminating to the study of militarism.

Overall, from considering the alterations and transformations in Cott's scientific research - as with those of Trevelyan and Penrose experience and undertaking of art - reveal the diffuse, varied and quietly understated effects on disciplines which engaged with camouflage and the military. This is narrative that has often been absent in studies of camouflage. But it is in Maskelyne that we can see the most poignant personal alteration resulting from his time working in military camouflage. On his return to Britain, Maskelyne found the country

¹⁰⁰⁸ Seawright, P. (2010) *Desert Stories*, Belfast Print Workshop Artist in Residence 2010.

¹⁰⁰⁹ For example in WWI and WWII, the British military employed over twenty two artists to document the conflicts, including Paul Nash, Stanley Spencer, Eric Ravilious and Mervyn Peake.

¹⁰¹⁰ Paglen, T. (2007) *I Could Tell You But Then You Would Have to be Destroyed by Me: Emblems from the Pentagon's Black World*; Paglen, T. (2005) *The Expeditions*; Paglen, T. (n.d.) *Limit Telephotography* http://www.paglen.com/pages/projects/nowhere/photos_images.htm.

¹⁰¹¹ Dear, M. Ketchum, J. Luria, S. & Richardson, D. (2011.) *GeoHumanities: Art, history, text at the edge of place*.

¹⁰¹² Driver, F. & Martins, L. (2007) John Septimus Roe and the art of navigation, c.1815-1830, *Art and the British Empire*.

¹⁰¹³ Graham (2010) op cit. & Gregory (2010) op cit.

¹⁰¹⁴ Ibid p.352.

disillusioned, tired and cynical. His memories of being involved in military camouflage and more broadly war were that:

...no matter what nobility and gallantry may be spent in it, no matter what total of young lives squandered, nothing of lasting value is ever gained, and much that is irreplaceable is forever lost. Folly, waste, brutality, cynicism - with misery, hate and turmoil to follow, no matter who wins. Remember it!¹⁰¹⁵

After the war Maskelyne never did return to the stage to embrace his fantastical magical persona; instead, he emigrated to Kenya, ending his days as a driving instructor.¹⁰¹⁶ It is important not only to highlight the further militarism of culture and knowledge that was encouraged through the development of camouflage, but also to consider the lasting effects on those who were involved and entwined with the technology's biography, and then left it behind entirely.

THE EFFECTS OF MILITARY AFTERLIVES AND WHY THEY MATTER

The alterations in the military also merit attention. The military can be seen to have embraced interdisciplinarity, like Cott, and has subsequently continued to transform its knowledge, still calling upon other knowledges in the development of warfare techniques and hardware. Barnes and Farish's work on the US and the Cold War reveals how the military continued to incorporate both physical and social sciences into the broader geopolitics of war and militarism.¹⁰¹⁷ Gregory's critical military geography of twenty-first century warfare has discussed the US military's enrolment of anthropologists in the War on Terror, ostensibly to aid in the development of counterinsurgent strategies.¹⁰¹⁸ It is this interest in and promotion of cultural intelligence and cultural-centric warfare through non-kinetic modes of engagement that has seen a so-called 'cultural turn' in late modern warfare. Similar to WWII with the hiring of social scientists in the US military as Barnes has explored, or the enrolling of scientists such as Cott for the development of camouflage, the military has begun to turn to academics and other professions to develop this military cultural turn, notably enlisting the Human Terrain Systems (HTS) project. Gregory is not alone in scrutinising and critiquing the US military's use of anthropologists and social scientists as part of the HTS, and more broadly the cultural turn in US military strategy, scholars within anthropology are concerned with the

¹⁰¹⁵Maskelyne, J. (1949), op cit. p.144.

¹⁰¹⁶ Fisher, D. (1983) op cit.

¹⁰¹⁷ Barnes, T. & Farish, (2006) op cit.

¹⁰¹⁸ Gregory, D. (2007a) 'The Rush to the intimate' Counterinsurgency and the cultural turn in late modern war, online essay.

attempt to enlist them into working for the military. Many, such as Gusterson and Lutz,¹⁰¹⁹ consider this involvement as ‘a reactivated mercenary anthropology’, thereby raising important ethical questions.¹⁰²⁰ Zehfuss explains that through HTS, social scientists are to fill the ‘cultural knowledge gap’ that faces the US armed forces in Iraq and Afghanistan.¹⁰²¹ The military argues that building a human dimension is central to counterinsurgency, and this too has been supported by anthropologists engaged in the HTS, such as Griffin who claims ‘in my experience, the U.S. Army’s HTS is directly helping to resolve conflict and create space for prosperity and freedom to take hold in Iraq’.¹⁰²² The suggestion is that HTS can reduce the death toll relies on the expectation that kinetic operations will be reduced through promoting cultural understanding, increasing the support for the US military, and thus, reducing violence.¹⁰²³

Gusterson has, however, noted that the military has framed resistance as a matter of cultural miscommunication, assuming that insurgents lack a sufficient grasp of what coalition forces are trying to achieve rather than having and acting upon objections to the coalition’s plans.¹⁰²⁴ Further, Gusterson suggests that the cultural turn and enrolment of social scientists in the military has consequences beyond the battlespace. He explains, ‘[t]he War on Terror is deepening the militarization of American society. It is enabling the national security state to build new constituencies and to penetrate disciplines and practices that were formerly off limits’, such as public health which, he argues, is currently being remade through the power of homeland security money.¹⁰²⁵ This anxiety in regards to the involvement in the HTS is just one example of anthropologists concerns with the use of their discipline ‘as a weapon in dubious battles’,¹⁰²⁶ others include the contribution by anthropology to the US military’s *Counterinsurgency Field Manual*.¹⁰²⁷ Similarly to the enrolment of outside disciplines in WWII and the Cold War, as discussed by Barnes and Farish, leading to the further militarism of knowledge and culture, issues posed by the incorporation of wider knowledges and disciplines

¹⁰¹⁹ Gusterson, H. (2010) The cultural turn in the War on Terror. In Kelly, J.D., Jauregui, B. Mitchell, S.T. and Walton, J. (eds) *Anthropology and Global Counterinsurgency* & Lutz, C. (2009) Anthropology in an Era of Permanent War, *Anthropologica* 51 pp.367-79.

¹⁰²⁰ Ibid p.6.

¹⁰²¹ Zehfuss, M. (2012) Culturally sensitive war? The Human Terrain System and the seduction of ethics, *Security Dialogue* 43 (2), p.176.

¹⁰²² Griffin, M. (2010) An Anthropologist among the Soldiers: Notes from the Field. In Kelly, J.D., Jauregui, B. Mitchell, S.T. and Walton, J. (eds) *Anthropology and Global Counterinsurgency*. p.229

¹⁰²³ Gusterson, H. (2010) op cit.

¹⁰²⁴ Ibid.

¹⁰²⁵ Ibid.

¹⁰²⁶ Sahlins, M. (2009) Introduction. In Network of Concerned Anthropologists (eds) *The Counter-Counterinsurgency Manual: Or, Notes on Demilitarising American Society*.

¹⁰²⁷ Network of Concerned Anthropologists (eds) *The Counter-Counterinsurgency Manual: Or, Notes on Demilitarising American Society*

into the military, to aid in the development of technology and knowledges, still pervade and demand critical examination. As such, previous encounters with militarism and warfare can be a means trace the roots of contemporary connections and the pervasiveness of militarism in culture. Camouflage can be considered as one such encounter, because - as a cyborg technology and military knowledge - it was assembled through a complex network of disciplines, materials, people and ecologies.

Camouflage can also be taken as a means to historicise and engage with the discomfort surrounding contemporary aerial military technologies, such as Unmanned Aerial Vehicles (UAVs). Aerially, technologies have long been heralded as having the potential to enable killing to be precise and efficient, yet to this day such hopes have still to materialise as current conflicts are, like those of the twentieth-century, strewn with tragedy and civilian deaths.¹⁰²⁸ The history of British military camouflage, which highlights the importance of appreciating angular geographies, reveals that the seemingly omnipotent gaze from aerial technologies has a long history of being technologically challenging to execute in practice. The ground has evaded and continues still to evade certain action, the earth's surface from above seems always observed as a place on the other side of the looking glass. Moreover, by focusing on the embodied experiences of individuals who were attempting to undermine the aerial gaze of the bomber miles above or the remote aerial interpreter, debates over the ethics of killing from a distance in conflict are enjoined. Camouflage in the desert worked to conceal or deceive, with the simplest of intentions, shared with many other military technologies, to save your own and kill the enemy other. Although this study primarily focuses on combatants, it goes some way to propose how arguments on killing from a distance are a diversion from larger questions into the ethics of violence and killing in war, which require greater scrutiny as the boundary between combatant and non-combatant is increasingly blurred. The efforts of British military camouflage emphasise that, whether battle is waged from a distance or at close range, the effect on the ground is the same: military technologies regardless of whether they appear, spectacular or prosaic, are steeped in violence and blood.

To this end camouflage has been the medium, in this study, through which to examine and trouble the division between the spectacle of military technologies and something of the embodied experience of conflict. As Gregory explains in relation to bombing, our understandings of such military techniques have 'been dominated by political and military historians who focus on strategy and social historians who recover the experiences of those

¹⁰²⁸ Gregory, D. (2011b) *op cit.*

who were bombed',¹⁰²⁹ two important projects which are all too often not in dialogue. Yet, conflict is characterised by both strategy and experience and each require consideration if the aim is to get beyond stereotypes of the military, avoid fetishising military technologies, and stop shrinking from the bloody consequences of conflict. Camouflage given its peculiar blend of the fantastical, scientific, absurd and tragic, can either staunch or hasten the flow of violence, and this ambiguous nature renders it perfect for observing the complexities of military technologies, the militarism of knowledge *and* the embodied, often bloody experiences of the battlefield. Thus, camouflage's biography reveals the pervasive and often understated character of militarism so that 'the consequences of this seemingly obvious and taken-for-granted thing [the military]¹⁰³⁰ can be scrutinised. In particular to our understandings of militarism this study has exposed that camouflage was a technology of violence, an observation that has been absent in other studies of camouflage. It was the capacity to enable violence which for some of its practitioners, such as Barkas, that was an exciting prospect of developing camouflage and it was the technology's aggressive potential that led it to be widely incorporated and utilised in battle plans throughout WWII.¹⁰³¹ Therefore, this violent component of camouflage's character and history should not be ignored. Highlighting the violence of seemingly mundane and seemingly unassuming military technologies and practices reveals the pervasiveness of militarism in unexpected places and disciplines.

WHY A *GEOGRAPHY* OF CAMOUFLAGE

In order to achieve this objective, geography has proven to be an insightful means to take camouflage to task. Camouflage is inherently geographical as it is a knowledge and practice that necessitates a deep understanding of our environment, together with our placing in and on the world. By designing this cultural-historical geography of camouflage through three intersecting and geographically-formed biographies - scientific, fragmentary-mobile and life-path - it is hoped that this study can contribute to existing literature on military camouflage by adding emphasis to the interdisciplinary nature and creative character of the technology. But further, by enabling multiple voices to state pluralistic, sometimes complementary and sometimes conflicting perspectives, this camouflage study can offer a more complex and unsettling history of military camouflage than has been offered to date. In particular, by

¹⁰²⁹ Gregory, D. (2011b) *Lines of descent* online essay 8th November 2011 <http://www.opendemocracy.net> p.21.

¹⁰³⁰ Woodward, R. (2004) *op cit.* p.154.

¹⁰³¹ Barkas, G. (1952) and Wiseman, D.J. (1953) *op cit.*

tracing Cott's engagement with camouflage spatially and temporarily, this study hopes to add insight into how configurations of knowledge, technology, entities and social reactions across and on space are shaped by militarism,¹⁰³² and in turn shape military geographies.¹⁰³³ Therefore, constructing the biography of a technology through its human innovators and examining along the way diverse entanglements of human and nonhuman knowledges and relations, has served to expose the perpetual transformation of knowledge practices and production, and thereby the subtle and diffuse nature of the militarism of knowledge. In addition, by following camouflage's life-path across and through various trails woven by its camoufleurs this study has also attempted to infuse life, into the history of military camouflage. From this geographical focus on biography it has been revealed here that the sites of camouflage development are never hermetically sealed but always composite hybrid spaces, which extend spatially and temporally from their settings in lines which interweave. As Ingold describes: 'An ecology of life, in short, must be one of threads and traces, not of nodes and connectors. And its subjects of inquiry must consist not of the relations *between* organisms and their external environments but of the relations *along* their severally enmeshed ways of life. Ecology, in short, is the study of the life of lines'.¹⁰³⁴ Following the lines of camouflage's life-path has exposed that technological development is an endeavour of passion, ingenuity, fear, hope and loss.

Thus, this engagement with the history of camouflage reveals that a geographical sensibility evades any restriction of a technology's history to one particular discipline or genesis. More importantly, it can sensitively yet critically account for the militarism of knowledge and culture as it pushes an agenda to rethink linkages between the military and technological development, in part by uncovering experiences of battle alongside the technical questions of how conflicts are conducted. Such spatial attentiveness allows critical consideration of contemporary military practices and knowledges with present and potential future conflicts and means of battle, all through a spatial lens on the past. Therefore, this small story about the history of camouflage configured through a geographical sensibility links into wider issues of human/nonhuman relations, knowledge production, militarism, morality and the ethics of violence. Thus, this camouflage biography has sought to reveal that '[m]ilitarism and military geographies shape the earth',¹⁰³⁵ and further to go some way to address Woodward's call that; 'Geography as a discipline should be more alert than at present it appears to be to the ways in

¹⁰³² Woodward, R. (2004) op cit.

¹⁰³³ Barnes, T. (2008) op cit. & Barnes, T. & Farish, M. (2006) op cit.

¹⁰³⁴ Ingold, (2007) op cit. p.103.

¹⁰³⁵ Woodward, R. (2004) op cit. p.159.

which these geographies are constituted, and the ways in which militarism's geographies are expressed'.¹⁰³⁶ To return to Virilio's statement that 'history progresses at the speed of its weapon systems',¹⁰³⁷ by studying camouflage in the desert environment it is clear that geography too is shaped in relation to weapon systems,¹⁰³⁸ but further that a geographical perspective becomes a means to describe and account for the weapons systems that progress the history in which human and nonhuman are enrolled.

WHAT MORE MIGHT BE DONE

In complicating the history of military camouflage and contributing to critical military geographies, this study acknowledges that it is not a complete or enclosed piece of work. As has been demonstrated by the afterlife of camouflage, it is clear that the history of the technology still informs contemporary conflict, not only through camouflage's continual presence in the battlefield, but also due to its historical impact on the character of warfare. As such, questions have been raised which have not been addressed in this study. For example:

Firstly, questions surrounding the complexity of the relationship between aerial and ground geographies have only just begun to be explored. This study of camouflage has attempted to go some way to address the limitation, currently present in work on aerial geographies, by historicising military engagement with the aerial view. However, as Cosgrove demonstrated with the invention of the canon ball and the subsequent changes in castle defences and conceptions of space, the development of military technologies has a much longer history of calculating the effects of battle in cubic space which have not been explored here in great detail.¹⁰³⁹ Also, by focusing on camoufleurs who sought to complicate this gaze, the earth has been figured as a dynamic active force in constructing the aerial geographies. This move goes some way to towards redressing the balance in aerial and military geographies which currently configure the air as the dominant perspective. However, fully to describe aerial geographies as a complex space of multiple and shifting angles, planes and perspectives arguably requires a more technical appreciation than has been provided here. Therefore, there is more to be done to explore the techniques and specialist skills - from technical deceptive art through to

¹⁰³⁶ Ibid.

¹⁰³⁷ Virilio, P. (2006) op cit. p.90.

¹⁰³⁸To clarify I use 'geography' here as the geography in/of the world, not 'Geography' as a formal academic discipline, except insofar that the discipline fuels and informs the kind of geographical sensibility used throughout this thesis.

¹⁰³⁹ Cosgrove, D. (1985) op cit.

contemporary geovisual technology - that the military has employed to comprehend the expansion of war into cubic space.

Secondly, the desert has figured as an important militarised environment for camouflage. It has been demonstrated by camouflage's history that battlefields require the military to employ traditional geographical knowledge in order to operate effectively. This study has considered the innovation of a visually deceptive camouflage technology, developed in response to its local geography and has touched upon the grander deceptive plans afoot in the British military during the Desert War. In particular, the employment of Ralph Bagnold in the Long Range Desert Group (LRDG) due to his experience of military service *and* his in-depth knowledge of the desert environment reveals, that by other and perhaps still more "underhand" means, the ethics of battle were being undermined in the desert. This raises questions surrounding stealth, deceptive geographies and battlefield morality. Bourke, for example, explains how the LRDG 'took pride in their murderous effectiveness' and that the killing of Prisoners of War was not unusual, due to its distance and detachment from authority, and that such defiance of the rules of engagement was rarely punished and perhaps even tolerated.¹⁰⁴⁰ Yet again, science and geography are enrolled through sand and war, raising critical questions about the geographies in and of deception.

Finally, camouflage has raised interesting questions about the place of nonhuman animals in warfare. Nonhumans are very much present and active in conflict, as companions in the battlefield, the means of labour and modes for fighting, and at times the line between human and nonhuman animal in conflict becomes blurred. For example, in WWII Wojteck the bear became a mascot, pet *and* an officially enlisted a soldier of the Polish Army.¹⁰⁴¹ Further, nonhuman animals are also beings with particularly useful intelligences for inhabiting the battlefield. One element of military camouflage that has not been explored in-depth in this thesis is camouflage behaviour. Camouflage training also taught soldiers to behave like other animals in the battlespace; soldiers were instructed to move across the battlefield by mimicking the movements of nonhuman animals through, for example, the 'monkey run' or 'leopard crawl'.¹⁰⁴² Wojteck and camouflage behaviour training give examples of the battlefield as a space that demanded and allowed different and diverse ways of being with and

¹⁰⁴⁰ Bourke, J. (1999) *op cit.* p.198.

¹⁰⁴¹ Orr, E. (2010) *Wojteck the Bear: Polish War Hero*. It is claimed that Wojteck (an abandoned cub bought by the Polish Army in Iran) helped the soldiers unload trucks of ammunition and was provided with the same rations as other 'soldiers'. Officially enlisted in the Polish Army he travelled across different battlefields of WWII from Iraq to Egypt. He ended his time with the military in a Polish Army camp in the Scottish Borders thereafter he was moved to Edinburgh Zoo where he stayed until his death in 1963 at the age of 22.

¹⁰⁴² The Instructors Handbook of Fieldcraft and Battle Drill, p. 9 – DG GMA A64/4/1/1

becoming nonhuman-animal. This complex entanglement of human and nonhuman continues in conflicts today in evermore hi-tech cyborg innovations through the science of biomimicry. Currently, the military is investing in novel research that learns from nature, recently, The Pentagon has awarded research grants to develop Micro Air Vehicles that can operate in similar ways to insects, mimicking their sensual engagement and interaction with the world.¹⁰⁴³ These increasingly complex relationships between the military and nonhuman animal bodies and experiences warrant further attention, while they also raise questions about the more-than-human nature of the battlefield.

These are only a few of many issues raised by this study, but they are ones which a geographical history of camouflage has begun to open up for scrutiny.

THE AFTERLIFE OF CAMOUFLAGE

The Desert War appeared to be the pinnacle of British military camouflage innovation and implementation as camouflage had decisively marked its space on the battlefield and its place in battle plans for the remainder of the war. After WWII, the British Military commissioned a report to reflect upon its use and development of military camouflage and it was clear that it appreciated the steps forwards that the camoufleurs had taken in the technology's development.¹⁰⁴⁴ The report highlighted that camouflage in WWII had proven its worth to the military and that sustained efforts should be maintained in peacetime to further develop camouflage. It concluded by stressing this point and by raising the possible issues, such as more reliable and sophisticated infra-red technology, that camouflage may be faced with in future conflicts.¹⁰⁴⁵ The military was correct to anticipate that technologies of observing and locating would improve. The Cold War introduced a different type of warfare than the total wars of the first half of the twentieth century. In the face of the threat of evermore destructive and violent weapons, such as nuclear weapons, war began and has continued to be waged asymmetrically between the might of conventional military powers and groups technologically who weaker employ guerrilla tactics. How camouflage has continued to evolve and adapt in response to such changes in conflict is an interesting point to consider.

Camouflage as the camoufleurs and the British military in WWII would have recognised it has altered somewhat. It seems that camouflage in the military has almost reverted to its WWI

¹⁰⁴³ Lim, D. (2011) Pentagon Wants to Cover Its Drones With Insects' Tiny Hairs <http://www.wired.com/dangerroom/2011/10/drones-tiny-hairs/>.

¹⁰⁴⁴ Wiseman, D.(1953) op cit. p.166.

¹⁰⁴⁵ Ibid, p.170.

state; the concealment of the swiftly mobile body of the soldier and equipment through Disruptive Pattern Material (DPM). The large-scale deception schemes of WWII are no longer effective against the sophisticated gaze of military observation and surveillance technology, grand sleights of hand are less likely to deceive and fool the digital eye. Yet, there is another way in which camouflage's contemporary life-path can be explored. This study into the cultural and historical geography of camouflage has examined the technology from within the military, and hence camouflage studied from this viewpoint in the contemporary setting may seem to have receded from its heyday in WWII. But, it is useful to return to the long term dissatisfaction with the term camouflage that dogged the camoufleurs and military in WWI and WWII. The desire for the work done under the title camouflage to be recognised as 'visual warfare',¹⁰⁴⁶ offers an interesting means through which to study camouflage in current conflicts.

Camouflage has for long been regarded as an abstract science which is only to be dabbled in by a few specially trained personnel, or at most the decorating of a vehicle or steel helmet with some foliage. Either because of this habit of Christmas tree decoration, spraying of paint, etc, or because of the invention of the term Camouflage, the real meaning of the term has been lost sight of or misused. The term 'Visual Training' probably signifies more correctly what is meant and what is required.¹⁰⁴⁷

The study of camouflage, and in particular issues of the implementation and enactment of camouflage, when contextualized within contemporary conflicts exposes a tension in the current work on visibility and geopolitics.¹⁰⁴⁸ The visibility explored recently in geopolitics has been considered in reference to the reveal, or unveiling. Graham explains the importance of the reveal as '[o]nce the hidden is unhidden, its seductive and ubiquitous mythologies can be confronted and potentially reversed'.¹⁰⁴⁹ However, camouflage has hinted at another aspect of visibility and militarism - obscurity. By exploring the hidden, by considering the methods of active obscurity something of the embodied nature of conflict can be exposed, understood and thus scrutinized. Unveiling and obscurity are not different projects they are, in different ways, a means to hold the geographies of militarism to account.

For example, the WWII camoufleurs, as has been explained, had to appreciate background aesthetics in order to effectively execute camouflage designs. The camoufleurs had to deceive by obscuring through the interplay of objects and their surfaces. It could be considered that a similar process of visual warfare is currently being waged by insurgents in Iraq and

¹⁰⁴⁶ Ibid, p.2

¹⁰⁴⁷ Wiseman, D.(1953) op cit. p.166.

¹⁰⁴⁸ See MacDonald, F. et al (2010)

¹⁰⁴⁹ Graham, S. (2010) op cit. p.351.

Afghanistan. As the work of Gregory and others¹⁰⁵⁰ has exposed, in asymmetric warfare although the military has high precision technology it is increasingly difficult to differentiate combatant from civilian. Camouflage as visual warfare - in particular its subversive characteristics of blending, disrupting and mimicking - could be seen to be currently employed by insurgents as they socially as well as environmentally blend in the background. Clayton has explored in his study of militant tropicality in the Cold War how insurgents exploited their intimate knowledge of the environments in which they fought in order to subvert the superior military force of the U.S.¹⁰⁵¹ A similar approach to the contemporary situation could be applied to the desert environments of Iraq and Afghanistan. Camouflage could be studied as insurgents utilising and blending into social, religious and cultural environments. This raises the possibility of whether camouflage has transformed again into a new form of visual warfare. The enactment of camouflage can be seen perhaps to have diffused into other registers of being in the battlefield, such as blending into particular time-space geographies of the civilian space. Camouflage for insurgents and also perhaps for those in the HTS, offers a pattern of being that allows soldier or insurgent to blend, and at times deceive, in the battlespace.

This brief consideration of the possible place of camouflage in contemporary conflicts highlights that camouflage's life path continues to evolve, taking new routes, emerging and renewing itself as it is faced with the continued innovation of military surveillance technology and the asymmetric character of contemporary conflicts. This, yet again, highlights the ambiguous nature of camouflage. In WWII camouflage became an active aggressive means of conducting conflict and it has continued in this vein. As it has evolved it has become increasingly difficult to locate and observe in the battlespace and therefore increasingly difficult to define, thus camouflage's biography in the contemporary situation continues to avoid scrutiny.

Finally, discussions on contemporary camouflage serve as a point of return to the central aim of the thesis; to explore camouflage, from the systematic adoption in the military from WWI through to Desert War and beyond, as a technology of violence. It is this element in particular that has been missing from other studies of camouflage, and it is exposing camouflage as an aggressive technology that has in this thesis been highlighted and began to be traced. Importantly, this aim has revealed the complex and diffuse nature of militarism,

¹⁰⁵⁰ Graham, S. (2010, 2009 & 2004) op cit. & Gregory, D. (2011a&b 2010 a&b) op cit.

¹⁰⁵¹ Clayton, D. (2012) op cit.

how it penetrates and transforms knowledges and disciplines with far reaching and long lasting consequences.

CONCLUSION

Thus in summary, underneath the comedy and creativity of camouflage, the technology has proved itself to be a trickster which played the fool and made the fool, with serious and deadly intent, as those who developed it clearly appreciated:

...it is useless in warfare to be merely brave, if bravery means presenting oneself as a useless target to the enemy. It is far better to employ intelligence and concealment, so as to induce *him* to present a target.¹⁰⁵²

This cultural-historical geography of camouflage, through considering the history of conflict, knowledge production and technological development, has sought to get close to the camoufleurs' own perspective on the technology that they crafted and produced, in order to hold a technology to account and further to describe and complicate the relations, practices and knowledges that it enrolled. An aim in this camouflage study has been an appeal not just to remember camouflage as the comedy of Chaplin attired as a tree, the artistically arresting cubist guns that so captivated Picasso, or the surreal pillbox painted as a car; but *also*, to scrutinise camouflage as a serious science, a scrappy craft, an uncanny magic and an artistic military aesthetic. It was all these overlapping, jarring and disconnected aspects of camouflage's character that led it to become both the soldier's talisman, warding off his worst fears, but also the trap waiting to ensnare him. A camouflage biography shaped by those who developed, used and were deceived by it has hence produced a narrative of a conflicted technology and jarring military practice. Taking a cultural-geographical engagement with camouflage has demonstrated that effective camouflage, whether in nature or in war, relied upon and exploited a superficial interest in surfaces and backgrounds, and therefore studies in camouflage and military geographies should look closer at the edges of militarism and bring into focus the lives - human and nonhuman - at the centre of this technology and other like it. By understanding the camouflage methods of dazzle, disruption and deception, and the interactions of art, science, theatre and the military, deceptively benign histories can be distorted through observant geographies.

¹⁰⁵² Penrose, R. (1941) op cit. p.102.

THE ABC OF CAMOUFLAGE: Y-Z

Y is for You, sir, on whom will depend the success or the failure of all, in the end.

Z is the Zeal with which you apply these few simple principles - do have a try.

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 CD&TC Film *Air View*- IWM DRA 220/01-04
 Aerial photograph (vertical) RAF 22nd May 1940 - C 1664
 Aerial photograph (oblique) RAF bomber 7th June 1940 - C 4415
 The Western Desert 1942: A sandstorm in the desert: a soldier battling his way to his tent -
 CBM 1358
 Vertical aerial photograph at El Magrun, Libya, in the afternoon of 22 December 1941 - CM
 2017
 A British soldier inspects a German tank. In the foreground can be seen the body of one of
 the crew, 26 November 1941 - E 6734
 Two Sikh members of an Indian camouflage unit in Baghdad, with a dummy Stuart tank
 mounted on a car chassis, 25 March 1942 - E 9697
 Troops carrying a dummy Stuart tank, 3 April 1942 - E 10147
 If going much further please take one.." Typical 'Aussie' humour is reflected in this sign
 erected on the El Alamein road by Australian troops, 14 September 1942 - E 16821
 El Alamein 1942: British infantry advances through the dust and smoke of the battle - E
 18474
 Pillbox camouflage as car in Felixstowe, War Office official photograph 24th August 1940 - H
 3306
 Aerial photograph (vertical) German Aerial Reconnaissance 29th October 1940 - HU 66030
 Aerial photography (oblique) No.1 Camouflage Unit 17th February 1942 - HU 93048
 Concealment in the Field No. 1 G.H.Q. Middle East - K 80/51
 James McIntosh Patrick Notes - M 16560
 Soldiers camouflaging a gun position in the desert, May 1940 - M E 90
 A Royal Air Force Lockheed Hudson AE626 aircraft of the Middle East Communications
 Flight flying over the pyramids 1942 -TR 27
 Photograph of WWI British Gunboat HMS KILDAGAN demonstrating dazzle - Q43387

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CAP - Preliminary Memorandum by Camouflage Division Ministry of Home Security n.d. - HO 186/171/4

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Letter from John Anderson to Mr Swinton 6th January 1940 -HO 186/174/2

Letter from John Anderson to Mr Swinton 12th January 1940 -HO 186/174/3

Preliminary memorandum by camouflage division, Ministry of Home Security n.d.-HO 186/171/4

Advisory Panel, Subjects for consideration n.d. - HO 186/171/5

Notes on the 6th Meeting of the Advisory Panel 12th January 1940 - HO 186/171/6

Camouflage Advisory Panel Notes from the 11th Meeting 20th March 1940 - HO 186/171/7

Letter from the Committee to the Minister of Home Security 26th March 1940 - HO 186/171/8

Camouflage Advisory Panel Interim Report 8th April 1940 - HO 186/171/9

Draft additional paragraphs for C.A.P. Interim Report - HO 186/171/10

Camouflage Advisory Panel Minutes of Meeting 1- HO 186/171/11

Camouflage Advisory Panel Minutes of Meeting 2 - HO 186/171/12

Camouflage Advisory Panel Minutes of Meeting 3 - HO 186/171/13

Camouflage Advisory Panel Minutes of Meeting 4 - HO 186/171/14

Camouflage Advisory Panel Minutes of Meeting 5- HO 186/171/15

Camouflage Advisory Panel Minutes of Meeting 6- HO 186/171/16

Camouflage Advisory Panel Minutes of Meeting 7- HO 186/171/17

Camouflage Advisory Panel Minutes of Meeting 8- HO 186/171/18

Camouflage Advisory Panel Minutes of Meeting 9- HO 186/171/19

Camouflage Advisory Panel Minutes of Meeting 10- HO 186/171/20

Camouflage Advisory Panel Minutes of Meeting 11- HO 186/171/21

Letter from John Anderson to unknown regarding Cott's resignation - HO 186/668/7

Draft letter by Sir Eady 10th April - HO 186/668/9

Letter from Cott to Sir Eady 27th April - HO 186/668/11

Letter from John Anderson to Herbert Morrison M.P. 20th August 1941 - HO 186/1343/1

Letter deputy under-secretary of state from research and experiments branch 13th June 1939 - HO 188/668/1

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Letter from Mr Galpin, Air Ministry to Ernest Swinton 15th September 1939 – HO 186/668/3

Letter from Sir Arthur Street (Air Ministry) to Sir Eady 31st July 1939 - HO 186/668/4

Letter from unknown to Mr Jordon 26th March 1940 - HO 186/668/5

Letter from John Anderson to Mr Brook 1st April 1940 - HO 186/668/6

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Draft, Minister re: camouflage by W.Eady 10/04/1940 - HO 186/668/9

Letter from Cott to Sir Eady, 27th April 1940 – NA HO 186/668/11

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