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Science in extremis: The 1963 American Mount Everest Expedition

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by

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The Dissertation of Philip William Clements is approved, and it is acceptable in quality and form for publication on microfilm and electronically:

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ABSTRACT OF THE DISSERTATION

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An interdisciplinary work of Science Studies and environmental history, *Science in extremis* investigates how scientific, political, and public traditions constitute the spaces and products of scientific inquiry. Together with the place of inquiry, they determine the character of knowledge produced therein. The 1963 American Mount Everest Expedition's biophysical, geological, sociological, and psychological research programs are exemplars of this process. Its scientists constructed an environmental imaginary toward Mt. Everest that allowed them to deploy it as an analog for Cold War theaters by coupling contemporary American ideologies with the masculinism and nationalism that connoted post-war Himalayan expeditions. The mountain's extreme environment was constructed as a laboratory, and its lack of experimental controls became an asset for scientists and sponsors who favored "reality" over "simulation."

Once in the field, the observers were subjected to the same phenomena as their test-subjects. They encountered difficulty transporting the materials, methods, and norms of scientific inquiry into the Himalayan hinterland. Technology malfunctioned, methods developed for university laboratories did not translate to the field sites, and normal precision and detached objectivity were undermined by the observers' presence within the locale. As a result, they perceived the mountain as resistant to their studies. Some researchers employed intuition to improvise and implement methodological substitutions. Others discovered that existential threats presented by the site altered the ways that they conducted their inquiries. All employed tough character to assert their scientific objectivity, even as they increasingly relied on the assistance of untrained Sherpas to complete their research routines.

Once on Mt. Everest's summit, practitioners lost all control over the production of scientific knowledge. Executing research routines nearly killed some researchers. Others abandoned inquiries or sacrificed specimens for the welfare of imperiled test-subjects. These shortfalls left substantial gaps in observation records, which made it difficult for researchers to support universal conclusions upon return to the United States. This led to further improvising to fulfill contractual obligations to project sponsors. Although the expedition's researchers ceased further reality-tests, content instead to pursue simulated experiments in controlled spaces, they never ceased imagining Mt. Everest's environment as a suitable laboratory for the production of scientific knowledge.

INTRODUCTION

On June 9, 1961, University of Cincinnati sociologist Dr. Richard Emerson received a letter from a colleague, who suggested that they collaborate to explore "research possibilities on high altitude climbs" that would take place on Mt. Everest in 1963. Emerson, a former mountain guide who had dabbled with sociological research during a climb in Pakistan's Karakoram range in 1960, was immediately receptive to the idea. By July 31, 1961, he had secured a place on the 1963 American Mount Everest Expedition (AMEE).

Armed with a new iteration of the methodology he developed for the Karakoram, tailored to Mt. Everest's immensity, Emerson successfully appealed to the National Science Foundation for funding upon the premise that his research objectives would be valuable to contemporary astronauts and soldiers, and that Mt. Everest's extreme locale made his mountaineering test-subjects suitable proxies for these groups. Preparing for his research on the mountain, Emerson acquired state-of-the-art, German-made portable tape-recorders, and printed research diaries to be kept by AMEE personnel for the duration of their expedition. He believed that the tape-recorders and diaries would allow for reliable data collection on the mountainside, where freezing temperatures, exhaustion, and the high-altitude ranging of his test-subjects would make normal sociological interviews impossible.

But the Mountain did not succumb easily. When AMEE reached Mt. Everest Base Camp on March 23, 1963, Emerson was already suffering from acute mountain sickness. The mountain's altitude left him bedridden, its temperatures froze his tape-recorders, and its treacherous terrain later killed one of his test-subjects. These misfortunes, combined with other contingencies generated by Mt. Everest's extreme environment, crucially re-shaped the nature of his research. As weeks of altitude-induced fits of coughing and vomiting sapped his strength, Emerson watched his remaining test-subjects ascend to higher and higher camps without him. On May 15, during a desperate attempt to reach them before they pushed to the summit, Emerson was caught out in the open, alone, at 7000 meters with night falling and a storm rolling in. Only by bivouacking in a glacial crevasse did he survive a windstorm that tore AMEE's uppermost camps from the mountainside.

The extreme environment on the Everest massif thwarted the efforts of Emerson and his colleagues. Upon leaving the mountain, another AMEE researcher reflected, "We came to appreciate the formidable problems facing [scientists] who undertake field research in this hostile physical environment at great altitude, and what must be done to engage effectively in such inquiry where inordinate amounts of time and energy must be spent simply to survive."[1] Mt. Everest was a place in which humans could not live without extensive life-support systems. It was unpopulated, had never been populated, and was only ever populated seasonally, and "without the normal complement of a fully functioning society."[2] Life only ever existed at the margins of the Everest massif. Rigorous scientific research in such a place would never be simple or straightforward. Emerson and his colleagues traveled halfway around the world at staggering cost to interrogate one of the world's most extreme environments. But what kind of science were

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[1] Maynard M. Miller, "Sketch of the Geology of the Mahalangur Himal with Preliminary Comments on the Glaciology of Mount Everest and Some Related Problems of High Altitude Research", (February, 1964): 2.
[2] Steve Pyne, "Extreme Environments," *Environmental History* Vol. 15 (July, 2010): 510.

they able produce in their new and unwieldy laboratory? Were their findings as exceptional as the place in which they were created, or could they be generalized to other environments?

Attention to such questions is on the rise. In 2003, historian David N. Livingstone synthesized a body of scholarship representative of the "Spatial Turn" in science studies. Just as 20th-century participants in the "Cultural Turn" made our understanding of scientific practices and beliefs more sophisticated by demonstrating their social and cultural heritage, Livingstone's collection of late-20th and early-21st century scholars analyzed the relationship between geographical locations and scientific research:

> There is something strange about science. Scientific inquiry takes place in highly specialist sites--high-tech labs, remote field stations, museum archives, astronomical observatories. It has also been pursued in coffee shops and cathedrals, in public houses and stock farms, on ships' decks and exhibition stages. And yet the knowledge that is acquired in these places is taken to have ubiquitous qualities. Scientific findings, to put it another way, are both local and global; they are both particular and universal; they are both provincial and transcendental. To ask what role specific locations have in the making of scientific knowledge and to try to figure out how local experience is transformed into shared generalization is, I believe, to ask fundamentally geographical questions.[3]

Spatial Turn scholars who asked those geographical questions have shown how those "highly specialist" places functioned as theaters of cultural performance, and how mundane places were transformed into scientific sites. Their analytical slant provoked new questions about the universality of scientific knowledge.[4] For, if scientific knowledge needs to bear "the marks of *nowhere*" to be considered universal, then the

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[3] David N. Livingstone, *Putting Science in its Place: Geographies of Scientific Knowledge* (Chicago: University of Chicago Press, 2003), xi.
[4] Suzanne Zeller, Book Review, *Isis*, Vol. 96, No. 3 (September, 2005): 469.

localized spatial contexts that are integral to generating that knowledge problematize its *nowhere*-ness.[5] Scholars who specialize in spaces of scientific inquiry interrogate how these spatial contexts affect the production of knowledge, and, in turn, how scientific inquiry affects and defines the spaces in which it is conducted.[6] They use two terms: *place*, a geographical, physical location, and *space*, an immaterial and abstract expanse in which scientific practices occur. It is the relationship between these two concepts that is the stamp of their trade.[7]

The following narrative takes the spatial turn in science studies to heart, seeking to demonstrate space's constitutive function in the creation of scientific knowledge by illustrating its manifold effects on a particular case in the mid-20th century. This case was chosen because it took place in an extreme environment, in a time of extreme politics; the political context that made sense of their quest to glean knowledge in an extreme physical environment. To combine temporal locality with geographical locality, we add *locale* to the Spatial Turn's lexicon. Locale emphasizes the presence of historical contingencies within the space of inquiry. Temporal and spatial contexts are both folded into locale, and, as I will demonstrate in the chapters to come, locale plays a causal role in the production of scientific knowledge at every step in its creation. Research questions,

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[5] Livingstone, *Putting Science in its Place*, 21.
[6] As Livingstone notes in his bibliographic essay, local contexts' generative role in the production of scientific knowledge dates to Clifford Geertz's *Local Knowledge: Further Essays in Interpretive Anthropology* (New York: Basic Books, 1983), *Putting Science in its Place*, 188.
[7] Livingstone, *Putting Science in its Place*, 5-7. Charlotte Bigg, David Aubin, and Philipp Felsch, who co-edited a special edition of *Science in Context* on the history of science in mountainous spaces, understand space as a "practiced place," as defined by Michel de Certeau in *The Practice of Everyday Life* (Berkeley: University of California Press, 1984), 117. Charlotte Bigg et al., "Introduction: The Laboratory of Nature -- Science in the Mountains," *Science in Context*, Vol. 22, No. 3 (2009): 314.

hypotheses, methods, observations, and conclusions are all subject to the contingencies of locale.

The extremity of AMEE's locale, and the practices of its five principal researchers, and their handful of assistants and test-subjects, throws into sharp relief the locale's influence over the production of scientific knowledge. But these influences amounted to more than the sum of the locale's geographical features. They also included political ideologies and scientific traditions. AMEE's scientists conducted research for institutions whose extreme ideologies created a gulf between the world's superpowers and bridged that gulf with extreme policies like New Look, Massive Retaliation, and Mutually Assured Destruction. They willingly ventured to a place at the physiological limits of human adaptation and inhabitation to propel six men to 8,848 meters above sea level, an elevation whose oxygen lack is at the very limit of human survival, and where objective dangers are so extreme that one AMEE test-subject was killed, and three others were mutilated by frostbite.[8] AMEE scientists also drew upon centuries-old traditions of scientific practices and environmental imaginaries about mountains as exceptional spaces for inquiry to both create a locale that was attractive to Cold War funding institutions and prepare for a locale that was hostile to scientific research.

Their attempt to construct and prepare for the unique Himalayan environment is also exceptional because it was the first and last time a multi-disciplinary scientific research program was married with a major mountaineering objective. Its architects

[8] John B. West, "Human responses to extreme altitudes," *Integrative and Comparative Biology*, Vol. 46, No. 1 (January, 2006): 33.

hoped that success on both fronts would normalize this partnership for future endeavors. However, neither scientists nor mountaineers have attempted to wed these goals since AMEE returned from the Himalaya in 1963. This raises the question of whether AMEE's scientific shortcomings extinguished hopes that these two disparate activities could be reconciled, especially since AMEE's mountaineering successes continue to be widely celebrated.[9] It also highlights the need to closely examine how scientific and mountaineering interests manifested and interacted in both the locale and post-expeditionary scientific reports. Such an examination can be used to determine whether the current consensus of irreconcilability is warranted.

This matter of interests is just one part of a Mertonian story about the scientific values and norms that constituted and obstructed AMEE's scientific practices.[10] Throughout this text, that story is accompanied by an analysis of localism: of constructing an environment for scientific inquiry, transporting inquiry into that environment, and "de-localizing" knowledge produced therein.[11] In AMEE's case, the scientists and their patrons were not entirely invested in producing universal knowledge. They were primarily interested in local phenomena that might recur under analogous circumstances. This commitment to localism for the duration of this particular expedition

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[9] John B. West, high-altitude physiologist and leader of the 1981 American Medical Research Expedition to Everest (AMREE), considers AMREE a scientific expedition.

[10] Of Robert Merton's scientific norms—Universalism, Communism, Disinterestedness, and Organized Skepticism—this text interrogates the third. As we shall see, the scientists' experiences within the extreme environment both delineated their competing interests for my analysis and destabilized their ability to maintain normal disinterestedness. See Robert K. Merton, "The Normative Structure of Science," in *The Sociology of Science: Theoretical and Empirical Investigations*, edited by Robert K. Merton and Norman W. Storer (Chicago: University of Chicago Press, 1973), 267.

[11] Locality and its various implications for the historiography of science are articulated in Jouni-Matti Kuukkanen, "Sense of Localism," *History of Science*, Vol. 50 (Dec., 2012): 477-500.

was instrumental in devising studies that secured funding by obviating the need to universalize their findings. As we shall see, both this tension between localism and universalism and the Mertonian story sketched above were comprised from the practitioners' relationship with the locale. The ways that these specialists conceptualized and assessed the environment in which they sought to work shaped their epistemologies and performances; just as their science constructed the environment, the locale constructed their science.

Chapter One demonstrates the utility of locale as a conceptual tool to analyze past scientific inquiry. Examples from the history of human interactions with mountain environments populate the public, political, and scientific dimensions that define a locale's character as a construct situated in both space and time. The contingency of these dimensions distinguish it from the geographical concepts of place and space. They allow investigators to track and synthesize factors that contribute to the dynamism of local inquiries, such as regional environmental imaginaries, public and private power structures that direct inquiry, and networks of transmission and normalization that transcend scientific disciplines and epochs.[12]

Where the first chapter is a general overview of locale as a conceptual tool, Chapter Two applies locale to the subject of this study: the 1963 American Mount Everest Expedition. It tracks how AMEE recruited its all-male scientific cohort, and how those scientists collectively adapted their research questions, hypotheses, and methods to

[12] Actor-network theorists may find locale to be useful to help conceptualize places as actants.

suit the imagined environment at Mt. Everest.[13] Because the imagined environment differed drastically from normal research sites, the scientists' designs deviated from disciplinary norms. None of the scientists believed that they could control for all the variables that they expected to encounter at Mt. Everest, so they created projects and practices of data collection that sought to record phenomena produced by the environment's contingency. Using their common imagination of the high Himalaya, the team's physiologist, sociologist, and psychologist co-produced a novel mode of experiment that they called "reality-testing," which they based upon an epistemology that favored test results produced under non-simulated field conditions, rather than simulations conducted in laboratories. Their planned deployment of reality-testing dictated new practices of place, which were ultimately folded into proposals sent to major granting institutions.

Chapter Three examines how AMEE scientists used analogy to make reality-testing at Mt. Everest applicable to the funding institutions of the American Cold War state. For public grant-funding institutions like the National Science Foundation, AMEE scientists compared Mt. Everest to other extreme environments, including the deep sea, foreign battlefields, high altitude, arctic and Antarctic outposts, and outer space. These analogous environments were emphasized because they were theaters of the Cold War, which allowed AMEE scientists to portray their teammates as proxies for submariners,

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[13] The all-male cohort of scientists and test-subjects may not have been an issue for contemporaries, however, 21st-century scientific expeditions are much more inclusive when it comes to gender. For example, see D.S. Martin, E. Gilbert-Kawai, D.Z. Levett, K. Mitchell, Bc. R. Kumar, M.G. Mythen, M.P. Grocott, "Xtreme Everest 2: unlocking the secrets of the Sherpa phenotype?" *Extreme Physiology & Medicine*, Vol. 2 (2013): 30.

soldiers, bombardiers, astronauts, and other Cold War agents. AMEE scientists approached the National Geographic Society--their major private grant-funding institution--with the same rhetoric, however, the Society's decision had less to do with Cold War Americanism, and more to do with its response to the automation of exploration and the prevalence of big-budget science and engineering projects during the post-war era. The Society saw AMEE's scientific endeavors on Mt. Everest as a means to link its institutional identity as a principal patron for American terrestrial exploration, and its ancillary male heroism, to NASA's Project Mercury missions.

Now fully funded and staffed, AMEE's travails through the Nepalese hinterland to the foot of Mt. Everest comprises the material for Chapter Four. Their arduous, four-week overland trek served to acquaint the American scientists with the cadre of Sherpas and climbers who were enrolled to serve as assistants to their data collection routines, and it sowed tension between expedition members who prioritized scientific research and those who prioritized reaching the mountain's summit. It also gave AMEE scientists a preview of the logistical, technological, and practical difficulties associated with fieldwork in the periphery. A series of health problems, communications breakdowns, inclement weather, and other contingencies challenged the scientists' ability to follow research protocols. These obstacles encountered during their march to Mt. Everest anticipated the destabilization of other scientific norms that occurred once the team began operations on the Everest massif.

That destabilization, and the scientists' response to its effects, is the subject of Chapters Five, Six, and Seven. These three chapters accompany the expedition's members as the climbed up the mountain and examine how local circumstances shaped their research programs. Over the ensuing 66 days, Dr. Will Siri, a biophysicist; Dr. Maynard M. Miller, a glaciologist, and his assistant Barry Prather; Dr. Richard Emerson, a sociologist; Dr. James Lester, a psychologist; and Barry Bishop, a glaciologist and Assistant Photo Editor at National Geographic, confronted the realities of reality-testing: instruments froze; mundane routines were always laborious, and often impossible; men and materiel scattered across the mountainside; researchers were injured; some test-subjects were incapacitated, and one perished. Under these circumstances, precise measurements became imperfect, detached objectivity dwindled as the observers consoled and sought consolation, collection methods were hampered, and their data were truncated. Because the extreme environment's destabilizing variables emerged without warning during day-to-day operations, AMEE scientists had to quickly and cleverly formulate on-the-fly solutions that often involved enrolling untrained, illiterate Sherpas as *de facto* (and subsequently invisible) technicians and field assistants.[14] Those solutions were manifestations of an extension of masculine scientific objectivity peculiar to their extreme site: beyond "mechanical objectivity" and "trained judgment," AMEE scientists exhibited a toughness of character analogous to the Mercury Seven's "Right Stuff." They had been culled for their toughness by AMEE leaders in 1962, they relied on it to see their projects through to the expedition's end, and it became part of the theatrics that celebrated their triumphant return to the United States. Ironically, the scientific knowledge generated by Siri, Emerson, and Lester would ultimately negate the need for

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[14] For more on those scientific practitioners who are often rendered invisible, see Steve Shapin, "The Invisible Technician," *American Scientist* Vol. 77 (Nov.-Dec., 1989): 554.

male "toughness" in scientific practitioners, as their science of character revealed that neither scientists nor test-subjects needed to embody the Right Stuff to succeed on Mt. Everest. Nor did they even need to be men.

Chapter Eight investigates how AMEE scientists attempted to make sense of their observations after returning to the United States in mid-1963, and how their benefactors in Washington D.C. exploited the expedition's successes to advance Americanist ideologies. The findings from each research project are analyzed to determine the degree to which the locality of their origin is present, with special attention paid both to the scientists' reflections on the process of conducting research in an extreme environment that defies reproduction, and to the reactions of their disciplinary communities. These reflections underline the conclusion of *Science in Extremis*: that the universality of scientific knowledge cannot be taken for granted by its practitioners or consumers; the extreme locale exerted seen and unseen influence over the constitution, conduct, and conclusions of the research performed within its domain. The knowledge born there was inextricably linked to the locality in which it was produced, evidenced by the scientists' admissions. For some of AMEE's scientists, this stunted the reception that their colleagues gave their work, while for others a closeness to "nature in the raw" heightened the authority of their results and propelled their post-expeditionary careers. Either way, Siri, Emerson, Lester, Miller, Prather, and Bishop's personal lives were transformed by their shared experiences on Mt. Everest in 1963.

CHAPTER ONE: CREATING THE LOCALE

The locales where scientific inquiry occurs are more than just the sum of their physical attributes such as location, or their more abstract attributes such as form. The places and spaces that constitute these locales are also defined by amalgamations of historical contingencies, some of which are derived from traditions that predate the so-called Scientific Revolution. Because of this, a locale is always temporary, and its character always locally situated by time and place. In this chapter, we will explore how traditions of publicity, policy, and science informed how AMEE's scientists, sponsors, and test-subjects constructed a locale at Mt. Everest in the early 1960s. Addressing how these traditions co-produced AMEE's locale will help us to better understand how AMEE scientists devised their inquiries and what kind of results they expected to produce, why politicians supported the expedition and what they hoped to gain from their support, and how the degree of public awareness shaped fundraising efforts and expedition objectives.

Locale uses a concept found in environmental history—the environmental imaginary—to address the public's perception of the places in which scientific inquiry is performed. That perception has shaped the ways that scientists conceptualized their projects, and affected public reception and consumption of popular scientific narratives. Locale can also be employed to track the ebb and flow of political interests in places of inquiry to record how scientists have exerted agency over their sponsors in the age of Big Science, rather than merely respond to the needs of their nation-state. Finally, locale accounts for scientists' partiality toward the technological and methodological traditions that their predecessors normalized for particular places, and what kind of environmental, public, and political stimulus was necessarily to depart from those disciplinary norms.

LOCALE AS PUBLIC

The public dimension of a locale is dependent upon the public's shared environmental imaginary.[15] That imaginary is shaped by collective interactions with the environment, including the stories told about local places, and the roles that those stories play in the lives of the regional inhabitants. European alpinists journeyed to the Himalaya long before Americans, and so environmental imaginaries toward the Himalaya were dominated by European traditions. Those traditions began long before the Alps became a stop on the Grand Tour in the seventeenth century, and this section explores a little of that history to demonstrate the power publicity can have over the use of mountains as a locale for inquiry. That power further increased once nation-states fused politics with public interests in the 20th century, and private institutions such as the National Geographic Society engaged public discourse with its brand of Americanism and exoticism.

For centuries, medieval attitudes toward Europe's mountains prevented their use as locales for inquiry; instead, they were places to be avoided. Although churches and citadels were built upon hills, scholars characterized high mountains like the Alps and Pyrenees as both terrible and worthless.[16] To learned men, their viewing inspired fear

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[15] Throughout this volume, we deploy Diana Davis's definition of "environmental imaginary" as "the constellation of ideas that groups of humans develop about a given landscape, usually local or regional, that commonly includes assessments about that environment as well as how it came to be in its current state." Diana K. Davis, "Imperialism, Orientalism, and the Environment in the Middle East: History, Policy, Power, and Practice," in *Environmental Imaginaries of the Middle East and North Africa*, ed. Diana K. Davis and Edmund Burke III (Athens: Ohio University Press, 2011), 3.
[16] For the warm regard tenth- and eleventh-century Germans had toward their local hills, see Gertrude Stockmayer, *Über Naturgefühl in Deutschland im 10. und 11. Jahrhundert* (Leipzig: Druck und Verlag Von B.G. Teubner, 1910), 38-43. For contemporary fear of the Alps, see David A. Warner, *Ottonian Germany: The* Chronicon *of Thietmar of Merseburg* (Manchester: Manchester University Press, 2001), 309; William Stubbs, *Seventeen Lectures on the Study of Mediaeval and Modern History and Kindred*

rather than sublimity, traveling amongst them was to be undertaken only out of necessity, and any pleasures that they might offer interfered with ascetic worship of the Creator. In some cases, terror inspired learned and unlearned men to populate regional mountains with dragons, witches, and evil spirits. These attitudes are evident in the writings of John d'Bremble, who deemed the Alps a "place of torment" in 1188, where the "stony ground" of ice inhibited walking and standing, and falling meant "certain death." Contemplation, too, was nigh impossible; d'Bremble's ink bottle froze, his fingers were too cold to write, his beard was "stiff with frost," and his breath "congealed into a long icicle."[17] He advised his correspondents to avoid the Alps.

Even when the climate was more amenable than the one encountered by d'Bremble at St. Bernard Pass (2,469m), mountains interfered with inquiry in other ways. Drawing on an ascetic tradition dating to Augustine of Hippo and Pope Innocent III, Petrarch famously advised his audience to abstain from climbing mountains, no matter their temptation. After ostensively climbing Mont Ventoux (1,912m) in 1336, he spurned both the exploration of the natural world and the physical hardship inherent to that climb: "I should have learned a long time ago from the pagan philosophers themselves that

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Subjects: Delivered at Oxford, Under Statutory Obligation in the Years 1867-1884; with Two Addresses Given at Oxford and Reading (Oxford: Clarendon Press, 1886), 147; Edward Tompkins McLaughlin, *Studies in Mediaeval Life and Literature* (New York: G.P. Putnam's Sons, 1894), 6-7; Majorie Hope Nicolson, *Mountain Gloom and Mountain Glory* (Ithica: Cornell University Press, 1959), 31-71; Francis Gribble, *The Early Mountaineers* (London: T. Fisher Unwin, 1899), 45; Salimbene de Adam, *Cronica*. Edited by Giuseppe Scalia. (Bari: Yale University Press, 1966), http://www.uan.it/alim/letteratura.nsf/%28cercaVolumi%29/79639A883D5C4E9CC1256D4F004126CF (accessed December 20, 2012). For contemporary ascetic scorn toward mountains, see Cardinal Lotario dei Segni, *De Miseria Condicionis Humane*, Edited by Robert E. Lewis (Athens: University of Georgia Press, 1978), 110; Leopoldine Van Hogendorp, *Landscape and Philosophy in the Art of Jan Brueghel the Elder (1568-1625)* (Surrey, England: Ashgate Publishing Limited, 2009), 71; Francesco Petrarch, *Selections from the Canzoniere and Other Works*, Edited and Translated by Mark Musa (Oxford: Oxford University Press, 1985), 17.

[17] Stubbs, *Seventeen Lectures*, 147.

nothing is admirable but the soul beside whose greatness nothing can be as great."[18] Climbing mountains inhibited, rather than augmented, the contemplative inquiries that were valued by empowered men prior to the formation of a literate public sphere.[19] It would be centuries before mountains occupied a different role in the public imagination, one that was more suited to their use as a space for inquiry.

Centuries later, explorations of the Alps by men of science led to accounts of alpine wonders, including "Rivers of Ice" extending from "Icy Mountains," invulnerable chamois, and mountain-dwelling dragons. These accounts were disseminated across Europe, attracting curious travelers to stop at alpine towns like Chamonix during their Grand Tour. Their wondrous stories transformed mountains into places of spectacle and sublimity for charmed publics. The Grand Tour stop at Montanvert above Mont Blanc's

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[18] Francesco Petrarch, *Selections from the Canzoniere and Other Works*, 17. Modern scholars have called Petrarch the "first recorded Alpinist," and remarked that his "colorful description of this enterprise has startled many readers who have been amazed to see a man of his epoch venturing to climb a mountain for a view like a modern alpinist. See Morris Bishop, *Petrarch and His World* (Bloomington, Indiana: Indiana University Press, 2002), 104; Ernst Cassirer, Paul Oskar Kristeller, and John Herman Randall Jr., eds., *The Renaissance Philosophy of Man: Petrarca, Valla, Ficino, Pico, Pomponazzi, Vives* (Chicago: Chicago University Press, 1948), 28. Jacob Burkhardt used Petrarch's letter to exemplify his belief that contemporaneous Italians were "the first among modern peoples by whom the outward world was seen and felt as something beautiful." Jacob Burckhardt, *The Civilisation of the Renaissance in Italy*, Translated by S.G.C. Middlemore (New York: Macmillan and Co., 1904), 298. In a scathing critique of Burckhardt's use of Petrarch's ascent of Mount Ventoux as an "epoch-making" event, Lynn Thorndike wrote: "Jean Buridan, the Parisian schoolman, had visited [Ventoux] between 1316 and 1334, had given details as to its altitude, and had waxed enthusiastic as to the Cevennes. So that all Petrarch's account proves is his capacity for story-telling and sentimental ability to make a mountain out of a molehill." Lynn Thorndike, "Renaissance or Prenaissance?" in "Some Remarks on the Question of the Originality of the Renaissance," by Ernst Cassirer, Francis R. Johnson, Paul Oskar Kristeller, Dean P. Lockwood, and Lynn Thorndike, *Journal of the History of Ideas* Volume 4, Number 1 (January, 1943): 71-72. Paul A. Lombardo argued that Petrarch, as an historically transitional figure, "retained a basically medieval posture toward the relative value of a life of solitude over a life of action in the world," however, his exploration of the possibilities "of virtue outside the religious life...opened the way for eventual praise of the *vita activa* by those who followed." See "Vita Activa versus Vita Contemplativa in Petrarch and Salutati," *Italica*, Vol. 59, No. 2 (Summer, 1982): 85-86.

[19] Jürgen Habermas, *The Structural Transformation of the Public Sphere: An Inquiry into a Category of Bourgeois Society*, Translated by Thomas Burger (Cambridge: MIT Press, 1989), 30.

Mer de Glace, pioneered in 1741, was celebrated by contemporary travel writers and novelists including Ann Radcliffe and Mary Shelley as its popularity grew.[20] Eventually it attracted a visit from Swiss aristocrat Horace-Bénédict de Saussure in 1760, who was so impressed by the sites that he offered a substantial reward to the first man to summit Mont Blanc. Over the next 100 years travel logs and alpine ascents were eagerly consumed by Europe's midde classes, the *Guides de Chamonix* professional club was founded to protect the interests of working-class French and Swiss guides, and the men who climbed mountains became heroes honored with larger-than-life statues.

Alpinism's "Golden Age" was an eleven-year period spanning the Wetterhorn's first-ascent in 1854 to the disastrous first-ascent of the Matterhorn in 1865.[21] During this Golden Age, genteel Britons and their Chamonix guides pioneered the requisite techniques to climb and "conquer" 140 of the Alps' most prominent peaks--mountains which had in past times seemed terrible and insurmountable. Out of their collective experiences, a sport was born whose rules were created by "upper-middling Victorians who borrowed from aristocratic traditions of chivalrous masculinity to create a tempering contest with nature."[22] These well-connected members of London's Alpine Club comprised a larger Victorian culture that celebrated the pursuit of sport as "one of the

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[20] Gribble, *The Early Mountaineers*, 90. Gribble reproduces an English translation of William Windham's letter from his pioneering visit to Montanvert and the Mer de Glace in Chapter XII. Based on Windham's account, it is likely that his party ascended to a point between 1600m and 1900m on the northern spur of Aiguille du Grépon, a subsidiary peak of Mont Blanc, which overlooked the Mer de Glace. The vicinity has been home to the Hôtel Restaurant du Montenvers since 1880. In *Frankenstein, or the Modern Prometheus*, Frankenstein is reunited with his creation atop Montanvert.

[21] C. D. Cunningham and Cpt. W. de W. Abney, C.b., R.E., F.R.S., *The Pioneers of the Alps* (Boston: Estes and Lauriat, 1888), 14.

[22] Joseph E. Taylor III, *Pilgrims of the Vertical: Yosemite Rock Climbers and Nature at Risk* (Cambridge: Harvard University Press, 2010) 19.

distinguishing marks of a gentleman and a route to a disciplined perception of the world."[23] The new sport's audience consisted of a literate, bourgeois public that read the climbers' widely-disseminated accounts in newspapers and books, and attended lectures given by the climbers upon their return to London. The alpinists had transformed the Alps from a place of natural wonders to a theater of human drama; the mountains were a space for young gentlemen to take risks and publicly advertise their manly virtues, and newspapers to exploit to sell features.[24]

In Europe, the public imaginary toward mountains and the public's enthusiasm for alpinism defined the construction of the Himalayan locale after World War I. They propelled alpinists who felt the Alps were "played out" to India and Tibet in search of unclimbed peaks to satisfy their aspirations for sport and social recognition.[25] They afforded companies like *The Times* and national institutions like The Royal Geographical Society the means to fund those expeditions and commercially exploit their achievements. Finally, they gave nation-states the political capital to make Himalayan expeditions into nationalistic endeavors during the heady days between the World Wars and those in the fifteen years following 1945. This fusing of public interests with private ones, and nationalism with public enthusiasm for mountain climbing, constructed a locale in which scientific inquiry could act as the culmination of centuries-old mountaineering traditions and serve the public good.

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[23] Bruce Hevly, "The Heroic Science of Glacier Motion", *Osiris*, 2nd Series, Vol. 11, Science in the Field (1996): 66.
[24] Taylor, 23.
[25] Maurice Isserman and Stewart Weaver, *Fallen Giants: A History of Himalayan Mountaineering from the Age of Empire to the Age of Extremes*, (New Haven: Yale University Press, 2008), 32.

By the middle of the 20th century, the National Geographic Society (NGS) had assimilated certain practices from the European adventure narratives to propagate its Americanist ideology, enhance its institutional prestige, and shape public opinion. Since the 1890s, the Society had used its Magazine to publish narratives of polar explorations as metaphors for modernity and progress in celebration of American technological achievements.[26] From 1953 to 1960, it featured fifteen stories that highlighted the courage, technological mastery, and scientific ingenuity of American polar expeditions.[27] During that time, the Society also expressed interest in expanding these narratives to the Himalaya. But, without an American expedition to back, its focus was limited to retelling "The Conquest of Mt. Everest" over a year after the mountain had been climbed. An American expedition to the exotic hinterland of Nepal would be the perfect locale for NGS to publicly disseminate its Americanist brand of heroic science with a view that it had inherited from the Victorians: "that the West was a superior civilization and that although there might be many stages of social evolution and many seemingly bizarre customs and superstitions in the world, there was only one civilization, one path of progress."[28]

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[26] Lisa Bloom, *Gender on Ice: American Ideologies of Polar Expeditions* (University of Minnesota Press: Minneapolis, 1993), 4.
[27] Selected titles include "Three Months on an Arctic Ice Island: Floating on a Glacial Fragment, U.S. Air Force Scientists Probe Top-of-the-World Mysteries Within 100 Miles of the Pole" (April, 1953), "All-out Assault on Antarctica" (August, 1956), "Admiral of the Ends of the Earth" (July, 1957), and "Year of Discovery Opens in Antarctica: Daring Scientists of a Dozen Nations, Pooling Knowledge and Resources, Launch Man's Most Ambitious Assault on the White Continent" (September, 1957).
[28] Bloom, 4-5.

LOCALE AS POLITICAL

Significant amount of Science Studies scholarship has been devoted to discovering the various ways in which governments or states have directed scientific inquiries. Locale is inclusive of a place's political dimension--that is, the various ways that state actors have vested places and spaces with state interests, and exploited their geography for political gain. The political dimension of the Himalaya, particularly after World War II, is salient to the construction of the locale at Mt. Everest in 1963. Mountaineers who served their nation-states during the world wars found the discipline and organizational skills that they learned in combat to be well-suited to Himalayan campaigns. Alpinists who harbored disdain for politics found themselves engaging in politics. Those mountaineering "purists" who considered their endeavors divorced from nationalist contexts found those contexts inescapable once on the mountainside. By the time American scientists prepared project proposals for Mt. Everest in 1961 and 1962, the Himalaya had hosted dozens of nationally-sponsored climbing expeditions from states whose territories were located thousands of kilometers away. Those activities normalized the Himalaya's political dimension, which, in turn, situated AMEE's Mt. Everest within a tradition of political exploitation.

The occupation and exploitation of geographical prominences for political purposes is not a recent trend. Antoine de Ville's ascent of Mont Inaccessible (now called Mont Aiguille) in 1492 by royal decree has been called "the 'Magna Carta' of mountaineering." Historian Peter H. Hansen interpreted King Charles VIII's dispatch of

Antoine de Ville's as the result of the French king's "thinking like a state."[29] Although the deed was later used by the French monarchy to symbolize Louis XIV's unassailable sovereignty in the early eighteenth century, when such acts were considered "ceremonies of possession," the practice of climbing mountains to expand the borders of state was underway soon after Antoine de Ville's climb.[30] When Hernán Cortés heard that the natives local to Popocatépetl that the volcano "was a most evil thing and all those who climbed it died," he "ordered certain Spaniards to climb it and see what it was like up there."[31] It took two tries, but the *conquistadores* made the summit.

Having visited the volcano's summit, the *conquistadores* exploited its natural resources for their chief political end: the subjugation of the New World. When Cortés' expedition ran low on gunpowder in 1521, he dispatched a Don and two soldiers to Popocatépetl's summit crater to collect sulfur to manufacture more. Although the three men endured a freezing bivouac, poisonous fumes, a crevasse rescue, an apparent case of Acute Mountain Sickness, and at least one eruption, they ultimately were able to lower one another into the volcano, dangling from 23 meters of rope above the "hellfire," to collect the desired sulfur.[32] Cortés would later write to King Charles that he would

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[29] Peter H. Hansen, *The Summits of Modern Man* (Cambridge: Harvard University Press, 2013), 22-25.
[30] Ibid., 23.
[31] Cortes, *Letters from Mexico,* Translated and Edited by A. R. Pagden (New York: Grossman Publishers, 1971), 279. Cortes' dismissal of local beliefs might reflect his valuation of indigenous knowledge; the beliefs of heathen savages may have been easier to discount than those of learned Christians. Alternatively, perhaps Spanish conquistadores were less inclined to fear what might lie in wait atop mountains, since at least one of Cortes' men had climbed Teide sometime before landing in the New World in 1519. Whatever the case, Cortes did not represent any trepidation on the part of the Spaniards, nor, in a letter to his King, would he have wished to. The natives' interpretation of the volcano is recounted in Dr. D. Francisco Cervantes de Salazar, *Crónica de la Nueva España,* Edited by M. Magallón (Madrid: The Hispanic Society of America, 1914), 754-756.
[32] Ibid., 756-759.

procure sulfur from Spain rather than send future expeditions into the dangerous volcano.[33]

By the 20th century, European possession of frontier mountaintops via their occupation had become both tenuous and fleeting, but no less political. The Himalaya and Karakoram ranges hosted a series of adventures whose political connotations established their utility to colonial powers' nation-building efforts. These efforts overlapped with the construction of a locale at Mt. Everest by American sponsors, scientists, and test-subjects in the early 1960s. They provided the political traditions that the Americans both emulated and disdained. Without this pre-existing political dimension to the Himalaya, the Americans would have had a much more difficult time securing state funding.

During the few years before World War I, nationalism, so strident in the recent exploration of the Poles, began seeping into Himalayan climbs as the "public imagination" turned toward Mount Everest. With both Poles attained by 1911, the national and institutional impulse to explore needed another "virgin prize." It was found in the Himalaya, which was "henceforth analogously styled 'the Third Pole.'"[34] Spurred on by the appropriation of heroic modes of rhetoric present throughout the race between Roald Amundsen and Robert Falcon Scott to the South Pole, the subsequent martyrdom of Scott, and the "military style and spirit" of the first world war, high-profile, state-sponsored climbing expeditions transformed Himalayan summits into places to plant

[33] Cortes, *Letters from Mexico*, 325. For his part, the appropriately-named Don Montaño said that he would not repeat the feat for "all the treasure in the world." Cervantes, *Crónica*, 760-761.
[34] Isserman and Weaver, 81.

flags, and portrayed their participants in "a high rhetoric of struggle and honor and fellowship and sacrifice."[35] In the wake of Verdun and the Somme, Mt. Everest symbolized for Britons "a national imperative, a supremely elevated point of redemption for a sacrificed generation."[36]

In the decade before the Second World War, European nationalism in the Himalaya proliferated. The nature of this proliferation was itself a matter for politics, with Anglo-American sources blaming a series of German expeditions to Kangchenjunga and Nanga Parbat for the injection of "a stridently nationalist understanding of Himalayan mountaineering."[37] In 1929, a German climber named Paul Bauer sought to summit Kangchenjunga to restore the "honor of the fatherland," which had been tarnished by the surrender at Versailles over a decade before.[38] After that unsuccessful expedition, Bauer worked to bring "German mountaineering into line with the new political disposition" of Nazism.[39] By 1936, he had earned a position under the *Reichssportsführer*, and was part of an institution that transformed Nanga Parbat--the site of two more failed German climbs in 1932 and 1934--into *der Schicksalsberg der Deutschen*: the "German mountain of destiny."[40] In this way, a mountain located entirely within British India was aggressively appropriated by Nazi Germany. Two additional German failures on Nanga Parbat in 1937 and 1939 further instilled the mountain in the

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[35] Ibid., 82.
[36] Ibid., 84.
[37] Ibid., 172. Although George Leigh Mallory had been appropriated as a national hero after dying on Mt. Everest in 1924, Germans are typically blamed for mixing nationalism with climbing. Their prewar history on Nanga Parbat can be found in Isserman and Weaver, 171-182, 200-203.
[38] Ibid., 135.
[39] Ibid., 172.
[40] Ibid., 181.

national consciousness.

The intervening years of war saw an upswing in nationalist rhetoric concerning Himalayan mountaineering ventures. Sharp dichotomies resulting from "wartime thinking" encouraged American and British mountaineers "to equate German cragsmanship with Nazi aggression."[41] The day after Great Britain declared war on Germany in 1939, the American consul in Kashmir blamed four expedition deaths on the newly-naturalized German leader's authoritarian style.[42] In 1941, the American writer James Ramsey Ullman, who later served as AMEE's official historian, blamed 1934 and 1937 German tragedies on Nanga Parbat on the kind of militarism that pervaded the contemporary Nazi state. According to Ullman, the 27 deaths on those two expeditions were the result of the Germans' predilection toward "all-or-nothing assaults. They were after victory, and nothing else mattered. And while feeling sorrow for the brave individuals who lost their lives, one cannot but feel that collectively they met the fate that they deserved. Blind, mindless force is no more the key to the conquest of a great mountain than to the conquest of the world."[43] The tide of war had turned by 1944, when the British mountaineer Frank Smythe lambasted the nationalism that accompanied Himalayan expeditions, blaming the Germans for introducing it to both the Alps and the Himalaya, and expressing hope that the "post war days will see this spirit dead." Unfortunately, this would not be the case; indeed in the very next sentence Smythe wrote without irony: "What could be a better or more worthy fulfillment of our joint ideals in

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[41] Isserman and Weaver, 225.
[42] Andrew J. Kauffman and William L. Putnam, *K2: the 1939 Tragedy* (Seattle: The Mountaineers, 1992), 188-189.
[43] James Ramsey Ullman, *High Conquest*, (Philadelphia: J.P. Lippincott, 1941), 199.

this war than that an American and a British mountaineer should stand together on the highest point of Earth?"[44]

When European mountaineers returned to the Himalaya in the 1950s, their national governments adopted the place as a theater for athletic and organizational performance. This result suited some mountaineers, and troubled others. When a French expedition set out to climb Annapurna in 1950, its members were divided between those who "happily embraced the idea of climbing for national prestige," and others who were "suspicious of those who would exploit patriotic rhetoric for less worthy or appropriate ends."[45] This division was in part spurred by an oath each team member was required to take: "I swear upon my honor to obey the leader in everything regarding the Expedition in which he may command me."[46] The oath, which Chamonix-based guide and expedition member, Gaston Rébuffat regarded as "a certain Nazification," represented the complicated political dimensions then cast upon the Himalaya. Between the tribulations of a war against fascism, the assimilation of militarized modes for large-scale undertakings, the new Cold War against communism, and national prestige-mongering, it was impossible for Himalayan mountaineers from the war's belligerent nations to avoid their expeditions' political overtones.

The French solution to this tension set a precedent imitated by other attempts on 8000-meter Himalayan peaks during the postwar era; the climbs were retrospectively set within their national narratives, their triumphs were emphasized, the tribulations that

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[44] Frank Smythe, "Correspondence," *American Alpine Journal*, Vol. 5 (1944): 311.
[45] Isserman and Weaver, 243.
[46] David Roberts, *True Summit: What Really Happened on the Legendary Ascent of Annapurna*, (New York: Simon & Schuster, 2000), 33.

could be heroicized were celebrated, and those that could not be heroicized were discarded. In the case of the French on Annapurna I (8091m) in 1950, two summiting climbers--Maurice Herzog and Louis Lachenal--were awarded the Legion of Honor in a ceremony at the Elysée Palace, where the President of France proclaimed: "You've shown the world a magnificent example of French solidarity. We know what France did during the Occupation, and how brave the French were in the Resistance. Most of you, I think almost all of you, were *résistants*, and now you have shown what the French are capable of in peacetime."[47] The widely reprinted summit photo of Herzog shows the latter triumphantly holding aloft an unfurled Tricolor, a tradition soon made normal.

Herzog's heroic account of the climb, *Annapurna*, went on to sell over 11 million copies after its publication in 1951. Like the ceremony and the summit photo, his recollection of the subsequent amputations of his toes and fingers--for he had lost his gloves during the multi-day descent--had a heroic, masculinist air:

> I felt a shock all over me, and Oudat announced:
> "The first amputation! The little finger!"
> This gave me rather a twinge. A little finger may not be much use, but all the same I was attached to it! Tears were very near. Oudat picked up the joint between his finger and thumb and showed it to me.
> "Perhaps you'd like to have it as a souvenir? It'll keep alright, you know! You don't seem very keen?"
> "I certainly don't want it. There's no point in keeping a black and moldy little finger."
> Throwing the "souvenir" casually onto the lid of a container, Oudat said:
> "Well, you're no sentimentalist."[48]

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[47] Isserman and Weaver, 252.
[48] Maurice Herzog, *Annapurna: The First Conquest of an 8000-Meter Peak*, (New York: Dutton, 1952), 284.

Herzog may not have seen sentimental when it came to his mutilated body, but the sentiments captured by Lachenal's camera on Annapurna's summit, and given voice by the French head-of-state, represented the heroism of suffering on behalf of the nation.

The expedition's events that did not fit the nationalist agenda were forgotten; nobody spoke of the "cowardice" and "meanness" that accompanied Herzog's descent, or of the disparagement of nationalism characterized by Rébuffat's comment on the enthusiastic reception that they received upon their return to France: "Oh, if only Herzog had lost his flags, instead of his gloves, how happy I would have been!" Whether they liked it or not, expedition members and organizers engaged in nationalistic rhetoric to justify their plans and actions, and to celebrate their achievements. Their actions made the Himalaya into a stage for post-colonial national performances in a rhetorical and organizational style normalized by two world wars.

Other expeditions followed the example set by Herzog, the French state, and their publicity. Nations with strong alpinist traditions clambered to support a first-ascent of at least one of the thirteen unascended 8000-meter mountains. For many of those states, their chosen Himalayan giant was already firmly ensconced in their national narrative, and its "conquest" in the 1950s served as an expression of national triumph in the wake of costly world wars, and the shame of decolonization. For the British that mountain was Mt. Everest, for the Germans it was Nanga Parbat, and it was K2 for the Italians, who had been sending expeditions up its Abruzzi Spur since Prince Luigi Amedeo, Duke of the Abruzzi, had first attempted it in 1909. Due to their extreme scale and the social structures that governed generations of European men during the twentieth century, the Himalaya became a space in which states could pursue national interests in quasi-military fashion. Mountains were conquered--not climbed--for national prestige by young men who deployed "siege tactics" and technologies developed for warfare. And, when they summited, they invariably planted national flags at the top. The character of Himalayan expeditions had been militarized. Even Swiss mountaineers who had not participated in the World Wars self-consciously employed the traditional military lexicon.[49]

The tradition of flag-planting on Himalayan summits was an explicit and expedient way to endorse one's nation-state. Done in front of a camera, the practice had the added benefit of authenticating the success of the climb and the patriotism of the climbers, further increasing their political prestige. During the postwar period it was ubiquitous. Edmund Hillary and Tenzing Norgay flew the flags of Great Britain, Nepal, India, and the United Nations atop Everest in 1953. News of their May 29 summit was made to coincide with Queen Elizabeth II's coronation on June 2, with *The Times* reporting: "Seldom since Francis Drake brought the *Golden Hind* to anchor in Plymouth Sound has a British explorer offered to his Sovereign such a tribute of glory as Colonel John Hunt and his men are able to lay at the feet of Queen Elizabeth for her Coronation

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[49] As illustrated by a passage authored by Swiss climber Rene Dittert: "Headquarters! Operations!--and I, who had always smiled at this military language when I found it in stories of the Himalaya, was using it too! Whether I wished it or not, the concept of a campaign was forced upon me more strongly every day...my previous Himalayan experience had made me a convinced adept of light expeditions. Like Tilman and Shipton, I thought it necessary to sacrifice weight for speed, but here one was dimly aware from the start that the problem was different. One would not dream of pushing as assault party forward recklessly, carrying eight or ten days' provisions, taking with them a few Sherpas and transporting their camping equipment a little higher every day. The distances are too great, the defences too powerful. It is necessary to occupy the conquered terrain, that each camp established shall be sufficiently provided with equipment and food to become in some degree another base camp...To put a party of four men in fighting condition above 26,000 feet requires three hundred men at the start in Katmandu. More or less the proportions of war." Dittert and Chevalley, *Forerunners to Everest*: *The Story of the Two Swiss Expeditions of 1952* (London: Allen & Unwin, 1954), 78.

Day."[50] When Hermann Buhl ended Nanga Parbat's deleterious reign over the Germans at the head of the 1953 *Willy-Merkl-Gedächtnisexpedition* (Willy Merkl Memorial Expedition), he flew the flag of Pakistan, having not brought a German or Austrian flag with him. This small oversight did not prevent German newspapers from reporting that Buhl had raised their national flag, regardless.[51]

When Achille Compagnoni and Lino Lacedelli topped K2 in 1954, they had not forgotten to bring their flags for the summit photos. Indeed, the entire Italian expedition to K2 was a "quasi-official national enterprise."[52] The expedition's leader, Ardito Desio, organized the venture "along military lines," and sought to inspire his climbers with communiques from Base Camp that appealed to their sense of national "honor."[53] The character of their victorious return to Rome further illustrates the nationalistic overtones of their venture: they were decorated by the Italian government, received by Pope Pius XIII at the Vatican, honored with a commemorative postage stamp, and became stars of a documentary film, *Italia K2*, which "played to packed houses."[54] The same year the

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[50] "The Challenge of Everest, a Brave Chapter in the Story of Human Endeavor," *The Times*, June 2, 1953, 7. Their triumph sparked the old regional rivalry with France, who had sponsored the first successful 8000-meter expedition; Sir Edwin Herbert, president of the Himalayan Committee in England, wrote in reply to a comment from an American publisher that hoped Expedition Leader John Hunt would reproduce the "emotion and feeling" found in Herzog's *Annapurna* in his official account: "I am afraid that it would be quite impossible and wholly undesirable for Hunt to emulate the Gallic élan of our French friends. To have brought the entire party back from Everest, including no less than 28 of them from the South Col (which is in itself higher than Annapurna) is a tremendous achievement, but with no frost-bitten limbs to show for it may seem less heroic than the French effort. The French remind me in this connection of Prince Rupert and his cavalry in the Civil War. They had all the dash and romance but it was Cromwell's Ironsides advancing at the trot who won the battles." Letter from Sir Edwin S. Herbert to Henry Hall, dated June 17, 1953, 1953 Everest Correspondence, American Alpine Club Library.
[51] Isserman and Weaver, 299-303.
[52] Ibid., 314. Its sponsors included the Italian Olympic Committee to the Italian National Council for Research.
[53] Jim Curran, *K2: Triumph and Tragedy* (Seattle: The Mountaineers, 1987), 106.
[54] Isserman and Weaver, 318.

Italians climbed K2, an Austrian team lead by Herbert Tichy climbed Cho Oyu. When they summited, the Sherpa sirdar drove his ice ax into the summit with the Austrian, Nepalese, and Indian flags attached. Tichy, who was "no lover of flags," was nonetheless brought to tears by "these symbols of my fatherland and the two countries that I think of and love so much."[55] The Japanese flew the national flags of Nepal and Japan atop Manaslu (8156m) in 1956, the Swiss unfurled their national colors atop Lhotse (8516m) in 1957, as did the Austrians on Broad Peak (8051m) that same year.

When an American team set out to Hidden Peak (8080m) in 1958, they sought to avoid the "jingoism" of their European and Japanese colleagues. They did not, however, avoid photographing flags on the summit; Great Britain, France, Pakistan, Switzerland, the United States, the state of Texas, and a green "Free Hungary" flag were all featured to intentionally emphasize the expedition's debt to "its predecessors," and its "international" character.[56] One explanation for the Americans' internationalism was that the United States and its public did not care much for Himalayan mountaineering. In the United States, recreational climbing was a fringe activity. Unlike his European predecessors, when Clinch tried to "wave the flag a little" ahead of the only American first-ascent of an 8000-meter peak, his efforts accrued little interest, and no funding. Although he felt that this failure to connect American prestige with Himalayan mountaineering meant he could

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[55] Herbert Tichy, *Cho Oyu: By Favour of the Gods* (London: Metheun, 1957), 247.

[56] Nick Clinch, *A Walk in the Sky: Climbing Hidden Peak* (Seattle: The Mountaineers, 1982), 34, 63, 176. The Free Hungary flag was a gesture of solidarity with the 1956 uprising against the Soviet-backed government of the Hungarian People's Republic. Its inclusion indicates that the Americans were just as concerned with political agendas as the Europeans who injected nationalism into Himalayan climbing. Rather than trying to consolidate a dissolving empire, like the British, or to rally a vanquished nation, like the French, Austrians, Germans, and Italians, the Americans used Hidden Peak's summit to reject their chief rival: the Soviet Union.

plan his expedition with a "clear conscience" from nationalistic trappings, it also outlined a problem for future American mountaineers who sought to connect their Himalayan expeditions with national interests.[57] American climbers who hoped to create a large-scale American mountaineering expedition to the Himalaya similar to those enjoyed by their European counterparts had their work cut out for them. They would have to combine the political traditions instituted by European expeditions with interests that appealed to U.S. political institutions.

In 1960, an American would succeed in that venture in part because he was also not American. Naturalized before World War II, the Swiss film-maker Norman G. Dyhrenfurth would create an expedition that mixed European traditions of publicity with American political and scientific interests. His use of science to garner political support would not have worked without the traditions of inquiry that had been established for mountain spaces by the preceding generations of naturalists who had collected specimens and performed experiments in the Alps. Certain of those scientific traditions were already suited to the high Himalaya, and so would be easily co-opted for the construction of Mt. Everest as a locale for inquiry.

LOCALE AS SCIENTIFIC

Science has rarely, if ever, been divorced from public or political interests. Its traditions have been crucially shaped by these dimensions, and so it is no surprise that they complement its role in the construction of a locale for inquiry. In this section, we

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[57] Ibid., 18.

again consider past human voyages to Europe's great ranges to illustrate how a locale's construction can be informed by the modes and methods of scientific inquiry. The following illustrations also provide a context for the various traditions that informed AMEE scientists' construction of a locale at Mt. Everest. As we move to the more recent past, the scientific dimension of locale starts to blend with the public and political traditions covered in the previous two sections. This is not accidental; the convergence of these three dimensions at Mt. Everest in 1963 are what define its characteristics as a locale for inquiry.

Beginning in the late Renaissance, Europe's mountains served as a resource for natural historians and a trans-alpine culture of collection. As early as 1541, a Zurich Professor named Conrad Gesner expounded the Alps' value to scientific inquiry, and communicated his enthusiasm and descriptions of his botanical collections to fellow natural historians in Verona. He resolved to climb mountains every year "at the season when vegetation is at its best, partly for the sake of studying botany, and partly for the delight of the mind and proper exercise of the body."[58] The Veronese to whom Gesner wrote regularly made their own herbalizing ascents in the Apennine ranges. Their accounts drew others to "this local Garden of Eden" from across Northern Italy. Driven

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[58] Konrad Gesner, *Libellus de lacte et operibus lactariis: philologus pariter ac medicus cum epistola ad lacobum Avienum De montium admiratione* (Liepzig: Johannis Gabrielis Bueschelii, 1777), iv. This passage is quoted in Gribble, *The Early Mountaineers*, 52, where he noted that Gesner's remarks anticipated Enlightenment attitudes toward the sublime: "For what, think you, is the pleasure, what the joy of a mind, affected as it should be, to marvel at the spectacle of the mighty masses of the mountains, and lift up one's head, as it were, among the clouds. The mind is strangely excited by the amazing altitude, and carried away to the contemplation of the great Architect of the Universe...Cultivators of philosophy will proceed to contemplate the great spectacles of this earthly paradise; and by no means the least of these are the steep and broken mountain-tops, the unscaleable precipices, the vast slopes stretching towards the sky." Gribble, pp 52-58.

by the same attitude that stimulated Gesner's special regard for the mountains, specifically their "concentration of rare and miraculous objects," they came to observe and collect "all the species of the most beautiful and rarest plants born...not only in Italy, but perhaps in all of Europe."[59] Combined with Gesner's observations in the Alps around Lucerne, the Italian field trips to Monte Baldo (2,218m) and, later, Monte Gennaro (1,271m), consolidated their appreciation for mountainous spaces as "privileged theaters of nature," normalized their use of mountains for natural history, and transformed how early-modern naturalists understood nature.[60] Indeed, as a result of their exposure to species unique to alpine environments, natural historians ceased searching for "universal specimens," instead appreciating that each sample "belonged to a local context whose natural history had to be charted."[61] The only way for them to chart these new histories was to observe them first-hand, which the natural historians eagerly arranged.

Within a century, the environmental imaginaries that Gesner and the Veronese constructed toward their local ranges found its way to natural philosophy. Blaise Pascal and his brother in-law, Florin Périer, needed an exceptionally high mountain to test Evangelista Torricelli's theory that the suspension of quicksilver in a cylinder sealed at one end was due to the weight of the atmosphere outside of the cylinder, and not due to the traditionally-held Aristotelian belief that nature abhors a vacuum.[62] With a barometer and a cadre of reputable men, Florin Périer ascended Puy de Dôme (1,464m), a dormant

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[59] Findlen, *Possessing Nature: Museums, Collecting, and Scientific Culture in Early Modern Italy* (Berkeley: University of California Press, 1994), 156, 182
[60] Ibid., 184. Narrative on the use of Monte Gennaro begin on 191.
[61] Ibid., 170.
[62] William R. Shea, *Designing Experiments & Games of Chance: The Unconventional Science of Blaise Pascal* (Canton, Watson Publishing International: 2003) 32-52.

volcano in southern France, in 1648. He performed "the ordinary vacuum experiment" several times in that extraordinary space, seeking to control confounding variables by using the same instrument and quicksilver for each test. The higher elevations correlated with a lower height of mercury in the glass, confirming Pascal's prediction and the mountain's utility as a laboratory for the inquiries of experimental philosophy.[63] Pascal published these results in a 1648 tract, entitled *Account of the Great Experiment on the Equilibrium of Fluids Devised by Monsieur B. Pascal*.[64]

Concerned with the weight of the atmosphere, the Royal Society drafted a series of inquiries to be conducted upon the most exceptional mountain known to its Fellows: the peak Teide (3718m), which was then believed to be "the highest Mountain hitherto known in the World."[65] Five Fellows including Viscount Brouncker and Robert Boyle drew up 25 experiments to made at its base, its summit, and "Severall other assents."[66] The first of their experiments was to repeat Pascal's "Quicksilver Experiment," which was, by then, a tradition for naturalists venturing into mountainous terrain. Boyle's desire to repeat Pascal's experiment upon Teide represents an evolution in the natural philosophers' environmental imaginary toward mountain summits. Animated by their adoption of Baconian experimental philosophy, Pascal and the Fellows of the Royal Society transformed the mountain from a trove of curiosities to be collected and

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[63] The summit of Puy de Dôme has hosted a permanent meteorological laboratory since 1876.
[64] M. B. Pascal, Jr., to M. Perier, November 15, 1647. For
[65] Robert Boyle, *A Continuation of New Experiments Physico-Mechanical, Touching the Spring and Weight of the Air and their Effects* (Oxford: Henry Hall, Printer for the University, 1669), 82. Based on observations made by various travellers, Boyle asserted that the "Sugar Loaf" of "Pic of Teneriff" (Teide), was about seven miles high, or, about 2400m taller than Mount Everest.
[66] The Royal Society Library, Classified Papers 19, Folio 12, "Questions propounded & agreed uppon to be sent to Tenariff".

displayed into an exceptional site for rigorous inquiry, testing, and observation. It was Puy de Dôme's height, and thus its "rarity of atmosphere," that appealed to Pascal; it was Teide's superior height that appealed to Boyle and the Royal Society. In his effort to foster experiments upon Teide's summit, Boyle opened a host of new lines of philosophical inquiry. He believed that a barometrical measurement of Teide's height would overturn Johannes Kepler's theory that the Earth's atmosphere extended no more than one mile above sea level, but he worried about "How far the Height of Mountains may make the Air at the tops of them inconvenient for Respiration" because he had read about the debilitating effects of altitude recorded by another naturalist who had climbed exceptionally high.[67]

Pascal and Périer's widely-read account of their work on Puy de Dôme inspired a corps of naturalists to repeat their measurements on regional peaks. For many, this meant venturing into the dragon-infested and demon-haunted Alps, instruments in hand. Another Zurich Professor, Johann Jacob Scheuchzer, empowered the rising culture of measurement in the Alps by publishing a multi-volume travel record of his voyages amongst them, producing a set of tables measuring barometric pressure at their various

[67] Robert Boyle, *A Continuation of New Experiments*, 85. Experiment XXIII, "Confirming, that Mercury in a Barometer will be kept suspended higher at the top, than at the bottom of a Hill, on which occasion something is noted about the height of Mountains, especially the Pic of Tenariff," exemplifies how Boyle connected the height of mountains, barometric measurement, and Earth's cosmology. The other naturalist was Joseph de Acosta, whose climb over the Escaleras de Pariacaca (4500-4800m) in Peru was recounted in *The Natural and Morall Historie of the East and West Indies: Intreating of the remarkeable things of Heaven, of the Elements, Mettalls, Plants, and Beasts which are proper to that Country: Together with the Manners, Ceremonies, Lawes, Governements, and Warres of the Indians*, translated by Edward Grimston (London: Val. Sims for Edward Blount and William Aspley, 1604), 129-131. John B. West cites a modern controversy about the exact location and altitude of the Escaleras de Pariacaca in *High Life: A History of High-Altitude Physiology and Medicine*, (New York: Oxford University Press, 1998), 16-19.

altitudes, and consistently dispatching reports on alpine wonders to the Royal Society.[68] Scheuchzer's travel record, replete with tales of dragon encounters, attracted at least one curious man to stop at Montanvert with a collection of scientific instruments in 1741.[69] William Windham did not know how to operate his instruments, but his detailed narrative about Montanvert and the Mer de Glace galvanized a man who could measure and catalog those places.[70] The Genevan engineer and instrument-maker Pierre Guillaume Martel would, in the following year, organize a multi-disciplinary excursion following Windham's route expressly to take the measurements that Windham's party could not.[71] In the process, Martel continued the tradition of using technology to record natural phenomena, accelerated the Royal Society's imperative to push those measurements to higher and higher elevations, and set a precedent for future expeditions to employ multiple naturalists for their combined expertise and the expedient use of time spent on

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[68] The publication cost of Scheuchzer's travel record, *Itinera per helvetiae alpinas regiones facta annis 1702-1711*, was underwritten by Isaac Newton. The set of tables can be found in "Tables of the Barometrical Altitudes at Zurich in Switzerland in 1708 observed by J J Scheuchzer and at Upminster by William Derham," Classified Papers Vol. 5, "Weather," Royal Society Library. See also "Concerning fire or degree of heat in the Alps by John Jacob Scheuchzer," Register Book Original Vol 9, Royal Society Library. See also, "De Ignis seu caloris certa portione Helvetiae adsignata," Classified Papers Vol. 4i, "Physiology, Meteorology, Pneumaticks," Royal Society Library. "Account of alpine trees and plants by John Jacob Scheuchzer," Register Book Original Vol. 9, Royal Society Library. J. G. Scheuchzer, "Remarks on the Height of Mountains in General, and of Those of Swisserland in Particular, with an Account of the Rise of Some of the Most Considerable Rivers of Europe," *Philosophical Transactions* Vol. 35 (1727-1728): 593.

[69] Windham's instruments likely included a version of Boyle and Hooke's portable camera-obscura (invented in 1665-1666), Fahrenheit's mercury thermometer (invented in 1714), and portable barometer. For advances in barometer construction which made them more portable by the end of the 17th century, see W. E. Knowles Middleton, "A Brief History of the Barometer," *The Journal of The Royal Astronomical Society of Canada*, Vol. 38, No. 2 (February, 1944): 41-64.

[70] Windham explicitly cited Scheuchzer's *Itinera* as an authority on the glaciers of Berne. Gribble, *The Early Mountaineers*, 90. Gribble reproduces an English translation of Windham's letter in Chapter XII. Based on Windham's account, it is likely that his party ascended to a point between 1600m and 1900m on the northern spur of Aiguille du Grépon, a subsidiary peak of Mont Blanc, which overlooked the Mer de Glace. The vicinity has been home to the Hôtel Restaurant du Montenvers since 1880.

[71] Gribble, *The Early Mountaineers*, 101.

the mountain.[72]

When Horace-Bénédict de Saussure made his successful bid to Mont Blanc's summit in 1787, his expedition showcased the various scientific traditions local to alpine excursions. With the help of seventeen assistants, Horace-Bénédict maximized the four hypoxic hours he had on the summit. The kind of inquiries he made were preceded by the Royal Society's Questions for Tenariff and the prior measurements made by Martel in the valley, below. Horace-Bénédict took readings from each of his barometer, thermometer, hygrometer, and electrometer; he noted the shape of the summit, the snow upon it, and its height relative to neighboring peaks; he boiled water, observed the declination of the compass, and the degree of noise made by a pistol shot; he acquired samples of the rarified air and snow for later inquiry; he observed the color of the sky, the atmosphere's effect upon a basin of limewater, and he attempted to test distilled water's rate of evaporation; he recorded his pulse and that of his companions; and, before he left, he noted places upon which he could erect more permanent shelters to facilitate sustained research within this exceptional space.[73] The tallest Alp, once publically known as "the Accursed Mountain" in southern France, was summited, measured, and cataloged. As

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[72] Martel included an apothecary "who was a good Chemist and Botanist" and a goldsmith in his party, and he packed a portable thermometer, a quadrant, a sea compass, a camera-obscura, a barometer which he used "according to the Method of Torricelli," and, finally, a copy of the barometric tables devised by Scheuchzer. Martel's narrative included a descriptive topography, rigorous altitude and temperature measurements from the surface of the glacier and the mountainside, speculations to the cause of the area's abundant crystals, and a theory of glaciation. Although Martel's experiments were cut short on account of a broken barometer, his experimental observations and descriptions of the mountain's natural history--including a list of the various plant species found upon the slopes above Chamonix--approach the thoroughness and exactness sought by the Royal Society's "Questions for Tenariff," without the fancifulness of Scheuchzer's dragons. Ibid., 102-104. Johann Jacob Scheuchzer's table was published in the *Philosophical Transactions*, Vol. 35, (1727-1728): 537-547.

[73] H.B. de Saussure, *Relation abrégée d'un voyage a la cime du Mont-Blanc, en août 1787* (Geneva: Barde, Manget & Compagnie, Imprimeurs-Libraires, 1787), 19-30.

Horace-Bénédict was wont to say that it and its cousins, were "the laborator[ies] of nature," in which "all phenomena of general Physics are displayed...with a greatness and majesty of which the inhabitants of the plains have no idea."[74]

In the nineteenth century, the contexts defining the Alps as a locale for inquiry shifted again when a dispute between two glaciologists added a layer of epistemic authority to the tradition of observing alpine phenomena first-hand. Analyzed in detail by historian Bruce Hevly, James David Forbes and John Tyndall were paragons of the new "alpinist-scientists": men who combined their Victorian imperatives regarding alpinism as a masculinist sport with their professions as scientists. Of the two, Tyndall's influence on the direction of scientific traditions for inquiry in the mountains was more significant. He made multiple daring ascents during his career, pioneered the more-dangerous practice of climbing solo, and wrote prolifically of these exploits. He asserted that climbing made him feel "in all my fires the blessedness of perfect manhood," and he used similar adventure rhetoric to support the veracity of his claims.[75] As Robert E. Kohler said, "we trust explorer-heroes [like John Tyndall] because we read their displays of physical endurance, courage, and self-sacrifice as guarantees of their credibility as scientific witnesses."[76] In one case, that support came in the form of Tyndall crossing a snow bridge over a crevasse "one hundred feet in depth" for an incidental demonstration of regelation, which was at that time a contentious theory about the physical properties of ice.[77]

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[74] From Saussure, *Voyages dans les Alpes*, cited in Bigg, et al., 316-317.
[75] Taylor, 25.
[76] Robert E. Kohler, "Place and Practice in Field Biology," *History of Science* Vol. 40 (2002): 190
[77] Hevly, 78-79.

The heroism involved in overcoming risk shaped glaciological arguments by serving as a "rhetorical resource for those who had ventured into the alpine landscapes and who could thus portray those who had not as armchair theorists."[78] As one of the principal practitioners who relied on this unique appeal to authority, Tyndall normalized a departure from past research methods for mountainous places. Through his enormous influence and popularity he normalized what Robert Kohler called "practices of place" unique to science in the Alps.[79] Like Kohler's field biologists, Tyndall took advantage of the element of place in his research. By prioritizing first-hand observations in carefully-selected places and showcasing their conclusions in the context of an adventure-narrative, Tyndall simultaneously underwrote his claims to authenticity with closeness to the phenomena while assimilating the Victorian norms and technical skills of alpinist culture into the scientific dimension of the alpine locale. Ultimately, adopting these practices of place would have far-flung consequences for scientific traditions in mountainous spaces.[80] So too would his 1859 climb of Mont Blanc, for which he employed twenty-six Chamonix porters to carry enough instrumentation to stock six observatories at varying elevations on the Mont Blanc massif--a prelude to the stupendous manpower of

[78] Ibid., 66.
[79] Kohler, 192. As opposed to placeless practices, with the placeless space being the modern laboratory.
[80] By combining research with climbing, Tyndall created what historian Michael Reidy called a "vertical laboratory of Nature." Because of his mountaineering prowess, Tyndall had the physical ability to conceptualize the Alps as a "'grand laboratory' that crossed through several atmospheric and temperature zones." In other words, his conceptualization of the space was dependent upon his ability to make use of that space, which was something that the vast majority of contemporary experimental philosophers and laboratory scientists could not do. See Michael S. Reidy, "John Tyndall's Vertical Physics: From Rock Quarries to Icy Peaks" *Physics in Perspective* Vol. 12 (2010): 123. As a result, later scientists had to acquire the skills to make first-hand observations in the mountains' most treacherous terrain, unlike Pascal or Boyle, who were complacent to send others in their stead.

Himalayan expeditions in the following century.[81]

A third major consequence of Tyndall's career was generated by the heroic character of his copious public writings. He had made scientists conducting research in extreme environments into heroes easily appropriated by political agencies. By the mid-nineteenth century, alpinists and commentators from the British Isles and the Continent were already connecting climbing achievements with heterogeneous nationalist ideologies. British ascents "exemplified the virtues of British manliness," Italians hoped climbing the Alps would "assert citizenship and sovereignty" for its newly-unified populace, so too in the Deutscher und Österreichischer Alpenverein which modeled in the mountains a "*Großdeutschland* (Greater Germany) that remained aspirational in politics," and the Club Alpin Français in France, whose establishment coincided with the "restoration of popular sovereignty in the French Third Republic."[82] In the 20th century, this traditional association of "adventure research" with nationalism was extended to other extreme locales--notably the Polar Regions and the Himalaya.[83]

Historian Mike Riedy claims that Tyndall, prolific in London when not in the Alps, did more to define physics than any other figure in the nineteenth century.[84] His popularity and clout certainly normalized several of his practices for subsequent use in the construction of Himalayan locales. He exploited the space of inquiry's topography to

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[81] Each station was equipped with two thermometers attached to posts driven into the ice. "Execrable weather" in 1860 destroyed the lower stations, and by the time Tyndall revisited the summit station in 1861, its thermometers were broken. John Tyndall, *Hours of Exercise in the Alps* (London: Longmans, Green, and Co., 1871), 58.
[82] For nationalism in alpine climbing, see Hansen, 191-193, and Walt Unsworth, *Hold the Heights: The Foundations of Mountaineering* (Seattle: The Mountaineers Books, 1994), 113-116.
[83] For an example of nationalist ideologies and polar exploration, see Lisa Bloom, *Gender on Ice*.
[84] Reidy, "John Tyndall's Vertical Physics," 126.

the benefit of his experimental routines. He went into that space himself, rather than send a proxy to conduct studies on his behalf. He used a technical skill-set, learned via alpinism, to negotiate that space. He employed indigenous populations to assist with excursion logistics.[85] He popularized his scientific research by weaving it into heroic narratives that appealed to contemporary ideologies. These practices of place manifested themselves over the coming century on scientific expeditions to extreme spaces. Long before Robert Falcon Scott perished on the Antarctic ice, geological samples in tow, Tyndall had imbued knowledge generated by life-threatening observations with epistemic priority over that gleaned from non-extreme observations. These risks, soon part of traditional scientific inquiry and epistemology in extreme locales, aided alpinist-scientists who later used them to justify scientific inquiries in the Himalaya.

TRADITIONS CONVERGE: MT. EVEREST AS LOCALE AFTER 1960

By the 20th century, state-sponsored scientific endeavors that blended risk and heroism with science and authenticity had moved from the Alps to the Polar Regions to the Himalaya--except for those undertaken by the United States. American public attention and political capital was focused on the nascent Space Program, not mountaineering adventures. Dyhrenfurth needed an event with the public and political gravity to attract potential sponsors. As we shall see in the following chapter, he formulated his efforts to take the United States to Mt. Everest as a response to China politicizing its 1960 expedition to that mountain. This conception of an American Mount

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[85] Tyndall did not pioneer this practice; use of local hunters and shepherds to aid in climbing and inquiry on mountaintops was common practice prior to the professionalization of guides in Chamonix.

Everest Expedition allowed him to merge American publicity and political interests with those traditionally found in the Himalaya, and America's current projects in Big Science with traditional modes and methods of inquiry suited to high mountain spaces.

China's expedition to Mt. Everest had been originally planned for 1959, to coincide with the tenth anniversary celebrations of the birth of the People's Republic of China. It was delayed by a political event of a humor when, in March, Tibetans took to the streets of Lhasa to declare their freedom from Chinese occupation.[86] This revolt, prompted by both Chinese interference in Tibetan affairs and a perceived threat to the Dalai Lama among the residents of Lhasa, was subsequently supported by the USA, Nepal, the exiled Republic of China, and the Soviet Union, who treated it as "an expression of legitimate grievances" against Chinese rule.[87] The Dalai Lama fled over the Himalaya into exile in India, and the Tibetan uprising was quickly crushed by Chinese forces. This series of events further raised the Everest region's profile in global political affairs. Indeed, if Chinese mountaineers could successfully summit Everest in 1960, then the Communist Party, like the Louis XIV in 1701, would employ their feat as a "ceremony of possession." As a result, this would "simultaneously strengthen Chinese claims to Tibet," whose southern border with Nepal passes over the summit of the mountain, "and remind Kathmandu of the importance of good relations with their powerful neighbor to the north."[88] Nepal, which had begun experimenting with

[86] Isserman and Weaver, 343.
[87] Richard Wich, *Sino-Soviet Crisis Politics: A Study of Political Change and Communication* (Cambridge: Harvard University Asia Center, 1980), 178. CIA-funded Tibetan resistance operated out of Mustang, Nepal, from 1959, parachuting operatives into Tibet.
[88] Isserman and Weaver, 343-344.

parliamentary democracy since opening its borders to western influence in 1946, feared that a Chinese ascent of Everest might lead to an attempt to annex the entire massif.[89]

In the context of these tensions, the Chinese expedition to Mt. Everest in 1960 enabled some Dyhrenfurth to conceptualize the mountain as a Cold War space. The Chinese rhetoric coming out of Beijing following the climb was as fiercely nationalistic as any previous state-sponsored Himalayan ascent, because "Chinese mountaineering...was intended to express the values of the collective over the rationality of a modern industrial society."[90] The official account by expedition leader Shi Zhanchun emphasized these ideals; the expedition consisted of over 200 individuals, and during the successful summit assault key problems were solved by the summit team, comprised of three "Communist Party members," by holding "a brief Party group meeting."[91] Like the Europeans before them, the Chinese carried a national flag to the summit, and did one better than their western rivals by purportedly leaving a plaster bust of Mao Zedong on the mountain's summit.[92] Ultimately, Zhanchun attributed the Chinese success on Everest to "the strategic thinking of Mao Tze-tung," and, "the leadership of the Communist Party and the unrivalled superiority of the socialist system."[93]

Dyhrenfurth took this shot at western ideals seriously, even though he was skeptical of the Chinese claims. He saw in the Chinese political rhetoric an opportunity

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[89] *New York Times*, "Nepalese See a Ruse by Reds on Everest," May 29, 1960: 6.
[90] Isserman and Weaver, 344.
[91] Shin Chan-Chun, "The Conquest of Mount Everest by the Chinese Mountaineering Team," *Alpine Journal* Vol. 66 (1961): 33.
[92] Zhou Zheng and Liu Zhenkai, *Footprints on the Peaks: Mountaineering in China*, (Seattle: Cloudcap, 1995), 82.
[93] Shin Chan-Chun, 35.

that was never presented by the British politicization of Mt. Everest in 1953. If Zhanchun's connecting political ideology to mountaineering success was advertised to the right parties, it might generate enough interest in the region to justify the launch of a large-scale, state-sponsored American mountaineering expedition on par with those conceived in Europe during the previous decade. And, since the state had never shown much interest in funding mountaineering excursions, Dyhrenfurth planned to enroll research scientists--the darlings of contemporary state-funding institutions--to connect his project to the state's newest breed of national hero: its astronauts.

CHAPTER TWO: A METHOD TO SUIT THE LOCALE, A LOCALE TO SUIT THE METHOD

The first year of the development of AMEE's scientific program was one of networking and exchanging ideas, with Mt. Everest's imagined environment occupying a pivotal role in the creation, transfer, and reception of research prospectuses. From his first conceptualization of an American Mount Everest expedition in 1960, until the final research proposals were sent to major granting institutions around Washington D.C. in 1962, Norman G. Dyhrenfurth and his varying collection of scientists had to contend with a locale that, in their minds, would both resist study while presenting unique opportunities to research exceptional phenomena which could not be replicated in even the most advanced laboratories. The reconciliation of obstacle and opportunity came in the form of research questions, hypotheses, and methods that prioritized the novel "non-simulated" character of the space of inquiry. This practice was a variation on the nineteenth-century precedents set by John Tyndall and James David Forbes who celebrated the masculinity of their work in extremity, as referenced in Chapter One. AMEE's variation was both enabled by contemporary political and military ideologies that prioritized human exposure to extreme conditions, and strategically employed by AMEE scientists to procure funding from American institutions invested in winning the Cold War. Ultimately, AMEE scientists justified eschewing laboratory controls and embracing the uncontrollable locale to produce a particular kind of interdisciplinary project that would yield useful knowledge for Cold War institutions.

This chapter focuses on how the varied conceptualizations of the locale held by AMEE's sociologist, psychologist, and physiologist combined with their correspondence networks to determine the construction of their research projects. Pre-existing notions of the challenges and opportunities encountered in extremis generated questions, hypotheses, and methods which were consequently evaluated and reformed as their understanding of the locale matured between 1959 and 1962. Although each researcher's disciplinary identity produced different perspectives toward Mt. Everest, all of them created projects that sought to observe phenomena produced by its uncontrollable contingency. In this way, they obviated the epistemological demand for strict controls found in laboratory science, the same controls that are supposed to make knowledge produced in laboratory spaces universal. To AMEE researchers, Mt. Everest was interesting as a laboratory precisely because it was not a laboratory; they argued that its non-simulated space would produce results with greater authenticity than those observed in a simulated space. By the middle of 1962 they would improve that argument by making AMEE an analog for Cold War agents, and Mt. Everest an analog for the diverse places in which the Cold War was fought: the deep sea, foreign battlefields, high altitude, and outer space. The creation of these analogies is found in Chapter Three. For now, let us turn to how AMEE organizer Norman G. Dyhrenfurth envisioned the expedition, and how he recruited American scientists to enhance its prestige and raise funds.

DYHRENFURTH'S MOUNTAIN

Dyhrenfurth had a long association with the Himalaya, dating back to his childhood. The son of German-Swiss geologists and Himalayan explorers Drs. Günter Oskar and Hettie Dyhrenfurth, Norman was attracted to the Himalaya after a youth of mountaineering and ski instruction in the Alps and the United States. During the Second

World War, Dyhrenfurth earned his American citizenship while serving as an officer in the United States Army. His ties with the Swiss mountaineering community, and his notable ascents on the Continent, scored him an invitation to accompany the Swiss post-monsoon 1952 Mt. Everest attempt as a climber and principal photographer. It was on this first expedition to the Himalaya that Dyhrenfurth acquired his "passion" for the space, which would eventually culminate in his organization and execution of the 1963 American Mount Everest Expedition.

This passion is evident in his writings and conduct during the years following the 1952 climb. As the failed Swiss expedition retreated from its base camp near the lake at Gorak Shep, 34-year-old Dyhrenfurth paused in "sadness and longing" to take a final look at the mountain which had foiled their attempt.[94] At this early date, AMEE was not yet even a dream, but Dyhrenfurth was so taken with the Himalayan locale that his sorrow at leaving its splendor transformed into an indomitable will to return.[95] The sublimity and challenge of that particular place superseded a promising career in academia; in 1953 he resigned as Director from the department that he founded--University of California Los Angeles Motion Picture Division--so that he could take up planning Himalayan expeditions full time. Thus, a decade before AMEE's cadre of scientists reconciled the opportunities and extremities in that place, Dyhrenfurth's

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[94] James Ramsey Ullman, *Americans on Everest: The Official Account of the Ascent led by Norman G. Dyhrenfurth* (Philadelphia: Lippincott, 1964), xix.

[95] Norman Dyhrenfurth to the author, dated April 29, 2009. Additionally, Broughton Coburn recorded that Dyhrenfurth identified with the space to the extent that while passing through Tengboche during their withdrawal in 1952, Dyhrenfurth was "suffused by a sensation that he had lived there in a previous lifetime." Broughton Coburn, *The Vast Unknown: America's First Ascent of Everest*, (New York: Crown Publishers, 2013), 35.

relationship with Mt. Everest determined how he formulated, and reformulated, his prospectuses for expeditions in 1955, 1958, 1960, and 1963. It encouraged him to conduct an expedition which married mountaineering with scientific research against the advice of his peers, and it shaped his selection of scientists for that scientific program.

But that was still a long way off. Before Dyhrenfurth had the chance to begin crafting expedition proposals, he received one from a biophysicist at University of California Berkeley. In May, 1953, Dr. William E. Siri, whose work on the Manhattan Project at the Radiation Lab during World War II had led to a permanent post at Lawrence Berkeley National Laboratory, was in the midst of planning an explicitly-Californian expedition to Makalu (8463m) for 1954. Having led a small high-altitude physiology climbing team to the Cordillera Blanca the year before, he was set to make the first-attempt on Makalu with a small team of Sierra Club-sponsored climbers the following spring.[96] Since no other American team had been to the Himalaya, Siri wished both to consult Dyhrenfurth on that part of the country, and to ask whether he would serve as the team's photographer and filmmaker, because Ansel Adams had withdrawn from the expedition during the course of its three-year development cycle.[97] Dyhrenfurth declined Siri's request because he was looking for something more intimate, more modest, and thus drastically different than the expedition he would lead in 1963. Still, his correspondence with Siri would bear fruit a few years later.

During the interim, Dyhrenfurth conceived several projects to return to the

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[96] Isserman and Weaver, *Fallen Giants*, 328.
[97] Norman Dyhrenfurth to James Ramsey Ullman, dated May 13, 1953, JRU Papers. Incidentally, American climbing teams had visited K2 in 1939 and 1953, however, strictly speaking the Karakoram is not the Himalaya.

Himalaya. Inspired by Siri's success in securing a 1954 permit for Makalu, he proposed a "light-weight" expedition to James Ramsey Ullman with an $11,000 budget and an agenda of unclimbed peaks under 26,000' in the Solu Khumbu, adjacent to the monastery at Tengboche, just south and west of Mt. Everest.[98] Although nothing came of that letter's particular plan, it eventually morphed into the 1955 International Himalaya Expedition, during which Dyhrenfurth led an unsuccessful attempt to climb Lhotse (8516m), Everest's closest neighbor. A few years later, in 1958, he served as deputy leader for the Slick-Johnson Snowman Expedition, searching for evidence of yeti. In 1960, he found his way back to the Himalaya as a filmmaker for the 1960 Swiss Dhaulagiri Expedition.[99] Their success on Dhaulagiri (8167m) meant that the last of the fourteen 8000-meter peaks accessible to Westerners had been climbed. Dyhrenfurth's passion to return to Everest remained as bright as ever.[100]

And so, upon his return from Dhaulagiri, Dyhrenfurth conceived a new project to lead a team of Americans to climb Mt. Everest in 1961. Before leaving Nepal for home, he pitched it directly to authorities in the Singha Durbar palace in Kathmandu. There, he learned that another American mountaineer named Major O. William Hackett had already secured a permit for 1961. Hackett approached Dyhrenfurth to join the venture. Dyhrenfurth signed on to lead Hackett's enterprise, and in the summer of 1960 he set about organizing an expedition. In the summer of 1960 he drafted a prospectus called

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[98] Dyhrenfurth to Ullman, October 23, 1953, Ullman Papers.
[99] Isserman and Weaver, *Fallen Giants*, 354-355.
[100] Wholly located in Chinese-occupied Tibet, Shishapangma (8027m) was climbed in 1964.

"American Everest Expedition, 1961."[101]

Although the 1961 plan became unrealistic as time lapsed, it represents the earliest iteration of Dyhrenfurth's visions and expectations for an all-American Everest endeavor.[102] It shared much of the same language and goals of subsequent proposals, including a promised "Grand Slam" of Everest, Lhotse, and Nuptse, and it even used World Book's funding of Edmund Hillary's 1961 attempt on Makalu as a benchmark for future funding of American mountaineering expeditions. However, Hillary's aborted Makalu climb was part of the larger Himalayan Scientific and Mountaineering Expedition, which included an extended physiological study of human adaptation to high altitude. Unlike Hillary's expedition, and unlike Dyhrenfurth's subsequent proposal for 1963, the 1961 application does not mention scientific inquiry of any kind. This is significant because it suggests that the science program was included as an afterthought, or as a device to procure prestige and funding, which complicates later claims made by AMEE members that the 1963 expedition had been "conceived and organized from the outset as a joint mountaineering-scientific venture."[103]

Indeed, the 1961 prospectus represented Mt. Everest as a contested Cold War space for human performance, not scientific inquiry. Citing the disputed "'conquest' of

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[101] This story is recounted in Ullman, *Americans on Everest*, 19-20; Isserman and Weaver, *Fallen Giants*, 513-514 n.19; Coburn, *The Vast Unknown*, 39-40.
[102] Norman Dyhrenfurth, "American Everest Expedition, 1961," typescript copy, ND [1960], JRU Papers, box 92, folder 6, Department of Rare Books and Special Collections, Princeton University Library.
[103] Hornbein, *Everest: The West Ridge* (Seattle: The Mountaineers, 2002), 21. Dyhrenfurth neglected to mention any scientific program in his February 18, 1961 letter to the Secretary of Foreign Affairs in Kathmandu requesting permission to lead an American expedition to Mt. Everest in 1963. Nor do the "twelve to fourteen" American mountaineers needed to climb Everest, Lhoste, and Nuptse seem to be enough to meet those objects and also conduct significant scientific research. Norman Dyhrenfurth to The Secretary, Ministry of Foreign Affairs, His Majesty's Government, Singha Durbar, Kathmandu, Nepal, dated February 18, 1961, WES Papers.

Everest from the North by three of Red China's mountaineers," Dyhrenfurth wrote: "Most mountaineers of the Free World agree that the struggle for the Himalaya should remain a purely idealistic, non-political pursuit. And yet, there can be no doubt that the ascent of [Mt. Everest] by an American team would go a long way toward winning new friends in many places!" Written just one year after the 1959 Tibetan Uprising and the flight of the Dalai Lama, this appeal to international rivalry in central Asia represented an expedient departure from Dyhrenfurth's post-war idealism; in a 1946 letter to R. L. G. Irving, Dyhrenfurth professed that "rivalry, competition, and such have no place in the mountains. A true mountaineer climbs 'because the mountain is there,' and not so that he can beat someone else to it."[104] Although Dyhrenfurth's private correspondence during AMEE's formative period substantiates his continued commitment to this egalitarian perspective, his letters to newspapers, public officials and state funding institutions presented Mt. Everest as a contested political space. That this concept was employed in public forums, but not amongst the nascent AMEE team, suggests that it was used strategically.

Later, as Dyhrenfurth recruited scientists in support of his 1963 proposal, these scientists would adopt Dyhrenfurth's strategy to successfully procure funding from research institutions of the United States federal government. Their practices are an intriguing departure from scholarly narratives constructed by historians of science studying the Cold War. Rather than being "responsive to the operational needs of the

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[104] Norman Dyhrenfurth to Mr. Irving, dated July 18, 1946, JRU Papers.

military services that supported it"[105] as suggested by historian Ronald E. Doel, AMEE's science program exploited Cold War ideologies to create research opportunities. The tail of personal ambition, in other words, effectively wagged the dog of military funding. Indeed, Claiming that AMEE scientists played the "politics of grantsmanship" for Pentagon-funded sponsorship in discordance with "the academic definition of research autonomy," as John R. Sutton concluded in his 1984 study of Lawrence Livermore Laboratory, readily relieves those scientists of their personal agency.[106] Like the Apollo scientists studied by Ian I. Mitroff in 1974, AMEE researchers were emotionally committed to their work and expressed a "deep affective involvement" congruous with that later displayed by NASA scientists, because their personal aspirations to visit Mt. Everest injected their scientific projects with personal value.[107] It is just as informative to consider how researchers shaped the direction of state-sponsored research in this bottom-up way, as it is to prioritize top-down power structures as Sutton and, later, Doel have done. In the case of AMEE's researchers, from 1962 until the conclusion of their projects up to five years later they leveraged the operational ideologies of American military services--eager to support basic scientific research that might produce tactical advantages if the Cold War ever turned hot--to support their various interests in scientific research and in mountain climbing.

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[105] Ronald E. Doel, "Constituting the Postwar Earth Sciences: The Military's Influence on the Environmental Sciences in the USA after 1945," *Social Studies of Science* 33, no. 5, Earth Sciences in the Cold War (Oct., 2003): 653.
[106] John R. Sutton, "Organizational Autonomy and Professional Norms in Science: A Case Study of the Lawrence Livermore Laboratory." *Social Studies of Science,* 14, no. 2 (May, 1984): 220.
[107] Ian I. Mitroff, "Norms and Counter-Norms in a Select Group of the Apollo Moon Scientists: A Case Study of the Ambivalence of Scientists." *American Sociological Review* 39, no. 4 (Aug., 1974): 587.

In the meantime, Dyhrenfurth continued transforming Mt. Everest from a "submarginal space" into a valuable proving ground for American Cold War interests. He began enrolling noted American mountaineers, with a particular concern for those who might contribute to a scientific research program. After he secured a permit from Kathmandu on May 10, 1961 authorizing an attempt on Mt. Everest, Lhotse, and Nuptse in 1963, Dyhrenfurth wrote to his old friend James Ramsey Ullman with a list of eleven men who were committed to an expedition in 1963. On that list was Dyhrenfurth's prior correspondent, biophysicist Will Siri, alongside newcomers University of Cincinnati sociologist Dr. Richard M. Emerson, and Dr. John A. Rupley, Professor of Chemistry at Cornell University who would be able to "do some research in protein structure."[108] Still chasing the "Grand Slam" of his 1961 proposal, Dyhrenfurth pursued something that he had overlooked in his prospectus the previous year: the potential financial windfalls resulting from the prestige and costs associated with a dedicated scientific research program.

A SPACE FOR AMERICAN SCIENCE

As Dyhrenfurth targeted commercial and non-profit organizations, such as *Sports Illustrated*, POST Cereal, Phillip Morris, and the Boy Scouts of America, his small network of recruited researchers began corresponding and collaborating to create opportunities for scientific inquiries that reflected Dyhrenfurth's aim to marry Mt. Everest's geophysical space to the contemporary basic-research interests of American

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[108] Dyhrenfurth to Ullman, June 12, 1961, Ullman Papers.

funding institutions.[109] On June 9, 1961, his sociologist, Dick Emerson, received an unsolicited letter from a clinical psychologist from Beverly Hills named Dr. James T. Lester. Lester, had recently met Dyhrenfurth at a local cocktail party, and was "stimulated" and "interested" in exploring the potential for "research possibilities on high altitude climbs."[110] In fact, he had already written to the U.S. Air Force Office of Scientific Research (AFOSR) "requesting information as background for preparing a proposal for research in the area of human behavior under stress at high altitudes." Specifically, Lester imagined an opportunity to use Mt. Everest as an analog for the "oxygen deprivation, sensory deprivation, limitation of human contact, temperature extremes, the requirement for prolonged physical exertion, and perhaps still other facts" that might be present on "future space expeditions." Already, Lester was creating ways to explicitly link Mt. Everest to outer space, and to compare mountaineers to astronauts. But, having never been to high altitude himself, his analogies were uninformed, and he was at a complete loss when it came to creating questions, hypotheses, and methods that took advantage of his imagined opportunities. So, he hoped to procure feedback from Emerson to help develop a "feasible and potentially fruitful" proposal.

Lester would need the help. As a 1956 University of California - Los Angeles Ph.D. and clinical psychologist whose previous research focused on relating empirically identified "personality dimensions" to differences in perception and cognition, Lester had never conducted field research.[111] He was a laboratory-trained psychologist and a

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[109] Ibid.
[110] James T. Lester to Richard M. Emerson, dated June 9, 1961, Emerson Papers.
[111] Lester to Emerson, dated June 19, 1961, Emerson Papers.

University of Maryland Overseas Program instructor, not a mountaineer. Yet, his conversation over drinks with Dyhrenfurth had sparked his imagination.

Lester found an ideal mentor in Emerson. Like Lester, his graduate research was conducted in a laboratory, and it soon became apparent that their penchant for controlled experiment and their professional lexicons overlapped. Unlike Lester, Emerson had field experience as a researcher and mountaineer. He had acquired years of experience in mountainous spaces as the first climbing ranger for the Grand Teton during the years following World War II, and as a member of Nick Clinch's 1960 American-Pakistan Karakoram Expedition to Masherbrum.[112]

Lester referenced this high-altitude research pedigree when he made contact with Emerson in June. In a representative example of the extant network of American climbing-scientists, Lester cited a letter written by Los Alamos physicist Dr. George Irving Bell which noted Emerson's "modest research" on the 1960 Masherbrum expedition.[113] Although American climbing communities in the early 1960s were "fragmented into a handful of barely connected locales," such as Yosemite, the Cascades, and the Tetons, their common regard for the Himalaya connected researchers from disparate professions.[114] Scientists who had never visited that locale used professional colleagues to network with researchers who had. In Lester's case, Emerson was his best resource for building an accurate understanding of the space in which he wished to study;

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[112] Emerson's service as climbing ranger is outlined in Coburn, *The Vast Unknown*, 16-30.
[113] Bell, alongside Willi Unsoeld, completed the first-ascent of Masherbrum during that expedition.
[114] Coburn, *The Vast Unknown*, 29. An investigation overlaying these two networks would improve our understanding of their interactions, their interdependence, and determine whether they were a motive force in mid-century climbing counter-culture, as described in Joseph E. Taylor III, *Pilgrims of the Vertical: Yosemite Rock Climbers & Nature at Risk*.

Lester had very little idea of what he could reasonably expect to encounter in the high Himalaya. This made him all the more impressionable to Emerson's influence.

Emerson's familiarity with the space of inquiry stemmed from his experience at Masherbrum in 1960. In his first letter to Lester, dated June 12, 1961, Emerson sketched an outline of his Masherbrum project which both illustrated his regard for the Himalaya as a challenging, yet uniquely appropriate space for experimental research, and transmitted this utilitarian perspective to the impressionable Lester. In the letter, Emerson demonstrated his reliance on Masherbrum as an analogous space to Mt. Everest. His conduct in 1960 was a "pre-test" to answer "a lot of necessary questions" generated by his preconception of Mt. Everest's extremity. That extremity created additional challenges for creating valid research questions, hypotheses, and methods; Emerson told Lester that the site demanded "careful planning and considerable ingenuity" if they wished to collect "valid and reliable" data. Further, Emerson acknowledged that the challenge of human studies in this space added another dimension of complexity. Those studies could not interfere overmuch with climbing activities because Emerson believed that he and Lester's social and psychological data would suffer "if the mountaineering enterprise is not pursued with full vigor."[115] If this milieu of imagined conditions could be overcome, then Emerson told Lester that Mt. Everest was a setting which "provides excellent material on individual stress, inter-personal tension, decision making and human relations

[115] Even though this final point was an apparent hindrance to a scientific program on an expedition with limited resources, it was a crucial component of the experimental designs later adopted by AMEE scientists. That the scientific program not interfere with AMEE's mountaineering objective would also become Dyhrenfurth's only stipulation for research design.

under stress, etc."[116]

These early deliberations by Emerson were impressed upon Lester, and were also representative of a growing tension Siri felt toward their common space of inquiry. This tension existed in their preconceptions of Mt. Everest as a site which would generate unique natural phenomena and as a site whose extremity could not be controlled. Although Emerson, Lester, and Siri prioritized the high Himalaya because of its extremity, they anticipated that this extremity would be a powerful obstacle to their research. To solve this tension, AMEE scientists created research questions, hypotheses, and methods that sought out and exploited the source of Mt. Everest's extremity: its uncontrollable contingency. In their prospectuses, they emphasized the advantages of non-simulated studies which could only be conducted under unique circumstances that were local to Mt. Everest, thereby imparting special characteristics to Mt. Everest's locale, and allowing that locale's extremities to shape their projects before they ever entered its domain.

This interplay between opportunities for research created by Emerson, Lester, and Siri, and their preconceptions of uncontrollable contingencies generated by extremity, represents a nuanced relationship between AMEE scientists and their field site that contravened the normal practice of experimenting within carefully controlled laboratory spaces. They had to invent a justification for conducting experiments in the field. This justification ultimately came in the form of the non-simulated lexicon employed by all three investigators. This approach towards, and use of, the extreme locale allowed them

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[116] Emerson to Lester, dated June 12, 1961, Emerson Papers. Masherbrum was not Emerson's intended locale for the pre-test. He originally planned to conduct pre-test routines on Denali.

to strategically create opportunities for basic research that could be combined with the aims of the American Cold War state. In so doing, they transformed Mt. Everest, a place whose sub-marginal extremity made it practically worthless, into a locale that was as valuable to contemporary scientific inquiry as the most expensive, high-tech laboratory.[117]

For Emerson, Lester, and Siri, Mt. Everest not only offered the opportunity to witness exceptional phenomena, they argued that the "realness" of its locale would both augment and supersede observations made in the laboratories of their home universities, where methodological norms demanded strict control over naturally-occurring contingencies. In designing their projects for AMEE, they embraced these contingencies in the hope that they would produce a different kind of datum, a kind which could not be produced via laboratory simulation and which, by virtue of its non-simulated production, was closer to nature. This epistemology was employed by AMEE investigators to create hypotheses and methods of data-collection which were particularly relevant to their fields, thereby justifying their choice in research site while obviating tension between the scientific need for control and their preconception of the space's uncontrollable contingencies. Tracking how those hypotheses and methods changed over time in response to each researcher's varying preconceptions toward the space of inquiry demonstrates the causal role Mt. Everest played in the development of their projects, eventually manifesting in analogs between Mt. Everest's non-simulated extremities and those encountered by Cold War agents. As the first researcher to develop a robust project

[117] This practice would be repeated over the ensuing eight years for *Mare Tranquillitatis*.

for AMEE, and justify that project by appealing to the space's non-simulated character, Emerson is the first to be examined.

EMERSON DESIGNS FOR SMALL GROUP RESEARCH

Emerson's desire to observe small-group dynamics in a non-simulated locale was a response to contemporary sociologists who problematized the artificial quality of contemporary research methods on small groups conducted in laboratories. One such sociologist, Dr. William R. Catton, Jr. of the University of Washington, wrote that laboratory-based small-group research seemed "a wobbly basis for scientific generalization," because the small groups were, "usually thrust into the laboratory without previous acquaintance and are observed for only brief periods of interaction under 'unreal' conditions."[118] This was worrisome for sociologists who wished to draw generalizable conclusions because the subjects of simulated experiments had "little or no opportunity to develop a spontaneous structure or group subculture," as they would have under normal circumstances.[119] As Emerson's justifications for his choice of methods and non-simulated locale developed over multiple prospectuses from 1959 to 1962, they increasingly addressed this epistemological problem such that, by the middle of 1962, he had convinced Lester to follow suit.

Although Emerson first mentioned this methodology to Lester during their correspondence in 1961, he had already tested its efficacy on Masherbrum in 1960. His

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[118] William R. Catton, Jr., Review of *The Acquaintance Process*, by Theodore M. Newcomb, *The American Journal of Sociology*, Vol. 67, No. 6 (May, 1962): 704.
[119] Ibid.

prospectus for the Masherbrum expedition was the progenitor to both his and Lester's projects for Mt. Everest. For that reason, understanding how Emerson defined his field methods, and how and why he employed them, are crucial to explaining how these scientists' research questions, hypotheses, and methods transformed Mt. Everest's remote, unpredictable alpine environment into a space for scientific inquiry during an expedition which could not afford time and energy for ordinary research schedules. Additionally, it is possible to infer how the extreme locale influenced Emerson's approach to research on Mt. Everest based on the modifications he made to the latter prospectus. Analysis of these prospectuses will illustrate how Emerson, and then Lester and Siri, shaped their conceptualization of Mt. Everest to fit their research, and the mountain reciprocated by shaping their research.

Emerson devised his prospectus to conduct a non-simulated test in a Himalayan locale in 1959, before he had been invited to participate in Clinch's expedition to Masherbrum.[120] Originally, he developed his project in conjunction with University of Cincinnati General Hospital clinical and experimental psychologist Dr. George Ashman and Dr. Alfred Kristofferson, experimental psychologist in the University of Cincinnati's Department of Psychology. The psychologists worked out a "program of laboratory tests to be studied for their power in predicting stress behavior in the field," while Emerson designed his study: "Communication and Decision Making Under Prolonged Stress." Although Ashman and Kristofferson's projects were never deployed, by the time Emerson was invited to join the Masherbrum expedition he had completed his designs to

[120] Emerson to Lester, dated June 12, 1961, Emerson Papers.

study the dynamics of small group communication on prolonged, stressful missions with uncertain outcomes.

Because Emerson developed his project independently from any pre-existing opportunities to join a prolonged mountaineering expedition, it is impossible that the research project was created as an *ad hoc* justification for going to the Himalaya, much less the Karakoram. From the outset, Emerson was genuinely interested in his research for its own sake; the opportunities he created and the ways in which he made the Himalaya into a site uniquely suited for fieldwork served Emerson the scientist, not Emerson the mountaineer. This prospectus served as a benchmark for Emerson's particular conceptualization of "a high and difficult Himalayan mountain" as a suitable site for scientific inquiry.[121] Alterations to subsequent drafts, including refined routines for data-collection and precision regarding the advantages of non-simulated conditions, were in-part caused by reactions to Emerson's experience from using Masherbrum as a space of inquiry in 1960.

Emerson wanted to study how small groups of people pursued a "group goal...so concretely formulated as to make success, failure and progress objectively definable."[122] With Ashman and Kristofferson, he planned to generate "propositions concerning the psychology" of his subjects, which would be examined in the field "in the context of interaction among members." Their field observations would lead to "hypotheses about communication" which could be tested in subsequent projects. Based on this initial study,

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[121] Richard M. Emerson, "Communication and Decision-Making in Small Groups Under Stress," TS, ND, Emerson Papers.
[122] Ibid.

he intended to produce exploratory questions concerning group decision-making, derived from communication processes observed in the field. Essentially, Emerson wanted to know what sort of things people say to one another when working under stressful conditions toward a common goal, in the hope that he could later explain how and why they say those things.[123]

Acknowledging the "unusual character of the research setting chosen for this project," Emerson employed "subject motivation" to create an opportunity conforming to his research goals and non-simulated methods. Emerson anticipated that the research setting would produce "gross behavioral stress reactions," and he claimed that "the variable which is perhaps the most difficult to manage in laboratory research is the one which is most crucial...That variable is subject motivation, a close runner-up in this regard is intense stress itself."[124] In the following passage, Emerson first explained why subject motivation and stress were difficult to manage in laboratory experiments, and how they were connected to his conceptualization of the extreme locale:

> With a sufficiently captive person as a subject, rather extreme conditions can be and have been induced experimentally. These conditions, however, generally involve high artificial stimuli, and/if not artificial they tend to be extremely limited in scope and duration. While intense motivation may be generated, it is usually motivation toward escape. The subject has very little positive motivation to face and cope with conditions in the interest of achieving real personal rewards. How will a subject respond in extreme stress conditions when he has brought himself into the situation in pursuit of important personal goals? How will he react under that same stress when he finally is forced, by the situation, to abandon his goal, thus losing the positive interests which brought him there? …[M]otivational investment plays a crucial role, and we must observe this variable across an unusually wide range of variation. In this study the subject must do more than "hang on" until the experimenter releases him custody. He must

[123] Emerson's routines for data collection precluded non-verbal forms of communication.
[124] Underlined text preserved from original.

> "live" under stress in fullest sense, faced repeatedly with crucial decisions of many kinds for which he, the subject, is fully responsible. He must manage all facets of a normal life, including his relations with other people who share his fate.[125]

By identifying subject motivation and extreme stress as linchpins to produce the sought-for phenomena, Emerson created scientific inquiries that could only be addressed in a very narrow range of locales. The laboratory was unsuitable. Previous attempts, including those conducted at Dachau during World War II, had resulted in the wrong kind of subject motivation. Even if laboratory experiments could be conducted humanely, Emerson believed that they would "require a large number of experimental conditions, each difficult to properly simulate, or an extensive series of experiments." Simply put, what Emerson wanted to study could not be produced via laboratory simulation, and was too complex for laboratory controls.

In Emerson's mind, there was only one accessible locale in which his research design and objectives could be carried out: "in the prolonged...effort of mountaineers to achieve the summit of a high and difficult Himalayan mountain," because ,"The high Himalayan climb is perhaps the <u>only</u> setting in which men voluntarily expose themselves to such intense and prolonged stress."[126] His test-subjects' motivation was managed by their voluntary pursuit of the summit, and their stress was managed by the well-known risks of Himalayan climbing.[127] He wanted to take twelve climbers to Denali to pre-test

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[125] Ibid. Underlined text preserved from original.
[126] While other locales, such as space travel and battlefields, seem to fit Emerson's research design and objectives, he did not consider their suitability, perhaps because access to astronauts and soldiers *in situ* was not available. Alternatively, *Freedom 7* lasted only fifteen and a half minutes--hardly "prolonged"--and it would be hard to determine the degree to which low-ranking foot-soldiers voluntarily enter combat.
[127] Emerson and Siri both emphasized that their test-subjects were voluntarily submitting themselves to extreme stress. This is, perhaps, unsurprising since the "highly publicized trial of Nazi researcher Adolf Eichmann" in 1961 generated a "legal comparison between Allied and Nazi research" that relied on non-

his methods before setting out to attempt either Dhaulagiri or Mt. Everest, without supplemental oxygen. Those methods would include data-collection via his subjects' self-administered observations, tape-recorded sessions with Emerson as a participant observer within the small group, and tape-recorded bull sessions during which Emerson manipulated conversations to test communication response. Total cost: $85,557.

Emerson never made it to Denali. Instead, his trip to Masherbrum in 1960 served as a pre-test, and the contingencies he encountered there informed the data-collection methods he proposed in his first prospectus explicitly crafted for AMEE. In this prospectus, transmitted to Lester on September 26, 1961, Emerson's purpose, theory, and hypotheses were more focused. By 1961, Emerson had spent 43 days above 4100m in the Karakoram. He used this experience to include significant affirmations regarding the suitability of Mt. Everest as a research setting. As with 1959, the variables of subject motivation and stress were linked to the research setting, although they were now identified as MI for "Motivational Investment" and stress was an unmanaged attribute of the environment which affected the relations under study: "The principal variables involved MI, [Energy Mobilization], and [Uncertainty], are known to exist with clarity and to vary widely during the period of the climb," and "the one variable which is the most difficult to manage in the laboratory, the subjects task motivation (MI), is known to

consenting subjects, which was then undermining the "moral legitimacy of American medical science." Cathy Gere, *The Two Soverign Masters*, Chapter I "Utility on Trial," (2014), 1, TS, letter to author. Explicitly stating the voluntarism of their subjects may have been a strategy to distance their research from parallels with the Nazis, who conducted low-oxygen and exposure experiments on concentration camp victims during the Second World War for the benefit of Luftwaffe crewmen. See also Maura Phillips Mackowski, *Testing the Limits: Aviation Medicine and the Origins of Manned Space Flight* (College Station: Texas A&M University Press, 2006).

be exceedingly high, at least at the outset, on such climbs." Although Emerson's word choice reflects the confidence he gained in his study from its pre-test, he qualified the longevity of MI with the words "at least at the outset," because on Masherbrum an unnamed member of the expedition, in what was "a great surprise" to his teammates, reacted to stress by exaggerating the mountain's objective hazards (e.g. the route's degree of slope), defining the mountain as "too dangerous to climb," engaging in "some kind of fantasy about 'this mountain' having it in for him," and tearfully admitting that "he was just too afraid to climb the mountain."[128] This single case was indicative of what could become a larger problem in 1963; if subject MI was substantially reduced, then the advantages of a non-simulated field experiment over laboratory-induced stress would become null.

Emerson's experience on Masherbrum also informed his prospectus' data-collection routines. In the cover letter for his 1961 prospectus, Emerson noted a lingering methodological problem generated by the locale's extremity which he encountered on Masherbrum: "When important data hinges around unanticipated events it may take some doing to be in the right place at the right time with the right observation instruments."[129] This was especially difficult because research personnel and test-subjects alike would both be "strung out all over the mountain, with days of travel time separating them into sub-groups with constantly shifting membership." Emerson hoped that he and Lester would be able to design data-collection routines which "anticipate the unexpected."

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[128] Emerson to Lester, October 29, 1961, Emerson Papers. Based on extant records by Masherbrum veterans Emerson and Hornbein, the unnamed member was most likely Richard McGowan.
[129] Emerson to Lester, September 26, 1961.

Although this suggestion seems like a non-starter, further examination of the 1961 prospectus demonstrates a set of three routines, derived from those used on Masherbrum, which sought to obviate the problems of extremity for the investigators.

Emerson's hypotheses demanded a record of Motivational Investment, Energy Mobilization, and Uncertainty for each individual within the expedition's small groups. Because he found that these variables were subject to variation from external factors, such as stress, Emerson needed regular data points to track how these variables changed in response to daily events. Because the scale and acute topography of Mt. Everest prevented the kind of direct observations that were made in laboratory studies, his primary mode of data-collection was the Self-Administered Routine, "in the form of subject self-ratings and appraisals" in a standardized diary pre-prepared by Emerson, distributed to test-subjects at the beginning of the expedition.[130]

Emerson planned to supplement self-administered data with the Participant Observer Routine, for which "two participant observers," Emerson and Lester, would use the same prepared diary to make daily estimates of MI, EM, and U for one particular subject with whom they worked that day. As a mountaineer, Emerson planned to conduct his portion of this routine with small groups of climbers high on the mountain, while Lester studied different groups operating out of Base Camp. In this way, Emerson hoped they would cover a wider geographical range without much overlap between subjects. To aid in this routine, Emerson proposed that he and Lester would each carry a portable tape recorder at all times, even after he discovered "certain shortcomings" with the Concertone

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[130] Emerson, "Information Feed-Back in Task-Oriented Groups," typescript, ND [1961], Emerson Papers, 7.

TR 100 he used on Masherbrum. The tape recorders would serve as those "right observation instruments" for the observation of "unanticipated events" which Emerson believed would shape their subjects' MI, EM, and U.

The final routine Emerson planned was the Experimental Routine, during which he and Lester would "introduce specific information into natural communication" with their subjects, effectively manipulating the conversation to observe how individuals within small groups responded to statements that he classified as "positive" and "negative." Unlike Emerson's "bull-sessions" on Masherbrum, which he had to abandon due to the problems of mobility and access he mentioned to Lester in the above cover letter, this routine followed a secret, pre-arranged schedule which employed a tape recorder engineered into the main radio set to circumvent those problems.

Although all three methods for data-collection were created in reaction to Emerson's experience in the Karakoram, none of them sought to exert control over the contingencies present at Mt. Everest. This was a departure from not only norms for mountain research established by scientific organizations who built laboratories in the Alps during the nineteenth century, but also from contemporary investigations as recent as Hillary's 1960-61 Himalayan Scientific and Mountaineering Expedition. The physiological component of that venture was fondly called the "Silver Hut Expedition" due to its use of a foam-insulated plywood station installed at 5800m on Ama Dablam. Led by Dr. L. Griffith C. E. Pugh, test-subjects and experimenters lived for up to nine months within the heated, "very comfortable" space, which, according to member Dr.

James S. Milledge, looked "a bit like a London underground train carriage."[131]

But, Emerson was not interested in comfort, and, unlike his 1959 prospectus, the 1961 plan did not seek to use his observations from Mt. Everest merely as preliminary research for future laboratory studies.[132] AMEE was the main event, one that defied normal experimental epistemologies because the extremity of its "natural field setting" precluded replication. Copies of this prospectus were sent to Siri and Lester and, as we shall see, their projects expressed similar interests in exploiting the opportunity to apply experimental methods outside the confines of the laboratory.

LESTER CREATES HIS ROLE

As early as the day after his prospectus was sent to Lester, Emerson wrote him again, urging him to plan for his psychological study to occur at Advance Base Camp (ABC), as opposed to Base Camp. Emerson believed that the volume of expedition traffic through ABC made it "a crucial spot to have a research man located," and it would help maximize their coverage of the team's activities on the mountain because Emerson was "confident I'll be able to get up quite high."[133] Lester, whose professionalization occurred in hospitals, not tents, had never been to a high altitude glacier, much less climbed through the icefall of one. He was cautiously eager about his prospects of making it to ABC. However, he was immediately receptive to Emerson's preference for the natural

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[131] James S. Milledge, "The Silver Hut Expedition, 1960-1961," *High Altitude Medicine & Biology,* Vol. 11, No. 2 (Summer, 2010): 94.
[132] Emerson, "Communication and Decision-Making in Small Groups Under Stress," TS, ND, Emerson Papers.
[133] Emerson to Lester, September 27, 1961, Emerson Papers.

field setting, even though it contrasted starkly with the research norms to which Lester was accustomed.

Lester's readiness to follow Emerson's lead within the extreme locale was likely due to his total ignorance of the space of inquiry, even if he was not totally unfamiliar with research conducted in extreme conditions; he was associated with three psychologists at Systems Development Corporation who had studied the behavior of front-line soldiers for an Army program during the Korean War called Project Fighter.[134] But, he had difficulty generating research questions or hypotheses for AMEE, likely because he lacked the background knowledge to create informed inquiries. He did not know much about previous psychological scholarship in the area, mountaineers, or mountains. He only knew that he wanted to go to Mt. Everest in 1963 because he believed that it would be "new and stimulating and challenging."[135] In this regard he was unlike Emerson, who was at home in the mountains, and who had developed a prospectus with pointed research questions before he had even been invited to join Clinch at Masherbrum. Where Emerson saw in AMEE an opportunity to further his preexisting research, Lester saw in his capability for research an opportunity to visit an exotic part of the world on what was likely to be an historic expedition.

Without a clear direction, Lester began acquainting himself with "everyone whom I know or hear of who might know anything about investigations of stress."[136] He corresponded with a variety of researchers working in field settings, including a

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[134] Lester to Emerson, June 19, 1961, Emerson Papers.
[135] Lester to Emerson, September 20, 1961, Emerson Papers.
[136] Lester to Emerson, August 21, 1961, Emerson Papers.

psychologist studying isolation in Antarctica, the former director of the Air Force Survival Research Field Unit, and the chief psychologist on Project Mercury. He discovered a bulletin of government-sponsored research abstracts, "a good deal" of which were related to his and Emerson's interests. In spite of these developments, Lester remained most interested in brainstorming with Emerson because his research design for Masherbrum was most relevant to AMEE's particular setting as a remote, high-altitude mountaineering expedition.

Unfortunately for Lester, Emerson was not quick to reply. In September, Lester found out that Dyhrenfurth and Siri wanted a concrete proposal from him for their planned trip to Washington D.C. to meet granting agencies. He had not yet heard back from Emerson regarding his Masherbrum project, so he sought out others with which he could collaborate. His contacts at Systems Development Corporation (SDC), Robert V. Katter, Milton G. Holeman, and Robert L. Egbert, who had authored a variety of works during the mid-1950s for Project Fighter, had ideas which resonated with Lester, and so he scheduled to meet with them to discuss their previous work.[137] By the time Emerson sent a prospectus to Lester it was not the prospectus that he used to guide his Masherbrum work, but instead the 1961 prospectus for AMEE, and Lester had already met with the SDC researchers. By October 4, Lester and the SDC group were "thinking BIG, and we may have to tone down our aspirations."[138]

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[137] Katter, Holeman, and Egbert collaborated to produce a number of papers from 1953 to 1955; some selected works include "Incidental Observations Gathered During Research in Combat Units," and, "Research on Motivation and Attrition Problems of the Army Officer Candidate Schools," published for the Defense Technical Information Center, and "Infantry OCS Evaluations and Combat Performance," for George Washington University and the Human Resources Research Office.
[138] Lester to Emerson, October 4, 1961, Emerson Papers.

They were, perhaps, thinking too big. When Lester wrote to Siri and Emerson on October 13 to indicate his research direction, his passive tone suggested that he was aware that his plans lacked focus: "One might also investigate the factors determining inter-personal attractions and rejections during the climb, the amount of and correlates of stress reaction shown by individuals, and perhaps even the incidence and determinants of distortions in the observational ability of climbers (or more accurately men under stress)."[139] Despite this tentative progress, Lester still knew nearly nothing about Everest's locale. For this reason, Lester's minimal critique of Emerson's 1961 prospectus concerned Emerson's "theoretical rationale...from which the hypotheses are derived," which made him vaguely uneasy; his reactions were mostly praise for Emerson's hypotheses and methods, and speculation about how Lester's stress-related project might benefit from Emerson's data-collection routines.[140]

Emerson's reply further demonstrated how his familiarity with the locale defined his expectations and non-simulated design, and how he used this knowledge to influence the direction of Lester's project. Since the experimental stimuli that Emerson and Lester used in their projects were emergent from the space's extremity, rather than induced in a simulation, they had to anticipate their occurrence. As a "climbing legend," Emerson was in a superior position to anticipate the likeness of what his test-subjects might encounter on Mt. Everest.[141] He used this authority to warn Lester away from relying on "critical emergency situations" to infer correlates of stress: "if you are thinking in terms of really

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[139] Lester to Siri, October 13, 1961, Emerson Papers.
[140] Lester to Emerson, October 20, 1961, Emerson Papers.
[141] Coburn, *The Vast Unknown*, 64.

severe events, such as the avalanche or the tent fire on Masherbrum, you should understand that they happen very infrequently, and may not happen at all."[142] Emerson also told Lester that the "small" and "plaguing hazards" that climbers encounter, such as crevasse negotiation, are so routine to mountaineers that they would not function as stimuli. Instead, Emerson suggested that Lester focus his study of stress around periods during the climb when individuals or groups must contend with "vague uncertainties," such as "more or less uncontrollable 'possibility' of getting stranded without support in prolonged bad weather, the vague possibility of avalanche, etc." Finally, Emerson speculated that a program of particular research of particular personalities, rather than his theory-driven project, would result in a set of "independent and unrelated case studies."

Every aspect of Emerson's response to Lester on October 26 served to tie his scientific authority to his previous travels within the locale. Because he argued that only a real (i.e. non-simulated) test would manage all of the variables necessary to produce authentic scientific results, Emerson's connection between authority and time spent in the field was integral to his methodology. In this regard, Emerson, and by extension, Lester, used the same epistemic justification as Tyndall and Forbes had done a century before when their explanations for glacier motion were "rendered reliable by the purposeful action each expended in the Alps."[143] Like his predecessors, Emerson believed he could underwrite his scientific authority with his "*presence*, not absence, *closeness*, not distance" from wild nature.[144] This trend crucially shaped not only Emerson's project, but

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[142] Emerson to Lester, October 29, 1961, Emerson Papers.
[143] Bruce Hevly, "The Heroic Science of Glacier Motion:" 66.
[144] Livingston, *Putting Science in its Place*, 41. Livingstone's claim also cites Dorinda Outram, and the *Osiris* volume in which Hevly's article first appeared, edited by Henrika Kuklick, and Robert E. Kohler.

ultimately those designed by Siri and Lester, as well.

Unfortunately for Lester's Mt. Everest prospects, he had not yet worked out exactly how to take advantage of his possible presence within, and closeness to, wild nature. He had not made significant progress toward creating a workable project or resolving whether he should heed Emerson's warnings before mid-November, when he met with research groups at the Institute for Personality Assessment and Research (IPAR) at University of California - Berkeley, and the U.S. Army Leadership Human Research Unit in Monterey, California.[145] Lester was interested in IPAR because of its prestige, ability to complete thorough personality assessments of AMEE team-members prior to leaving for Nepal, and because he believed these assessments offered a degree of psychological detachment and scientific objectivity.[146] IPAR was likewise interested in access to AMEE climbers; having grown out of the Office of Strategic Services' (OSS) personnel assessments during World War II, IPAR was at that time still invested in military applications for personality assessments.[147] Their interest manifested into action when IPAR Director Dr. Frank Barron offered Lester a two-year research associate appointment in conjunction with his still-undefined AMEE project. It is evident from

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[145] IPAR is now known as the Institute for Personality and Social Research, and the Monterey group was administered by The Human Resources Research Organization (HumRRO).

[146] Lester to Emerson, November 16, 1961, Emerson Papers.

[147] "History" http://ipsr.berkeley.edu/about.html. In Jamie Cohen-Cole's recent book, *The Open Mind*, he argues that the personality assessments conducted at IPAR--of which Lester's project was a part--were developed to measure creativity and autonomy as "democratic traits that everyone but authoritarians possessed," and for ranking individuals "according to their level of creativity." These exercises served to differentiate American citizens from their Eastern Bloc rivals, at least in the minds of academics and public servants. Jamie Cohen-Cole, *The Open Mind: Cold War Politics and the Sciences of Human Nature* (Chicago: University of Chicago Press, 2014), 44. Further, small-group settings like those used by Lester and Emerson were believed to be ideal for interdisciplinary research, which was at that time a new trend in American academia: interdisciplinary social science was both more scientific, and its practitioners embodied democratic values by being "creative, practical, open minded, tolerant, and scientific" Cohen-Cole, 67.

Lester's characterization of Barron's interest in his project that Mt. Everest's unique locale influenced his decision to extend the appointment to Lester; Barron had completed work on the effects of drugs on imaginative processes, dreams, and fantasies, and he was searching "for ways to extend his studies into the effect of unusual external (as opposed to internal) conditions on these processes; naturally the Everest expedition interests him from this angle." Barron's conceptualization of Mt. Everest as an extreme space was such that he was convinced that AMEE climbers would encounter unusual external conditions there.

Researchers in Monterey also saw in Mt. Everest a unique opportunity to extend their studies to an exceptional space. One of their projects, an extension of Project Fighter called Task Fighter, attempted to predict "which men will show stress reactions under combat conditions." This was related to Lester's initial research topic to study stress correlates within individual climbers. Task Fighter researchers were concentrating their efforts on developing both procedures to simulate stress in laboratory conditions, and techniques to observe and quantify performance under stress. Although Lester did not imply that either he or the Monterey researchers considered using AMEE members as analogs for soldiers in a November 16, 1961 letter to Emerson, it would not take him long to discover and capitalize on that opportunity. Nor did it take Emerson long to see the similarities between the communications and actions of his small groups and those of the Research Unit's other project, Task Raid. Task Raid studied the social factors that determined the effectiveness of a new Army tactic: the deployment of small reconnaissance teams operating separately from their parent unit for periods up to three weeks. Since Emerson sought to study the communication patterns of small teams of climbers pushing reconnaissance routes up unknown peaks, and since Lester was in the midst of hashing out a project that either assessed personalities, or predicted the effects of stress, or both, it is probable that Lester's contact with Task Fighter and Task Raid helped determine how AMEE's social scientists both capitalized on military analogs when they drafted their proposals for granting agencies in 1962.

Unhappily, by January 9, 1962, Lester still felt that his ideas for research "stubbornly resist maturing, beyond the I-wonder-what-happens-when-18-men-try-to-climb-3-mountains stage."[148] There was a glimmer of hope, however, when his office-mate, Dr. Keith Sward, introduced him to Theodore Mead Newcomb's 1961 monograph, *The Acquaintance Process*. *The Acquaintance Process* was based on Newcomb's Bennington College Study, in which he used rating scales and rankings to track changes in the social and political beliefs held by newly-acquainted, college-aged young men living together in two groups of seventeen students.[149] Lester saw parallels between Newcomb's group of test-subjects and AMEE climbers, and between their shared interest in non-simulated locales, which were just beginning to be interpreted as "superior" to "the more familiar experimentation with ad hoc laboratory groups" by a wider range of social scientists.[150] These parallels encouraged Lester to include a Newcomb-type study in a January 12 draft of his prospectus, alongside the three other areas of research which were inspired by his collaboration with SDC and IPAR.[151]

Without a clear idea of what was possible at high altitude, Lester could not devise

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[148] Lester to Emerson, January 9, 1962, Emerson Papers.
[149] Theodore M. Newcomb, *The Acquaintance Process* (New York: Holt, Rinchart & Winston, 1961).
[150] William R. Catton, Jr., Rev. of *The Aquaintance Process*, 705.
[151] Lester to Emerson, January 12, 1962, Emerson Papers.

a specific plan. Although he had turned to Emerson for guidance before, Emerson never shared his phenomenological experiences of high altitude research with Lester, even after Siri directed Emerson to help Lester "progressively 'zero in'" on research questions, hypotheses, and methods because of his "familiarity with the mountain situation."[152] As a result, Lester was still worried about his project's "feasibility, desirability, sensibleness, fuzzy thinking, etc," even when he and Siri made a joint pitch to IPAR on January 16.[153]

Because Lester had a tenuous relationship with his space of inquiry, his IPAR pitch included a constellation of loosely-related psychological projects which had been co-produced with individuals who had first-hand experience in non-simulated spaces. Lester lacked the expertise to create a definitive plan, so he pitched his role in Emerson's project on small-group communication-feedback, his role in collecting data for SDC's projects on stress reactions, his role in assessing external conditions on imaginative processes for IPAR, and an emulation of Newcomb's study which replaced a college dormitory with Mt. Everest and undergraduates with mountaineers. This pitch evolved into a full-fledged proposal by April, 1962, but it was one that Lester was never fully comfortable with. As we shall see in the following chapter, Lester deftly created parallels between his imprecise, "shotgun approach" proposal and contemporary Cold War concerns, but his final proposal never met the precision and specificity of Emerson's or Siri's.

SIRI'S PROJECT

[152] Emerson to Lester, November 21, 1961, Emerson Papers.
[153] Lester to Emerson, January 12, 1962, Emerson Papers.

Like Emerson, Siri had been on expeditions to extreme locales; however, unlike Emerson, Siri had not prepared a prospectus prior to his invitation to join AMEE in 1963. Indeed, before AMEE, Siri had never conducted a non-simulated study even though he had prodigious field experience. In 1950 he spent several months in Peru under the direction of Dr. John H. Lawrence as part of an AEC- and Navy-sponsored University of California research team using tritium-labelled water to study the physiology of high-altitude indigenous populations in the Andean laboratories of Dr. Alberto Hurtado in Lima and Morococha (4511m).[154] He returned in 1952, leading a contingent of Dr. Lawrence's study consisting of six men who intended to climb in the Cordillera Blanca while Siri conducted physiological observations. Unfortunately, the day after Siri's team finished their approach march up to 4875m, a climber named Oscar Cook succumbed to pneumonia, probably induced by High Altitude Pulmonary Edema. Once the remaining climbers returned to their high camp after carrying Cook's body out for transport back to the United States, their scientific program, "which was never begun, was perforce abandoned" due to lack of time.[155] Such was the extremity of the Cordillera Blanca, a range whose tallest peak was still over two kilometers shorter than Mt. Everest.

Siri returned to high altitude in 1954, where he led the California Himalayan Expedition to Makalu. Although a small physiological research project conducted by Berkeley Professor Nello Pace generated enough interest with the U.S. Air Force for it to provide free round trip transportation for the expedition to Calcutta, Siri was not involved

[154] John H. Lawrence, Rex L. Huff, William Siri, et al., "A Physiological Study in the Peruvian Andes," *Acta Medica Scandinavica*, Vol. CXLII, Fasc, II (1952): 117-118.
[155] William Siri, "Cordillera Blanca Adventure," *The American Alpine Club Journal* Vol. 8, Iss. 3 (1953): 439. Dr. John H. Lawrence was brother to Nobel-laureate Dr. Ernest O. Lawrence.

in its design or routines.[156] In 1957-1958, Pace and Siri both summered in Antarctica, Pace as the lead physiologist for Operation Deep Freeze III, and Siri as the Field Leader for the International Physiological Antarctic Expedition attached to Edmund Hillary's Trans-Antarctic Expedition. Under the direction of Dr. Pugh, Siri made detailed physiological observations of the Britons who made the first attempted land crossing of Antarctica.[157] With all of this field experience, Siri was well-acquainted with extreme spaces of inquiry when Dyhrenfurth asked him to join AMEE, even though he did not have a pre-planned prospectus.

Siri's prospectus was developed in response to Dyhrenfurth's invitation; the opportunity to co-lead an expedition to Mt. Everest was too good to pass up. For inspiration, Siri turned to the work of another member who was included on the initial AMEE roster in 1961: Dr. Thomas Hornbein. Hornbein, who went to Masherbrum with Emerson on the 1960 American Pakistan Karakoram Expedition to conduct high-altitude physiological studies on its climbers, accepted Dyhrenfurth's invitation to join AMEE under the condition that he would not be responsible for conducting scientific research. If he was going to go to Mt. Everest, Hornbein was going to climb. This allowed Siri to pick up where Hornbein had left off on Masherbrum. Hornbein had produced two scholarly papers from his physiological research in the Karakoram: "Evaluation of iron stores as limiting high altitude polycythemia," and, "Adrenal cortical response to chronic

[156] In an account written for the Sierra Club, 1954 California Himalayan Expedition climbing leader Willi Unsoeld characterized Pace's research methods as "a veritable orgy of physical tests indulged in under the relentless eye of our physiologist." William W. Dunmire and William Unsoeld, "California Himalayan Expedition: Makalu," photocopy (1954), 15. Nello Pace Himalayan Documents, 1954-1995, Mandeville Special Collections Library, University of California, San Diego.
[157] *The Science News-Letter* Vol. 72, No. 22 (November 30, 1957): 345.

hypoxia," both published in early 1962. Siri's planned research for AMEE was an extension of these works, combining the bio-nuclear methods of J. H. Lawrence with the same penchant for a non-simulated environment that was shared by AMEE social scientists Emerson and Lester.

In an attempt to solidify their network, Emerson even suggested that he and Lester collaborate with Siri for their studies of stress. Since the nucleus of Siri's plan concerned adrenal cortical activity, and Emerson recalled Hornbein's measurements of that activity in connection with acclimatization, Emerson suggested that Hornbein's data should "contain psychological information."[158] While Emerson believed that information might benefit Lester's project in particular, neither Lester nor Siri followed up on his recommendation. Emerson would again push to overlap data collection routines with Siri and Lester late in 1961; he believed that when their test-subjects were inert, having blood drawn at the low camps for Siri's studies, that Lester might take that opportunity to conduct interviews. Additionally, Emerson assured Siri that he could "plan on" having Emerson administer galvanic skin response readings or "tests of any kind" as high as the South Col (7909m).[159] Rather than embrace Emerson's drive for tighter networking between the trio, Siri designed his study to pursue questions generated by Hornbein's work and his previous experience in the mountain laboratories of Peru and on the slopes of Makalu.

Through the 1950s, Siri had learned methods for using radioisotopes to quantify physiological systems from his mentors at the Donner Laboratory of Medical Physics,

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[158] Emerson to Lester, June 12, 1961, Emerson Papers.
[159] Emerson to Lester, November 21, 1961, Emerson Papers.

including R. L. Huff and J. H. Lawrence.[160] From these methods, Siri pioneered ways to use tritium tracers to determine body composition and fluid volume, culminating in a 1962 paper, "Tritium Exchange in Biological Systems," which immediately preceded his grant proposal for AMEE.[161] For Mt. Everest, Siri planned to use a different medium--radioiron-labeled plasma--to determine the effects of hypoxia and acclimatization upon iron turnover in erythropoiesis, the production of red blood cells. The relationship between iron stores and intake and polycythemia, or an increase in the proportion of red blood cells in blood, had been examined in previous high-altitude research investigated by the Swiss at Dhaulagiri in 1958 and Hornbein at Masherbrum in 1960. Siri wanted to apply the methods he learned at Donner Lab to this perennial problem.

Siri's second major research objective was derived from a combination of work done by his Makalu colleague, Pace, and his AMEE compatriot, Hornbein. In 1957, Pace published a paper entitled, "Plasma and urine 17-hydroxycorticosteroid and urine 17-ketosteroid levels in man during acclimatization to high altitude" based on research that he conducted at Makalu in 1954.[162] In February, 1962, as Siri was drafting his prospectus, Hornbein published an article demonstrating that, "acute oxygen lack causes increased cortical activity," and, "no significant difference in 17-hydroxycorticoid output was

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[160] In his grant proposal to NSF, Siri cites the techniques pioneered by Huff, an AEC Post-doctorate Fellow at Donner Lab in 1950: R. L. Huff, T. G. Hennessy, R. E. Austin, J. F. Garcia, B. M. Roberts, and J. H. Lawrence, "Plasma and Red Cell Iron Turnover in Normal Subjects and in Patients Having Various Hematopoietic Disorders," *Journal of Clinical Investigation*, Vol. 29, No. 8 (August, 1950): 1041-1052.
[161] William E. Siri, "Tritium Exchange in Biological Systems," *Tritium in the Physical and Biological Sciences*, Vol. II (International Atomic Energy Agency, Vienna), 1962.
[162] P. S. Timiras, N. Pace, C. A. Hwang, "Plasma and urine 17-hydroxycorticosteroid and urine 17-ketosteroid levels in man during acclimatization to high altitude," *Federation Proceedings*, Vol. 16, No. 1 (1957): 340.

observed between [sea level and above 21,000 ft.]."[163] From these works, Siri's inquiries into the adrenal cortex sought to "secure data that will provide additional insight into the mechanisms that control red blood cell volume, and the role of the adrenal cortex in regulating the body's functions, metabolism, and chemistry."[164] Like Lester, Siri's vague justification for his study was perhaps representative of the *ad hoc* nature of his prospectus.

By April, 1962, Siri, Lester, and Emerson were all eager to exploit their studies' unique locale to conduct experiments in explicitly non-simulated conditions. Their proclivity toward using an extreme field setting for research was further encouraged by the disciplinary peers whom they solicited to critique their prospectus drafts. Professor of Sociology and Anthropology at Michigan State University, Donald W. Olmstead, was so intrigued by Emerson's prospectus that he "put aside what I should have been doing" to tell him that it was "exciting stuff (simply as soc-psych theory, apart from the icy-mountain aspects."[165] Siri had a similar experience that further highlighted the importance of the locale's non-simulated setting when Donner Laboratory Assistant Director Dr. Hardin B. Jones wrote in support of Siri's project. Jones specifically cited the study's possible benefits due to the locale's "extreme environmental duress coupled with isolation and various emergencies."[166] This kind of praise demonstrated the power of Mt.

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[163] Thomas F. Hornbein, "Adrenal cortical response to chronic hypoxia," *Journal of Applied Physiology*, Vol. 17, No. 2 (February, 1962): 246.
[164] Although Siri did not cite Hornbein's study in his August, 1962 prospectus, it is likely that he was familiar with Hornbein's work at Masherbrum, since Hornbein was an AMEE member, and he was listed on Siri's prospectus as a Field Assistant to his project.
[165] Donald Olmstead to Emerson, January 15, 1962, Emerson Papers.
[166] Hardin B. Jones to John H. Lawrence, July 20, 1962, Siri Papers.

Everest before they ever reached the Himalaya. A laboratory director, writing in favor of a locale that was rife with uncontrollable variables which he noted would complicate the "behavior and judgment" of test-subjects and researchers alike, all because the phenomena present within that locale--"maximal exertion...against hypoxia, fatigue, cold, muscular effort and dehydration"--was rarely, if ever, achieved in the laboratory. For this reason, the non-simulated character of AMEE research drew the endorsement of fellow scientists who normally preferred to exert control over their workspaces rather than relinquish it.

That same character also served AMEE researchers in procuring interest from potential sponsors by connecting the non-simulated locale to American Cold War interests. When Jones claimed that the "randomly occurring accidents and emergencies" which mobilized the phenomena Siri sought to study were manifest at Mt. Everest, he noted that they might also be encountered in one other theater: war. AMEE researchers and organizers were aware of this fact, and after repeated exposure to their research's potential for military and political applications by peers at their home universities and other institutions funded by the Pentagon, such as SDC and HumRRO, Emerson, Lester, and Siri drafted their final proposals to emphasize those applications. By doing so, they provided a scientific basis to Dyhrenfurth's efforts to make Mt. Everest, an otherwise submarginal space on the periphery of clashes between East and West, into a contested Cold War proving ground.

CHAPTER THREE: MR. DYHRENFURTH GOES TO WASHINGTON

As Emerson, Lester, and Siri were drafting their final proposals in early 1962, Dyhrenfurth was in the midst of a campaign whose specific purpose was to link the expedition to the United States' Cold War interests. AMEE's science program deliberately created analogies between Mt. Everest and spaces that were contested by the United States and the Soviet Union during the Cold War, and between AMEE climbers and agents fighting the Cold War. These analogies were dependent upon contemporary developments in American foreign policy and technological advances, and they created research opportunities by exploiting the ideologies of funding institutions. Although AMEE members professed to be "above the pettiness of jingoism and flag-waving," they nonetheless took advantage of the rhetoric produced by the Cold War's polarizing extremism to bestow a special significance upon the space of inquiry.[167] AMEE's scientific program was transformed into a means to wage the Cold War by proxy, using the vigorous performances of American scientists to master a place fraught with symbolic value that demarcated a permeable, contested border between East and West.

Whereas the previous chapter illustrated how the space of inquiry generated logistical problems that AMEE scientists sought to solve through the collaborative creation of methodologies suitable for a non-simulated experimental environment, this chapter demonstrates how that naturally-occurring, nonmutable space of inquiry was manipulated by investigators to attract the interest of potential benefactors. An analysis of AMEE's networking with funding institutions to this effect reveals how its scientific

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[167] Ullman, *Americans on Everest*, 23.

program's pertinence to a Cold War victory was crucial when it came to securing funding. AMEE scientists' particular framing of the space garnered support from a variety of public and private institutions such as the Atomic Energy Commission, three branches of the United States Armed Forces, and the National Geographic Society, whose support brought three additional scientists to the team. These scientists, along with Emerson, Lester, and Siri, made Mt. Everest relevant to the Cold War by tapping recent technological, strategic, and political developments. Interrogating this method for procuring funding illustrates how the men and women who created their research designs were empowered actors who skillfully attracted Cold War funding to support basic research, rather than practitioners who merely responded to the operational needs of the United States Department of Defense. By funding their projects, the Pentagon validated AMEE's applicability to its interests, along with the carefully-constructed analogies between Mt. Everest and contested spaces of the Cold War, including orbital space, the Moon, foreign war-zones, and submarine environments. Thus, even as they privately eschewed the Americanist rhetoric upon which these missions were founded, members of AMEE leadership and its science program framed Mt. Everest as a Cold War space, appropriate for scientific inquiry and the performance-spectacle of athletic mastery by American men.

A CONFLUENCE OF INTERESTS

Dyhrenfurth began this process almost immediately after securing his climbing permit in May, 1961. Although he expressed an interest in going to Mt. Everest "just for fun and good companionship," he knew from previous expeditions the financial difficulties facing American mountaineers seeking to fund a Himalayan mountaineering venture.[168] Dyhrenfurth believed that he could not expect the same level of financial support for mountaineering objectives from American institutions as his counterparts in Europe could expect from their home countries. This belief was reinforced by his contemporaries: upon hearing that Dyhrenfurth planned a "Grand Slam" climb of Everest, Lhotse, and Nuptse, Nick Clinch, leader of the Masherbrum expedition on which Richard Emerson and Tom Hornbein had conducted previous research, told him, "Norm, you're crazy! You'll never get that kind of money in this country. Remember, this isn't Europe, but the U.S.A. Nobody gives that much of a damn about mountains or mountaineering."[169] Dyhrenfurth's friend, James Ramsey Ullman, would later liken the fundraising to "wandering the streets with a tin cup," or, "soliciting funds for the erection of a statue of Karl Marx on the White House Lawn."[170]

Ullman's latter comparison used a Cold War context to frame Dyhrenfurth's fundraising efforts, highlighting the principal strategy used by Dyhrenfurth from the middle of 1961 to secure financial backing. His contemporaries had discouraged him from believing that the American public would support a large expedition whose goal was to climb for climbing's sake, and the trickle of funds flowing into AMEE coffers seemed to prove that sentiment. So, Dyhrenfurth tried a different approach; he explicitly connected his expedition goals to American nationalism and its national Cold War interests. This meant concealing his personal abhorrence of overt nationalism, resorting

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[168] Dyhrenfurth to Dr. Charles Houston, March 18, 1962, Ullman Papers.
[169] Ullman, *Americans on Everest*, xx.
[170] Ullman, *Americans on Everest*, 21.

to "a certain amount of flag-waving," and formulating his endeavor in a way that attempted to resolve a contemporary crisis in American heroism and masculinity by placing men, rather than machines, on the frontiers of exploration. Dyhrenfurth's formulation mirrored certain administrators within NASA who sought to create what historian David A. Mindell would later call a "well-articulated technical philosophy" to ensure that its astronauts embodied "the classical American hero" by still having a role to play in an enterprise that was "increasingly dominated by impersonal technological systems (especially in contrast to the supposedly over-automated Soviet enemy)."[171] Whereas NASA's effort garnered political capital and a tremendous allocation of resources, Dyhrenfurth hoped his would create avenues to "obtain funds from the National Science Foundation, Office of Naval Research, etc."[172] If the American public, and its institutions, had little interest in memorializing Marx in the White House, perhaps they might favor an expedition that promised to plant the Stars and Stripes on the highest point of Chinese-occupied Tibet.

Dyhrenfurth's flag-waving solution to the fundraising problem was evident in a July 31, 1961 proposal that was circulated through the AMEE roll and to Dyhrenfurth's contacts in Washington D.C. In the proposal, Dyhrenfurth sought to justify AMEE by appealing to a collection of contemporary concerns for the United States defined by its involvement in the Cold War, such as national prestige, spreading democracy in southern Asia, challenging the growing regional influence of "Red China," and substantiating

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[171] David A. Mindell, *Digital Apollo: Human and Machine in Spaceflight* (The MIT Press, Cambridge, Massachusetts: 2008), 5.
[172] Dyhrenfurth to Houston, March 18, 1962, Ullman Papers.

President Kennedy's New Frontiers rhetoric. This last point was the most developed, and appeared in numerous forms. Dyhrenfurth cited the continued "challenge" presented by "every inch of" the mountain. He explicitly compared climbing Mt. Everest to boosting Yuri Gagarin in orbit, to Amundsen reaching the South Pole, Peary at the North Pole, August Piccard's balloon ascent, and Jacques Piccard sinking to new depths in the sea. Like these other achievements, climbing Mt. Everest was "part of the continuing process of man's expansion of his frontiers."[173]

Dyhrenfurth's pitch matched the rhetoric employed by John F. Kennedy, the presidential candidate. On July 15, 1960, Kennedy had accepted the Democratic National Convention's presidential nomination with a speech about New Frontiers. He characterized the New Frontier as the brink of the 1960s, "the frontier of unknown opportunities and perils, the frontier of unfilled hopes and unfilled threats," which he claimed was "a set of challenges" faced by the nation. Kennedy called on American citizens and government not to shrink from these challenges, whose definition included the "uncharted areas of science and space," but to act in the face of their uncertainty. When Dyhrenfurth composed his pitch the following year, he adopted Kennedy's style and message:

> Man responds to challenge because that is the nature of man. In the sciences, the arts. And in the physical world. He goes north and south to the poles, down into ocean depth, out into space... and as far into space as his own legs and lungs will take him, which is to the world of the mountaintops. Of this world, the focal point is the Himalaya. The Himalaya's focal point is Everest. It is still there. It always will be. And it is time we had a look for ourselves.[174]

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[173] Norman G. Dyhrenfurth, "The American Mount Everest Expedition, 1963," TS, 1-2, WES Papers.
[174] Dyhrenfurth, "The American Mount Everest Expedition, 1963," 7-8.

As Himalayan mountaineering historians Isserman and Weaver point out, "Kennedy's election-year rhetoric could not have been better suited for Dyhrenfurth's purpose if he had written the candidate's speeches himself. What was the summit of Everest but the ultimate New Frontier?"[175]

Regardless of whether Dyhrenfurth intentionally mimicked Kennedy's tone, he created an association between AMEE's purpose and those of contemporaneous, state-run American ventures such as Operation Deep Freeze, which sent U.S. scientists to Antarctica during the International Geophysical Year in 1957-58, Operation Sunshine, a submerged transit of the North Pole by the *Nautilus* in 1958, Project Nekton, which sank the bathyscaphe *Trieste* to the bottom of the Challenger Deep in Mariana Trench in 1960, and Project Mercury, which boosted Alan Shepard to sub-orbital space on May 5, 1961. These associations illustrate Dyhrenfurth's attempt to transform his unfunded mountaineering expedition into the kind of national spectacle conceived, carried out, and exploited within the framework of the domestic Cold War imperatives.[176] In accordance with those imperatives, he claimed that AMEE would "be a feather in our cap, a booster to our prestige, a refutation beyond argument of our detractors' taunt that we are a nation gone soft and gutless," and thus more susceptible to communist penetration.[177] Hoping to secure a fraction of the support generated by these other projects, Dyhrenfurth began a letter-writing campaign to public officials whose political clout might turn in AMEE's favor.

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[175] Isserman and Weaver, *Fallen Giants*, 355.
[176] Charles J. G. Griffin, "'Operation Sunshine': The Rhetoric of a Cold War Technological Spectacle," *Rhetoric & Public Affairs*, Vol. 16, No. 3 (Fall, 2013): 522.
[177] Dyhrenfurth, "The American Mount Everest Expedition, 1963," 8.

After writing U.S. Supreme Court Justice William O. Douglas and John R. Clingerman, at the American Embassy in Kathmandu, Dyhrenfurth wrote directly to President Kennedy seeking a meeting at the White House.[178] He received a reply on July 27 from White House Science Advisor Jerome B. Wiesner, who wrote that Kennedy's schedule made it "impossible" to meet Dyhrenfurth, but that he "requested that his best wishes be conveyed to you and your party for success in your 1963 assault."[179] Although this was a blow to Dyhrenfurth's ambitious attempt to drum up the state enthusiasm for Himalayan expeditions found in European countries, Wiesner also suggested that Dyhrenfurth write several contacts who invested in similar activities, including Donald H. Dow, Chief, Military Geology Branch, U.S. Geological Survey, Simon McNeely of the President's Council on Youth Fitness, the Army Quartermaster Corps, the Office of the Assistant Secretary of Defense for Logistics at the Pentagon, and the National Geographic Society. When Dyhrenfurth conveyed these developments to the team in the first Expedition Newsletter, dated July 31, 1961, he promised to meet with these men and institutions, along with Secretary of Defense Robert McNamara and Secretary of the Interior Stewart Udall, just as soon as he returned from directing a state-funded technical film north of the 78th parallel.[180]

Dyhrenfurth's polar experience changed the way he imagined his expedition's

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[178] Justice Douglas, who served on the Board of Directors for the Sierra Club at the time, declined to have his name associated with AMEE because he did not "become associated" with projects in which he could not take part. Justice William O. Douglas to Norman Dyhrenfurth, May 31, 1961, NGD Papers, American Mountaineering Center, Golden, Colorado.
[179] Jerome B. Wiesner to Norman Dyhrenfurth, July 27, 1961, Dyhrenfurth Papers.
[180] Expedition Newsletter #1, July 31, 1961, Tom Hornbein Papers, Mandeville Special Collections, University of California - San Diego.

potential, and significantly altered how scientific research fit into his pitch. After four weeks in the Canadian Arctic filming AEC and U.S. Weather Bureau men install "the world's first nuclear-powered automatic (unmanned) weather station," Dyhrenfurth had an epiphany.[181] The AEC station had been engineered and manufactured by the Glenn L. Martin Company, who were at that time developing the successor to their first ICBM, the Titan I, and with whom Dyhrenfurth discussed his ideas for AMEE. While on the southern tip of Axel Heiberg Island, Dyhrenfurth conceived AMEE in a different light, one that altered the way he approached fundraising with state institutions; his early proposals and letters focused on the political prestige and the challenge of "the conquest of the world's greatest mountains," but after he returned from the Arctic he began pitching AMEE as a venue for scientific inquiry and technological achievement. Since the federal government had not yet been receptive to Himalayan mountaineering as a manifestation of political rhetoric, perhaps he could make AMEE useful to something that they had a proven interest in: enhancing national prestige via technological spectacle, justified as scientific exploration and basic research in areas that might benefit national defense.

Dyhrenfurth immediately began promoting AMEE in this way upon his return to the United States, even as he pursued his earlier contacts with the Military Geology Branch of USGS, the President's Council of Youth Fitness, and the Pentagon. On August 29, the day after returning from the Arctic, he met with engineers working in the Martin

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[181] Expedition Newsletter #2, Tom Hornbein Papers, Mandeville Special Collections, University of California - San Diego.

Company's Nuclear Division.[182] The next day, he met with Arnold Berman of the AEC Division of Isotopes Development to discuss placing an isotope-powered automated weather station on Mt. Everest's South Col.[183] Based on their "ecstatic" encouragement, he drafted a letter to President Kennedy on August 30 to volunteer AMEE's services to support this project. "It occurred to me," he wrote the President, "that in addition to other scientific research projects which we intend to carry out this would be a unique opportunity to install the world's highest nuclear-powered automatic weather station on the upper slopes of Mount Everest."[184]

Dyhrenfurth claimed that this technological feat would boost American prestige and influence in Southern Asia. He argued that the weather station would "for the first time provide the Indian and Nepalese governments with routine weather observational data from the Upper Himalaya," that it would "enhance the scientific prestige of the United States among the Asian peoples," and that it "could not fail to prove dramatically this country's intent to use atomic energy for the economic and social well-being of mankind,"[185] a sentiment harkening to President Eisenhower's "Atoms for Peace" speech to the United Nations General Assembly in 1953. This nascent proposal represented a change in Dyhrenfurth's focus from prestigious athleticism to pragmatic scientific research that was dictated by the shifting currency of ideological spectacle.

Although Berlin's 1936 Olympic games was the most famous 20th-century

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182 Expedition Newsletter #2.
183 Isserman and Weaver, *Fallen Giants*, 356.
184 Expedition Newsletter #2. The Newsletter contains a draft of the entire letter under the heading "Proposed nuclear-powered weather station on South Col."
185 Expedition Newsletter #2.

example of how sport and athleticism were employed to further state ideologies, the Cold War provided a new dynamic for athletics as a cultural arena for geopolitical struggle, where "the condition of US bodies were weapons" against the Eastern Bloc.[186] Sport historians David L. Andrews and Stephen Wagg would later coopt George Orwell's aphorism to describe international sport during the Cold War as "war minus the shooting," and, as illustrated in the previous chapter, post-colonial states transformed the Himalaya into a proving ground for their athletes' feats. Despite these trends, the deployment of nuclear weaponry and the increased technological sophistication of nuclear deterrents made obsolete the exhibition of athletic *Übermenschen* as proxies for soldiers. Spectacles of physical strength and skill were no longer sufficient to demonstrate cultural dominance over one's rivals; technical strength and skill, and scientific expertise, were equally important in the Nuclear Age.

Dyhrenfurth hoped that his new appeal, with its added element of scientific ingenuity, would pique the President's interest enough to warrant a meeting, so he sent his proposal to the President on September 1, 1961. Unfortunately, President Kennedy again declined; even if he had been interested in Dyhrenfurth's idea, the Soviet Union resumed atmospheric nuclear testing after a three-year moratorium the day after the letter was dispatched. This strained the already-tense Berlin Crisis, and left little time for the Kennedy Administration to discuss a mountain climb, no matter its potential benefits to American state interests. Beside these events, Isserman and Weaver argued that Kennedy

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[186] Jeffrey Montez de Oca, "The 'Muscle Gap': Physical Education and US Fears of a Depleted Masculinity, 1954-1963," in *East Plays West: Sport and the Cold War*, Stephen Wagg and David L. Andrews, Eds, (Routledge, London: 2007), 124.

was "a shrewd politician who spent political capital carefully," and that endorsing AMEE was a risky venture because it could easily end in failure.[187] Despite this impasse, Dyhrenfurth tenaciously explored other avenues to link his expedition to the prowess of American technology and science.[188]

Over the course of Dyhrenfurth's four-day trip to Washington D.C., he continued to promote AMEE's potential for technological and scientific research to representatives from federal funding agencies. From August 29 to September 1 he completed a whirlwind campaign with officials from the Office of the Surgeon General, national Academy of Sciences, Army Research Office, Army Quartermaster, AFOSR, U.S. Information Agency, USAF Aerospace Medicine Division, U.S. Weather Bureau, Army Medical Research & Development Command, National Geographic Society, and NSF. Less than a week later, on September 6, Dyhrenfurth spent the entire day at the Army Quartermaster & Engineering Center in Natick, Massachusetts meeting with a host of staff researchers. His focus on the advantages of scientific and technological research gained traction with many of these representatives; the Aerospace Research Group was interested in physiological research, the Army Quartermaster in testing clothing, equipment, and food, and the Surgeon General's Office inquired whether AMEE climbers would consider having their vital physiological functions observed during the summit assaults by "small wires attached to us along the lines of our space monkeys and the

[187] Isserman and Stewart, *Fallen Giants*, 356.

[188] Dyhrenfurth received a telephone call from a White House aid the morning of September 1, "apologizing for the fact that due to circumstances the President had to cancel all previous appointments in order to devote his full attention to the crisis at hand." Norman Dyhrenfurth to Dr. Glenn Seaborg, Director, Atomic Energy Commission, October 2, 1961, Dyhrenfurth Papers.

Astronauts," while physicians from the Surgeon General's Office recorded "temperature, pulse, respiration, heartbeat, etc. while observing their monitoring equipment at basecamp."[189] One Col. Colin P. Vorder Brugge, Deputy Commander of the U.S. Army Medical Research & Development Command with the Surgeon General, believed that their office could fund AMEE's projected cost of $186,524 "by simply including it in their huge budget next year."[190] Although Dyhrenfurth left the East Coast without any firm pledges, his presentation of Mt. Everest as a site suitable for Cold War research had attracted the interest of multiple granting agencies, long before AMEE's scientists had any concrete research objectives.

Once back in Santa Monica, Dyhrenfurth drew up a list of "People To Write To" which further illustrated his shifting emphasis toward AMEE's possible contributions to scientific and technological research.[191] An outgrowth of his meetings in Washington D.C., nineteen out of the 21 recipients on his list were scientists or agencies for scientific research.[192] At least two--the Director of Research at the U.S. Weather Bureau and a meteorologist at the Rand Corporation--were recommended by the Director of the National Academy of Sciences, Dr. Ross Peavey, with whom Dyhrenfurth had spent an afternoon in Washington D.C. Others ranged from program directors at NSF, to cosmic

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[189] Expedition Newsletter #2.
[190] Ibid.
[191] Although Dyhrenfurth continued to send letters advancing the international prestige angle to public officials, including Secretary of Defense Robert McNamara on November 21, 1961, and California gubernatorial candidate, former Vice President Richard Nixon on November 29, 1961, discouraging responses further pushed Dyhrenfurth toward the creating connections between AMEE and American scientific endeavors.
[192] The non-scientific agencies were the Federal Aviation Agency, whom Dyhrenfurth wrote to propose the installation of an "Atomic Powered Radio Beacon on Everest," and the Army Chief Signal Officer, whom he wrote to procure walkie-talkies and other communication equipment. Norman Dyhrenfurth, "People To Write To," ND, 3. Dyhrenfurth Papers.

radiologists, to instrumentation engineers, to the research branches of the Army, Navy, and Air Force. In his October letters to the Director of AEC and the U.S. Weather Bureau Chief, Dyhrenfurth continued to pitch the half-baked plan to install a nuclear-powered weather station on the mountainside, however, by November Dyhrenfurth finally had prospectuses authored by actual researchers to include in his informational brochures. Emerson and Lester's reality-testing projects were sent to the remainder of Dyhrenfurth's recipients, and the idea to construct a nuclear-powered installation on the border of China was temporarily abandoned.[193]

Sociological and psychological research at Mt. Everest enjoyed one distinct advantage: unlike Dyhrenfurth's weather station, they would not require special permission from the Kennedy Administration or Nepal to place radioactive material on a mountain sacred to the indigenous populations, nor was it as provocative as constructing an observatory overlooking the Chinese-occupied Tibetan steppe. These projects, along with promised physiological, microbiological, and glaciological programs, proved attractive to the Army, AEC, NSF, NASA, ONR, AFOSR, and National Geographic Society (NGS). Before making firm pledges, however, these agencies wanted more details than Dyhrenfurth could deliver. So, through early 1962 he implored AMEE's roster of scientists to "work out worthwhile projects which offer a chance of funding...Please do not delay any longer!"[194] This directive was not just for Emerson, Lester, and Siri, but two other scientists who had signed on to AMEE: Operation Deep

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[193] This idea reappeared in an altered form just three years later. See Chapter Eight's discussion of the CIA's plot to install a nuclear-powered monitoring station in the high Himalaya.
[194] Expedition Newsletter #2.

Freeze geologist William H. Long, and Dr. John Rupley, a biochemist at Cornell.[195]

Wanting a detailed program that aligned with their institutional ideologies, granting agencies deferred their decision to fund the expedition. However, Dyhrenfurth's correspondence and September meetings with the interested institutions laid the groundwork for a follow-up visit by Will Siri, who, as Scientific Leader, could better explain AMEE's science program than Dyhrenfurth. In Washington D.C., Siri disseminated Emerson's 1961 prospectus (which emphasized the non-simulated character of his research), the expedition's brochure (which included a blurb from Lester), and preparatory remarks on his own research project. However, William Long's withdrawal from AMEE on November 2 and John Rupley's imminent withdrawal on February 3, 1962, left Siri without a pitch for the glaciological or microbiological projects. Like Dyhrenfurth, Siri returned from the East Coast with optimistic encouragement from NSF, ONR, and NASA, but no funding pledges.[196] It was clear that Washington would not budge without more concrete plans than those that were offered.

Without a clear direction for the science program, Dyhrenfurth's fundraising efforts were in trouble. As Emerson, Lester, and Siri assembled their research proposals in late 1961, Dyhrenfurth expressed to Ullman that he was having a very difficult time raising funds through commercial and private sponsors. Their letter-writing campaign to private individuals and the editors of 175 leading newspapers in the United States produced very little money for the expedition's not-for-profit corporation, and

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[195] Although Lester was not listed on the roll, in the body of Newsletter #2 Dyhrenfurth mentions that Emerson should coordinate the psychological research project with Lester.
[196] Expedition Newsletter #3.

Dyhrenfurth's campaign to secure commercial sponsorship had gone bust. Apart from the public agencies in Washington D.C. and Natick, only NGS registered tenuous interest in financially backing the endeavor, which surprised Dyhrenfurth since it had "never shown any interest in American Himalayan expeditions in the past."[197] Although with Long out, AMEE would need a reputable field scientist to attract NGS.

In early December, Dyhrenfurth visited Washington D.C. for a second round of stumping. This time, he took Ullman along, and their efforts produced auspicious results. A meeting with Secretary of the Interior Stewart Udall, "threw the doors wide open" for the floundering expedition. An environmentalist from the Southwest, Udall openly declared "that federal funds should be provided for the Expedition," and promised to lobby on AMEE's behalf to the relevant funding agencies.[198] On top of this windfall, a second meeting with NGS led to a lengthy discussion of their possible sponsorship *quid pro quo* a "well-illustrated article," substantial scientific research, and the accompaniment of "one of their own men" on Mt. Everest.[199] Never mind that AMEE already contracted an exclusive article with *LIFE* magazine, Dyhrenfurth believed that with a completed proposal for AMEE's scientific program, NGS and Udall's contacts might just come around.

When reporting NGS' interest to the rest of the team, Dyhrenfurth introduced the names of two men who would become instrumental in securing NGS sponsorship the following year. Maynard M. Miller, a Michigan State glaciologist who ran the Juneau

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[197] Expedition Newsletter #2.
[198] Expedition Newsletter #3.
[199] Ibid.

Icefield Research Program in Alaska, would replace William Long. Miller's work was known to NGS--the Society had helped fund JIRP in 1960-61 in the spirit of other "pioneer expeditions" that it had "dispatched...to study glaciation there in 1909, 1910, and 1911."[200] In addition to Miller, NGS Assistant Photo Editor, Barry C. Bishop, who had sold his photo-essay on his experiences as a researcher and test-subject during the Silver Hut Expedition to *National Geographic* magazine in early 1962, would be the Society's agent on AMEE's adventure to the Himalaya. Together with Emerson, Lester, and Siri, these five scientists did what Dyhrenfurth and Ullman could not; they convinced institutions in Washington D.C. that the extremity of Mt. Everest, and the duration of the expedition, afforded a unique opportunity for research which simply could not be replicated in the United States. Dyhrenfurth's final meetings in 1961 had primed those patrons for his scientists' research routines and compelling analogies to contemporary political and military ideologies so that those institutions were eager to validate AMEE as a Cold War endeavor via their patronage.

INTEGRATING INTERESTS: ANALOGS

In 2001, science historian Mark Solovey paraphrased the historiography of Cold War Science when he wrote: "Cold War politics helped to determine what science was, what it did, and what it meant."[201] This was true of the "machinations" within the federal grant-funding and advocacy groups revealed by Daniel S. Greenberg's *The Politics of*

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[200] National Geographic Society News Bulletin, July 20, 1962, BCB Papers.
[201] Mark Solovey, "Introduction: Science and the State during the Cold War: Blurred Boundaries and a Contested Legacy," *Social Studies of Science*, 31 (2001): 168.

Pure Science in 1967. Historian Stuart Leslie discovered the same trend in American university laboratories--supposedly the bastions of free-thought--in *The Cold War and American Science: The Military-Industrial Academic Complex at MIT and Stanford*. Even Solovey's postwar social scientists were prepared to let their patrons' Americanist social-engineering projects dictate the course of their studies.[202] AMEE, too, was enveloped in Cold War politics, but its scientists did not simply become instruments of state interests. Instead, they used the postcolonial environmental imaginary about the high Himalaya to graft enough Cold War objectives into their proposals that state institutions would not reject them. In so doing, these scientists also strategically transformed the environmental imaginary's largest obstacle--its extremity--into an asset tailored for new questions generated by the Cold War's virtual battlefields.

As illustrated by the preceding chapter, the predominant Western environmental imaginary in the years following World War II regarded the high Himalaya as a mysterious, unexplored place--despite the activities of its indigenous populations--where skilled men battled harsh conditions to "conquer" mountains for national prestige. Its analogy to a battlefield can be seen in the martial language used to describe mountaineering expeditions throughout the 20th century, and Dyhrenfurth's scientists structured their proposals to create an analogy between Mt. Everest and the Moon in the environmental imaginaries of their potential benefactors. Incidentally, this practice followed a seventeenth century precedent set by Galileo; in a 2015 article "Discovering the Final Frontier: The Seventeenth-Century Encounter with the Lunar Environment,"

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[202] Mark Solovey, *Shaky Foundations: The Politics-Patronage-Social Science Nexus in Cold War America* (New Brunswick: Rutgers University Press, 2013), 4

environmental historian Michael Rawson illustrated how European natural philosophers' use of their terrestrial environment to populate an environmental imaginary of extraterrestrial environments during telescopic studies of the Moon "sparked an inquiry into extraterrestrial environments that...continued unabated" into the present.[203]

Proposing that scientific knowledge about the Himalayan environment, and social, psychological, and physiological responses to that environment, might apply to a manned moonshot or a warzone had one major pitfall that AMEE scientists needed to circumvent. If the mountains of Nepal were truly analogous to the craters of the Moon and Pork Chop Hill, then the process of traversing them must be so hazardous that it would leave few opportunities for rigorous scientific research. In the words of Dr. Charles S. Houston, an eminent high-altitude physiologist, mountaineer, and former naval flight surgeon who expressed his doubts about AMEE to Dyhrenfurth on March 30, 1962, "it is not possible to combine 'first-rate' scientific work with a major mountaineering objective. One may do one thing or the other, but trying to do both is certain to lead to failure in one."[204] Houston considered the Himalayan environment too dangerous and taxing for an expedition to successfully split its priorities in the way that Dyhrenfurth suggested. If AMEE scientists hoped to maintain their ethos within their disciplinary communities and win grants from patrons in Washington D.C. then they needed to

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[203] Michael Rawson, "Discovering the Final Frontier: The Seventeenth-Century Encounter with the Lunar Environment," *Environmental History*, Vol. 20 (2015): 209. Perhaps the most famous example of this connection was demonstrated in Jon Krakauer's *Into Thin Air*, when Krakauer and mountain guide Rob Hall discussed the impossibility of rescue from Mt. Everest's summit ridge, Hall said, "'You might as well be on the moon.'" Hall subsequently perished on that ridge during a storm in 1996. Jon Krakauer, *Into Thin Air: A Personal Account of the Mount Everest Disaster*, (New York: Anchor Books, 2009), 293.
[204] Charles S. Houston to Norman G. Dyhrenfurth, March 30, 1962, Dyhrenfurth Papers.

develop a response to this criticism.

The response to criticisms like Houston's lay within the tenets of the non-simulated, "reality-testing" described in the previous chapter. AMEE scientists used the analogous environmental imaginaries between Mt. Everest and other extreme environments to paint their test-subjects as proxies for Cold War agents operating under extreme conditions like suborbital space, the Moon, submarine environments, and foreign zones of conflict. Because their epistemologies relied on reality-testing, the more the test-subjects focused their attention and energy on climbing Mt. Everest, the better aligned their experiences would be to the men for whom they served as proxies. This attribute of reality-testing meant that AMEE scientists needed to maximize their subjects' exposure to the extreme environment to maximize the quantity and quality of their data. To collect that data, the scientists needed to accompany their subjects wherever and whenever possible. Thus, their research methods encouraged these scientists to assist climbing the mountain because the quality of their results depended upon keeping their subjects--and themselves--under the most extreme conditions possible, for as long as possible.

This was not a perfect answer to Houston's critique. The constraints of reality-testing on Mt. Everest in 1963 placed the researcher under the same stresses as their subjects. If the environment was so extreme that it could be expected to disrupt the proxies' activities, then it was likely extreme enough to disrupt the data-collection routines of their researchers. Although Dyhrenfurth's scientists knew that those routines would require them to risk their lives, none of them seemed particularly concerned about their ability to retrieve data within the extreme environment. Nor were they sensitive to how the environment might disrupt other professional norms like precision and objective detachment. The granting agencies seemed equally unconcerned by these potential impediments. Instead, their wholesale support for AMEE's science projects legitimized the analogies between the Himalayan, lunar, and warzone environmental imaginaries. This allowed AMEE to move forward with a sanctioned science program, which embodied the contemporary American ideologies of masculinity, scientific mastery, and technological spectacle that were then being institutionalized by agencies of the federal government.

Dyhrenfurth was the first to liken Mt. Everest to other extreme environments in which the United States might have a stake. While the scientists were still ironing out the details of their proposals, Dyhrenfurth wrote to the White House, comparing the mountain to outer space, and AMEE's climbers to astronauts:

> While the early years of this program have seen a pre-occupation with the physical and technological problems of getting a vehicle out of the earth's gravitational field, as these problems are solved it is becoming clear that there are more human problems that need to be studied if men are going to explore space in person. We will need to know such things as: 1) What kind of men will make the best Astronauts? 2) Which Astronauts will be best suited for which job? 3) What factors determine the effectiveness of a team of men isolated in a space-exploring rocket capsule? 4) What kind of training should be planned to prepare Astronauts for their jobs?

Dyhrenfurth claimed that these questions could be partially answered through AMEE's studies of "men working together under difficult conditions here on earth."[205] This deployment of mountaineers and scientists as terrestrial proxies for future astronauts made it into the scientists' proposal drafts, as we shall see, but it also took on a slightly different shape in early 1962 when Dyhrenfurth sought support for AMEE from

[205] Norman G. Dyhrenfurth, "The American Mount Everest Expedition, 1963," TS, ND, 22. Siri Papers.

politicians in Washington D.C.

On February 23, 1962, Dyhrenfurth wrote a letter to California Senator Clair Engle in which he characterized AMEE as a response to Kennedy's inaugural address, and its team-members as kin to American astronauts. "We can't all be astronauts," he wrote, "Countless numbers of patriotic Americans are eager to serve their country but haven't been told just how. And yet, there is one small group of determined men who has taken the initiative without waiting to be told." AMEE's roster--then numbering 18--had responded to the President's challenge to "ask not what your country can do for you, but what you can do for your country," and came up with the plan to scale Mount Everest. Dyhrenfurth extended the analogy to make a plea for funds: "Where would the Astronauts be in the tax-payers hadn't provided billions of dollars to the space program? If they had to go around the country, hat in hand, to solicit funds as members of the Everest expedition are forced to do, the launching pads wouldn't even have been built!"[206]

Such comparisons between mountaineers and astronauts were not unpopular during this time, due to the heightened profile of national spectacle during the Cold War, in which Himalayan mountaineering and manned spaceflight achieved unprecedented successes; a 1958 Popular Mechanics book, *There's Adventure in Rockets*, part of a series written "for boys" by Julian May, used a description and diagram of the 1953 British Mt. Everest ascent's acclaimed siege-tactics as an analogy for Wernher von Braun's multistage rocket design that might make subsequent moonshots and interplanetary voyages [Fig. 1]. Unlike May, who used mountaineering norms to explain advances in

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[206] Norman G. Dyhrenfurth to Senator Clair Engle, dated February 23, 1962, Dyhrenfurth Papers.

rocketry, Dyhrenfurth leaned on the mythos of the astronaut to glorify his team and project. Nowhere did his correspondents criticize this approach--indeed, Senator Engle's subsequent press release cited the United States' "obligation as a world power" to conquer the world's great mountains as a reason to fund AMEE in its "great [adventure] in a vast world of untapped natural resources."[207] Taking heart from Dyhrenfurth's rhetorical strategy to entice officials in positions of power, his cadre of scientists adapted the analogy to their research proposals.

In the cover materials submitted with the scientists' final research proposals to NSF and other state institutions, Will Siri cited two of AMEE's Articles of Incorporation to explain the purpose of the expedition: "to engage in the specific business of ascending Mount Everest, Lhotse, and Nuptse in Nepal and of doing scientific research in the fields of high altitude physiology, psychology, and other fields related to space and high altitude travel," and, "To engage generally in mountain climbing expeditions and in scientific research during such expeditions for the purpose of enhancing the prestige of the United States and in furthering our scientific knowledge." By immediately connecting these two activities for his audience, Siri set the tone for the enclosed proposals, for which astronauts were but one of the analogies that connected AMEE research to the United States' national interests.[208]

Siri's summary of the "Expedition Scientific Program," appearing two pages later, encapsulates the argument by analogy that AMEE scientists created to pitch their

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[207] Clair Engle, "Statement By Senator Clair Engle of California". Box 34, "Thomas Hornbein Papers, 1958-2003."
[208] Richard Emerson, "Application for a Research Grant for a study on Communication Feedback in Small Groups Under Stress," TS, ND, 2.

proposals. Calling the locale "a unique setting" with "conditions that cannot effectively be simulated," Siri cast the research subjects as "unique subjects for research on human factors because of the submarginal environmental conditions and extreme states of stress to which they voluntarily subject themselves for extended intervals." The manifestations of "severe, prolonged stress" were unlikely to be found in any of the university or industrial laboratories favored by contemporary federal funding institutions, and the conclusions of AMEE's human experiments could benefit "any autonomous, goal-oriented group engaged in a military or civilian task under stressful conditions." The argument suggested that the mountain's non-simulated, extreme conditions could naturally induce physiological, psychological, and social responses in the test-subjects. Because these responses were not artificially stimulated, and because the environment in which they were produced was extreme, the observed phenomena "may reasonably be expected to apply" to other populations. Populations, like astronauts, air crews, or front-line soldiers, whose efficiency and well-being were of particular concern to an interventionist Cold War state.[209]

Emerson was quick to extend this analogy to his research proposal, which was sent to NSF and ONR on April 10, 1962 with Lester and Miller's applications.[210] In the first two pages of his narrative, Emerson identified "squads within a battalion" and "military units with assigned missions or teams in space exploration" as the two groups to which his findings might be generalized.[211] This language was not in earlier drafts of his

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[209] Ibid., 4.
[210] Siri's final proposal was not included because he had not yet finished writing it.
[211] Ibid., 9-10.

proposal that he sent to Siri and Lester for their feedback, suggesting that it was added specifically for the purpose of attracting funding agencies who were otherwise interested in the fortunes of battalions and astronauts. Lester also organized his proposal around the extreme conditions that he expected to be present in the space of inquiry. From the first page, he emphasized how the locale's "real-life (as opposed to simulated) conditions" meant that "stress, task-orientation, and ego-involvement will *actually* be in operation and varying from time to time; propositions concerning such variables can be tested under *truly* relevant conditions."[212] His word choice implied that a laboratory investigation of the same variables using simulated methods would produce results that were less authentic than those of his study. Like the rest of his cohort, Lester indicated that artificial simulations produced artificial phenomena. Turning next to his chosen analogs, Lester implied that the stakes of the Cold War were too high to not fund reality-testing:

> [T]he conditions of the Expedition are relevant to conditions under which military and quasi-military tasks will be carried out. Behavioral observations made on the Expedition may contribute to an understanding of how best to select and train men and what psychological problems to expect them to meet in the carrying out of their assignments, particularly men who are to serve in cold climates or at high altitudes. Information gained from the proposed investigation might also have relevance to problems connected with the selection, training, and functioning of future astronauts.[213]

Although Siri, too, stressed the significance of the non-simulated space of inquiry, and the highly-motivated test-subjects who would voluntarily endure that space for

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[212] James T. Lester, "Application for a Research Grant for Some Proposed Behavioral Research Concerning Psychological Variables to be Observed During the 1963 American Mount Everest Expedition," TS, ND, 10. Emphasis added.
[213] Ibid., 11.

"extended intervals" that could not be "tolerated by subjects in a purely research setting," he did not explicitly suggest analogs in the same way Emerson and Lester had. By 1962, high-altitude physiology had a long-standing association with military applications dating to the Luftwaffe's Aeromedical Research Institute in 1936. Indeed, weeks before Siri sent his finalized proposal to Washington D.C., AFOSR had already committed to fund $10,000 of his budget. Even if Siri did not feel the need to explicitly stipulate the relevant analogs, a letter of recommendation enclosed with his packet by Assistant Director of Donner Laboratory, Hardin B. Jones, suggested that the physiological processes Siri sought to study "occur more commonly in the course of expeditions and in war."[214]

Glaciologist Maynard M. Miller, who did not have human test-subjects to use as analogs, deployed himself in that role in his grant proposal to NSF. He envisioned himself as a proto-lunar-explorer, proposing that the techniques he developed to study the terrain in Mt. Everest's harsh environment might be applied "for lunar surface studies" by NASA.[215] The assumption underlying this argument was that the extreme conditions present on Mt. Everest's Khumbu Glacier were comparable to those that would be encountered on the surface of the Moon. Miller did not seem troubled by the contemporaneous debate within the geological community about its "jurisdiction beyond the Earth" to extraterrestrial environments.[216] Indeed, the case he made to NSF implicitly

[214] Hardin B. Jones, "In support of William Siri's study of humans exposed to extremes of effort and environment during the American Mt. Everest Expedition," July 20, 1962, in William E. Siri, "Application for a Research Grant for a Study on Erythropoiesis and Adrenocortical Function in Man at High Altitude," TS, ND.
[215] Maynard M. Miller, "Application for a Research Grant for Glacio-physical Investigations on the Khumbu Glacier and Chomolongma Massif, Nepal," TS, ND, 27.
[216] Lisa Messeri, "Earth as Analog: The Disciplinary Debate and Astronaut Training that Took Geology to the Moon," *Astropolitics: The International Journal of Space Politics & Policy*, Vol. 12 (2014): 202.

denied a narrow definition of geology which was published in the *Bulletin of the Geological Society of America* in the same month that his proposal was sent to Washington D.C., which stated "Clearly, geology is restricted to the study of the Earth and of terrestrial phenomena and does not apply to extraterrestrial bodies and processes."[217] Miller's willingness to connect the methods he planned to use at Mt. Everest with the collection of lunar specimens made him an early pioneer of the kind of "analog fieldwork" that was employed by NASA-affiliate Astrogeologic Studies Group in the American Southwest from 1963 to train NASA astronauts for lunar exploration.[218]

To make his proposal more appealing to federal funding agencies, Miller also emphasized the "strategic position" of the locale to American foreign policy interests. Mt. Everest stood "along the Sino-Indian border," and he argued that the recent "incursion of Chinese troops into the neighboring zones of dispute serve as additional justification" for mapping the topography of that area.[219] Miller hoped to capitalize on a fear of Chinese expansionism; the Communist Party of China already occupied Tibet, and it was making incursions over the disputed McMahon Line that demarcated India from China along the crest of the Himalaya. Intelligence along China's border with Nepal might prove useful to future operations in that area. In these ways, AMEE scientists made Everest's low-oxygen environment analogous to that of American high-altitude bombers such as the B-52, or the space capsules used in Project Mercury. Further, the hostile, isolated Himalayan

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[217] K Rankama, "Planetology and Geology," *Bulletin of the Geological Society of America*, Vol. 73, No. 4 (1962): 519.
[218] Lisa Messeri, 203. Messeri concluded that this early "analog fieldwork" was normalized by planetary scientists such that it is now "very mainstream," and that "there are dozens of sites around the world that scientists at NASA and universities travel to as part of their research activities." See p. 207.
[219] Ibid., 18.

environment was made analogous to a foreign war-zone, or the Moon.

American Cold War doctrines like Plan Totality, mutual assured destruction, and New Look's massive retaliation, alongside practices like the brinkmanship that led to the Cuban Missile Crisis in October 1962, characterized the political extremes of the time. Dyhrenfurth had worked to connect Mt. Everest's geographical position overlooking communist China to the prestige of an American state fighting the Cold War, and his scientists had transformed that place into a locale uniquely suited to research issues that were essential to that effort. They were wildly successful.

AWARDS

As historian Stuart W. Leslie has observed: "military-driven technologies of the Cold War defined the critical problems for the postwar generation of American scientists and Engineers."[220] General Dynamics, Lockheed, and Boeing supplied the problems, and AMEE researchers purported that they could create solutions. Feats of engineering regularly sent American airmen into Soviet airspace above 21,000 meters in Lockheed-built U-2 aircraft, or into Earth's suborbital space in McDonnell capsules atop Chrysler Corporation Redstone missiles. How long could ground controllers expect their crews to operate under extreme physical stress if their life-support systems malfunctioned? To find out, AFOSR, NASA, AEC, and NSF committed a combined $41,600 to Siri's physiological program. Variants of the Bell Aerospace HU-1A and Boeing's new CH-47 helicopters allowed the U.S. Army and Marine Corps to tactically insert and extract small

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[220] Stuart W. Leslie, *The Cold War and American Science: The Military-Industrial-Academic Complex at MIT and Stanford* (New York: Columbia University Press, 1993), 9.

teams of soldiers--including the recently-activated U.S. Special Forces--in frontier positions to assist with Containment. How should such teams, isolated from friendly forces, be organized and motivated to most effectively pursue their mission objectives? NSF awarded Emerson's sociological project $24,660 to answer this query. After General Dynamics' USS *George Washington*'s launch in 1959, the U.S. increasingly relied on nuclear-powered ballistic missile submarines deployed with Lockheed-designed UGM-27 Polaris missiles to fill the second strike role for strategic nuclear deterrence. To maintain their integrity as a second strike option, the submarine was designed to remain submerged indefinitely, and its crews were isolated from the world beyond their hulls' steel alloys for up to six months at a time. On its decision to grant $35,190 toward Lester's research project, ONR commented to *Newsweek*: "We want to learn the best criteria for selecting men for prolonged submarine duty, Arctic duty, and space exploration."[221]

Dyhrenfurth also sought support from the Department of the Army via its policies for providing material and financial support to expeditions under Regulation No. 705-15 Research and Development of Materiel: Operation of Materiel Under Extreme Conditions of Environment. This regulation applied to AMEE specifically because Mt. Everest's extreme environment might offer the Army the opportunity to determine whether tested materiel performed satisfactorily under target operating conditions. The Army initially wanted to send geomorphologist Dr. Will Thompson along on the expedition, however, Dyhrenfurth resisted the accompaniment of any military personnel "due to the proximity

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[221] "Freud on Everest," *Newsweek* (Dec. 13, 1962): 33.

of the Chinese Communists."[222] So, AMEE's research contract with the Army was limited to materiel testing and systematic observation of medical problems caused by exposure to the extreme environment, and of local facilities that could potentially be used by U.S. personnel in the event of operations in the area between Kathmandu and Mt. Everest.[223] For these services, and to support the general scientific program, the Army supplied $10,000. In all, AMEE science procured $111,450 in support from federal funding agencies ahead of its departure.[224]

By August 22, 1962, Dyhrenfurth had received letters from most of the above agencies committing their support for Siri, Emerson, and Lester's projects, but AMEE had "struck out" so far as Miller's request for $25,800 from government agencies was concerned; Miller had devised one of his cohort's most focused and achievable proposals, however, its failure may be attributed to its tangential applicability to the interests of the Cold War state.[225] Despite this setback, Dyhrenfurth and Siri had not yet given up hope for Miller's inclusion in the expedition. A series of encouraging meetings with NGS between April and August had allowed AMEE to cultivate a promising relationship with the Society, and so Dyhrenfurth and Miller approached this potential benefactor with the same fervor they had federal funding institutions.

As a private commercial enterprise, NGS required a different approach than NSF,

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[222] Norman G. Dyhrenfurth to Harry S McPhilimy, Expeditions Project Supervisor, Earth Sciences Division, Quartermaster Research & Engineering Center, June 12, 1962, NGD Papers.
[223] Harry S. McPhilimy to Norman G. Dyhrenfurth, December 31, 1962, NGD Papers.
[224] Adjusting for inflation, $111,450 is approximately $866,123 in 2015 dollars according to the U.S. Bureau of Labor Statistics.
[225] Norman G. Dyhrenfurth to Maynard M. Payne, August 22, 1962, BCB Papers, National Geographic Society Library.

ONR, and other federal agencies. Whereas those institutions, impressed with the analogies of AMEE's human-research scientists, let Emerson, Lester, and Siri dictate the ways researching climbers on Mt. Everest would benefit the Cold War state, NGS needed to be persuaded that AMEE would meet its commercial needs in addition to its ideological ones. Its Committee for Research and Exploration (CRE) needed convincing that AMEE could manage to produce both a triumphant story of American exploration that it could sell to its readers, and a significant contribution to scientific knowledge to enhance its identity as a serious, if populist, patron of rigorous science. And, in the eyes of NGS hierarchy, if the expedition succeeded in furthering United States' Cold War agendas, then so much the better.

COURTING THE NATIONAL GEOGRAPHIC SOCIETY

In her 1993 monograph, *Gender on Ice: American Ideologies of Polar Expeditions*, science studies scholar Lisa Bloom wrote that during its early history, NGS "appropriated" American nationalism and "popularized" American identity as "essentially a white masculine one" via its mass media outlet, *National Geographic* magazine. Combined with this penchant for masculine heroism, the Society's ability to "occupy the discursive space that normally belonged to governmental institutions" explains why it funded AMEE and its science program, and, in the process, doubled AMEE's budget by injecting the expedition with its own part-commercial, part-nationalistic agenda.[226] Additionally, during the build-up to the expedition, NGS's influence exacerbated AMEE's

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[226] Lisa Bloom, *Gender on Ice*, 57.

identity crisis; certain members on the Society's Committee for Research and Exploration were interested exclusively in AMEE's scientific program, while others within in the institution sought to create avenues to capitalize on AMEE's mountaineering venture. Leaving the ways by which NGS used AMEE to shape popular American dispositions toward scientific exploration for Chapter Eight, this section investigates how Mt. Everest's locale influenced NGS' decision to finance AMEE's research program. With that support, however, came modifications to AMEE's personnel, programming, and purpose.

As Dyhrenfurth remarked in Expedition Newsletter #2, NGS had never before shown interest in funding a mountaineering expedition, but it did have a long history of backing scientific research in foreign frontiers. It framed these explorations, which were often, but not always, geographic in nature, as aesthetic, disinterested activities that were "completely autonomous from any commercial or colonialist practice."[227] The aesthetics were transmitted to its readership of non-scientific practitioners via narrative, illustration, and, eventually, photographs in accordance with the idea that "visualizing a culture or place" was "synonymous for actually being there." The two Society-affiliated activities that were most pertinent to its involvement with AMEE were Robert Peary's polar explorations, and the labors of Society-photographer Barry Bishop during the 1960-61 Silver Hut studies on Ama Dablam headed by L.G.C.E. Pugh and Sir Edmund Hillary.[228] These two events illustrate a complicated relationship between NGS's ideology and policy, and its heterogeneous definitions for scientific exploration. A quick analysis of

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[227] Ibid., 62.
[228] Ibid., 60.

NGS's role in these events can help place its decision to fund AMEE into a wider context.

In terms of basic scientific research, Peary's 1909 venture to the North Pole was of little value. Peary's party used triangulation techniques using solar observations, which were pioneered millennia before, to determine the location of the Pole. They waved a flag, stood for a photo, and returned the way that they came. Even if contemporary professional scientists considered the "economic, political, or scientific value of such exploration" as "dubious," flag-waving and photographing were enough for NGS's audience of "armchair explorers." For these laymen, the magazine fulfilled its purpose both as a venue for entertainment in the form of a heroic scientific narrative, and an arbiter of the subsequent controversy between the claims of Peary and his rival, Frederick Cook.[229] By 1962, however, expectations had changed for some within the Society, for whom scientific ability was "the foremost sign of male power and achievement," and the success of American explorers was an expression of technological mastery, rather than Victorian masculinity.[230] Although NGS had enshrined Peary in the popular American memory, fifty years later *National Geographic's* heroes were "no longer polar explorers but astronauts. The moon and planets had replaced the Poles as "the testing ground for the project of science," and the transport and communication technologies required to visit those places "intensified contradictions already present between male heroism and male dependence on technology, resulting in a significantly greater gap" between the

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[229] Phillip Pauley, "The World and All That Is in It: The National Geographic Society, 1888-1918," *American Quarterly*, Vol. 31, No. 4 (Fall, 1979): 518, quoted in Bloom, *Gender on Ice*, 61. Matthew Henson, an African-American assistant to Peary, was rendered invisible in NGS' published accounts, despite the fact that he was likely the first of Peary's party to reach the perceived Pole in 1909.
[230] Bloom, *Gender on Ice*, 55.

ideal male hero and his material experience.[231] This gap was exacerbated by the early astronauts' passive roles in contemporary Project Mercury missions: In 1961, Alan Shepard sat in a capsule for the fifteen minutes that he spent on the periphery, in constant radio contact with Mission Control, following a flight path programmed into a computer. He had little time for scientific research, limited adversity against which to test his mettle, and no leeway for autonomous action. The object for NGS in the 1960s, then, was to somehow recapture the drama and spirit of triumph that it had bestowed upon Peary nearly a half century before.

AMEE offered NGS the chance to connect contemporary American values with the "challenges and struggles of an earlier age...when men were real men," an opportunity to revitalize the heroic, Americanist narrative propagated by the Society a half century before--so much so that in the wake of AMEE's return from Mt. Everest *National Geographic* did not hesitate to connect its Himalayan achievements with the names Peary and Amundsen.[232] The Golden Age of Himalayan mountaineering legitimized using Mt. Everest as a place to exercise NGS's brand of male heroism in a way that enhanced its status as an institution that expanded the boundaries of American prestige via scientific and technological achievement. If the testing ground for science had become the moon and planets, then NGS and AMEE's scientists worked to make Mt. Everest the testing ground for the astronauts and technicians who sought to explore those extraterrestrial bodies.

AMEE's appeal to CRE was enhanced by Barry Bishop's performance on the

[231] Ibid., 81.
[232] Ibid., 82.

World Book-sponsored Silver Hut expedition. Alongside Bishop's winter first-ascent of Ama Dablam, which "set the climbing world on its tail," his involvement with Pugh's physiological experiments and his own solar radiology observations were portrayed in *National Geographic* as having implications for the space program, the understanding of human physiology, and American military endeavors at altitude.[233] Although Bishop was a newly-hired Assistant Photo Editor for *National Geographic* in 1960, the magazine elected not to professionally employ his involvement with the expedition, however, *National Geographic*'s editors were so impressed by Bishop's work that they bought his photographs and an article for "far more money than it would have cost to keep him on staff." His participation and the fruits of his research, including the *National Geographic* article and a scientific paper delivered to NASA in 1962 for use in TIROS-4 and TIROS-5 weather satellites and Mercury flights *Friendship 7* and *Aurora 7* solidified his place in the Society, and, ultimately, as correspondent for AMEE.[234]

Bishop's performance on Ama Dablam demonstrated a "combination of physical strength and scientific ability" which aligned with the Society's "epitome of manliness."[235] Because scientific proficiency was an integral component sought by the Society, CRE required explicit assurances that the heart of the Dyhrenfurth's expedition was its scientific research, and that the research would not be sacrificed for the pursuit of Himalayan summits. This problem was presaged by Charles Houston, as mentioned above, and it was one that Dyhrenfurth struggled with during the run-up, and for the

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[233] W. A. Marcus and M. G. Marcus, 195.
[234] Ibid.; Barry C. Bishop to Melvin Payne, ND, BCB Papers.
[235] Bloom, *Gender on Ice*, 117.

duration of, his expedition. Ultimately, he took the same tack as Emerson, Lester, and Siri when they pitched their projects based on their non-simulated space and methodologies. Dyhrenfurth convinced NGS that the climb would not compromise AMEE's scientific investigations because those investigations' success were contingent upon climbers pushing themselves as high and as hard as possible.

This task to convince CRE was made somewhat easier when NGS President and *National Geographic* Editor, Dr. Melville Bell Grosvenor, approached Barry Bishop to accompany AMEE in a dual capacity for NGS as a scientific researcher and a photo-correspondent. In an example of how contemporaries imagined the Himalayan space as one that would exacerbate tensions between scientific and climbing commitments, Bishop was skeptical he could successfully split his "time and effort" between these projects.[236] But, when he discovered in March 1962 that certain unnamed CRE members harbored reservations about AMEE's commitment to its scientific investigations, he sent a proposal to continue the "solar radiation measurements," which he had begun on Ama Dablam in 1960, to NGS Executive Vice President and Secretary Melvin M. Payne. Bishop's proposal was attached as an addendum to those submitted by AMEE, after which he did not again profess his skepticism.

Bishop planned to augment the data he collected at 5,800 meters in the Mingbo Valley southwest of Mt. Everest with observations at 7,300 meters in the Western Cwm below Mt. Everest and at 8,382m on the ridge above the South Col between Mount Everest and Lhotse using pyrheliometers with automated recording equipment to measure

[236] Barry C. Bishop to Melvin Payne, ND, BCB Papers.

solar radiation. He estimated that their installation would take 30 minutes to an hour once their chosen sites had been reached, and that after installation they "could be left alone and checked only once every ten days."[237] Since NGS still had the Eppley Laboratories-designed pyrheliometers from the Silver Hut expedition, Bishop assured CRE that there was "no expense involved in the 'guts' of the program." It is interesting that Bishop did not seem to doubt his ability to install the instruments, even though the South Col site was nearly a mile above the highest elevation he had ever visited. He did emphasize that their installation could be completed in the course of his activities as *National Geographic*'s photographer; after all, the magazine would want Bishop to go as high as possible to take photographs and be in a position to witness the drama from which he could create its heroic narrative--perhaps even on the summit! In the event that he became incapacitated, Maynard Miller would take over the scientific aspects of the project on Bishop's behalf.

For his part, Miller privately acknowledged that the geological program that he proposed to NGS was extraordinarily ambitious in light of the limited resources and duration of the expedition. Delivered to NGS in late March, Miller's program included seven distinct projects that spanned multiple geological disciplines, and required extensive travel at high altitude over rugged terrain in a compressed timeframe. He planned to take "regime measurements" to determine accumulation and ablation below and above the Khumbu Icefall, requiring passage through the Icefall and a lengthy stay in

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[237] Barry C. Bishop to Melvin M. Payne, ND, BCB Papers.

the Western Cwm.[238] While in the Cwm, he hoped to take core samples of glacial ice from up to 15 meters in depth for on-site analysis of crystalline structure and strain orientation, and to measure the englacial temperature of the Upper Khumbu between 6400 and 7300 meters using 26-meter strings of thermistors. Across the entire glacier, Miller hoped to "re-establish" several of the surface velocity transects set up by the Swiss in 1956 in order to detect significant changes in volume transfer since the Swiss observations. He also sought manifestations of discontinuous movement along the glacier's surface, as evinced by crevasse patterns, tectonic foliation, and overthrusting.[239]

On the approach march, Miller proposed to install meteorological stations made up of "light-weight weather recording instruments, including plastic rain gauges, max-min thermometers, shelter screens, thermographs, and other standard recording equipment" at the monastery at Tengboche (3860m) and the village, Thukla (4620m).[240] Once at Base Camp, Miller hoped to make systematic meteorological observations at 5486 meters, and at the planned sites of Advance Base Camp (6553m), Camp III (7010m), and Camp IV (7863m). In the best case, Miller hoped to obtain "a few days of record at the South Col." Also during the approach march, Miller intended to conduct a three-pronged glacial-geology and general morphology study along the Dudh Kosi river valley. First, he planned to make observations of notable topographic features between Namche Bazaar and Thukla for comparison with, and correlation to, valley flank features

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[238] Maynard M. Miller, "The Geological and Glaciological Program of the American Mt. Everest Expedition, 1963," Seattle, Foundation for Glacier Research, ND, JRU Papers. Later reprinted in *Harvard Mountaineering*, No. 16 (May, 1963).
[239] Ibid.
[240] Ibid. Thukla is also known as Dukla, and, more commonly, Dughla.

in the Khumbu Glacier area. Additionally, he would create traverse profiles of moraine systems along the Lower Khumbu, and record indicators of former ice levels present along the valley walls above the Khumbu's current elevation. These observations, along with "a close scrutiny of rock weathering at high levels" and "major grooving and striae in the outer zones," would be "elemental in the interpretation of outer glacial limits of the Pleistocene." Second, Miller planned to note evidence of pre-Glacial morphology--how the area appeared before the onset of glaciation. The third morphological observation he intended to make during the approach to Base Camp was of the "lichen and their sub-strata" on the moraines he sought to catalog.

Miller planned to minimize his final project, a survey of the region's bedrock geology, due to the expedition's limited, three-month duration. He would only conduct spot assessments of bedrock outcrops and sample collection for later laboratory analysis, so as to not jeopardize his other glaciological efforts. This included a gravimetric study using a light-weight gravity meter to determine glacier depth along "key transects" to expand the "world-gravity network"--which was a catalog of gravity measurements taken from various sites around the globe--to include "this theoretically thickest zone of the earth's crust."[241]

Miller had made similar measurements of many of the phenomena in his geological program in more accessible locations in Alaska, the Andes, the Patagonia, along with other low- and middle-latitude cordilleran regions of the globe. However, he saw AMEE as an opportunity to carry those routines into the high Himalaya to research

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[241] Ibid.

their climatological character and to "extend backwards from the present glacial position into the past" for "the interpretation of morphological features representing the sequence of major Pleistocene and post-Glacial events" where they might be correlated with observations elsewhere. Indeed, this correlation was one of Miller's major justifications to NGS to fund his study. He imagined his data could be used to define "a prototype behavior pattern for systems of high ice in the eastern Himalaya. From this, comparison may then be possible with regional patterns of glacier fluctuations in coastal Alaska and in the Peruvian and Patagonian Andes."[242]

These previous field investigations gave Miller insight into the necessity for flexibility far beyond his fellow AMEE researchers. In a pamphlet describing his project published before the expedition, Miller paraphrased the British explorer of the Himalaya, Sir Francis Younghusband: "On an Himalayan expedition, one must have a plan, but if the wind blows be prepared to throw the plan to the wind."[243] Everything in Miller's proposition was contingent upon the field conditions, even the availability of Sherpa aids to supplement the two Western assistants for whom he requested additional funds. Clearly, Miller knew from the onset that the workload of his program was too strenuous for one person.

The expansive nature of Miller's program, along with those of his cohort, made some CRE members apprehensive about the likelihood that AMEE scientists would have the time and resources to carry their projects to their conclusion in the face of climbing two 8,000-meter peaks and the 7,861m Nuptse. In Dyhrenfurth's Expedition Letter #5,

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[242] Ibid.
[243] Ibid.

which was distributed to AMEE parties on April 26, 1962 shortly after Emerson, Lester, and Miller's proposals were sent to NSF, Dyhrenfurth noted that the initial CRE meeting to discuss the merits of AMEE's proposed scientific program had met resistance: "some people in the Research Committee entertain certain doubts as to our sincerity in carrying out our extensive research program."[244] Melvin M. Payne, who was in Dyhrenfurth's corner along with NGS President Grosvenor, telephoned Dyhrenfurth to suggest that he fly to NGS Headquarters to do "a 'selling job' on the hold-outs."[245] After the addition of Siri, Miller, and Bishop to the itinerary, AMEE met with NGS to decide its fate on May 7.

Two consequences from that meeting illuminate how important scientific research was to NGS's funding AMEE. First, during the meeting, Miller's presentation was such that AMEE's support from NGS came close to "being scuttled."[246] In a letter from Payne to Dyhrenfurth on May 17, he wrote that CRE felt that portions of Miller's presentation "would be appropriate for undergraduates, but not for them."[247] Payne, who had known Miller for a number of years, had to "do battle" on his behalf to convince CRE that the quality of Miller's glaciological project would be significant enough to warrant their funding.

The meeting also forced Dyhrenfurth to amend AMEE's Articles of Incorporation to suit CRE's high expectations for its scientific research:

> Article Third is amended to read: THIRD: The corporation's purposes are (a) To conduct scientific research in the fields of psychology, sociology,

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[244] Norman G. Dyhrenfurth, "Expedition Letter #5," TS, April 26, 1962, Tom Hornbein Papers.
[245] Ibid.
[246] Norman G. Dyhrenfurth to Melvin M. Payne, May 9, 1963, BCB Papers.
[247] Melvin M. Payne to Norman G. Dyhrenfurth, May 17, 1963, BCB Papers.

> physiology, glaciology, geology and microbiology. (b) To engage in scientific research in connection with mountaineering expeditions for the expansion of scientific knowledge.

As the Third Article demonstrates, the whole document was restructured to explicitly make scientific research the primary purpose of the expedition. The Fifth Article went on to give NGS officials spots on AMEE's Board of Directors, so that they could enforce the Eighth Article, which dealt with the disposition of the expedition's assets, stipulating that "In the event of dissolution of the corporation, any remaining assets of the corporation shall be distributed exclusively in the furtherance of the scientific and educational purposes for which it is organized. Such distribution will be determined by a majority vote of the Board of Directors."[248] This was particularly significant because it shows that at this point, long before the success of the expedition was decided, NGS sought to protect its investment in science and education, not mountaineering or the personal fortunes of AMEE members. Thus, if circumstances on the mountain forced AMEE to abandon its expedition, its surplus funds would be funneled into AMEE's American Foundation for Mountain Research, not diverted into recuperating other expenses. As we shall see in the following chapter, these structural commitments made by Dyhrenfurth would later restrict the team's ability to adapt when confronting logistical dilemmas created by the Himalayan locale.

Less than a week after receiving Dyhrenfurth's amended Articles, CRE approved its grant, and NGS sent a Memorandum of Agreement to Dyhrenfurth that included the terms of support for $47,350, and two stipulations that further enforced their investment

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[248] Norman G. Dyhrenfurth to Melvin M. Payne, May 9, 1963, BCB Papers.

in scientific research. First, these funds were explicitly to be used "in support of the glacio-physical and solar radiation programs."[249] Miller received $37,550 for his program plus two assistants, and Bishop $10,000 for his project. Second, NGS made it clear that AMEE's mountaineering objectives were "in no way to detract from or interfere with scientific progress."[250] Dyhrenfurth instantly agreed to the terms of the agreement, and over the course of the next eighteen months the expedition was increasingly tailored to the ideological interests of *National Geographic*'s editorial staff.[251]

As Lisa Bloom has so eloquently shown in her study of the Arctic explorations, American patriotism was an important element of the NGS ideology. This extended to the most quotidian details of AMEE's equipment. On behalf of Tom Hornbein, who had collaborated with Maytag Company to manufacture a new mask of his own design for AMEE's supplementary oxygen equipment, Dyhrenfurth requested CRE approve an additional $10,000 grant for AMEE to purchase newly-developed oxygen tanks that were made in the United States by Garrett AiResearch, who had also designed the atmosphere-delivery life-support system for Project Mercury.[252] Funding was made available to Dyhrenfurth on May 17, but when Hornbein discovered that could not fill the order for that cost, that funding was revoked. Less than three weeks later, Dyhrenfurth requested that the same $10,000 be made available to purchase French-made oxygen tanks, however, the reply from Payne was that "the Committee was not at all sympathetic to the

[249] Memorandum of Agreement Between National Geographic Society and the American Mt. Everest Expedition, 1963, TS, ND, BCB Papers.
[250] Ibid.
[251] Bloom, *Gender on Ice*, 81.
[252] Melvin M. Payne to Mr. Hogen, May 15, 1962, BCB Papers.

proposal, and I am fairly pessimistic about any subsequent approval."[253] The approval never came. Although no reason was given for this change of heart amongst CRE members, it is plausible that it was based in the same institutionalized Americanism characterized by Bloom; NGS was willing to fund the American-made tanks because it could represent the codependent relationship between heroic American explorers and ingenious American industry in its magazine. Because French equipment did not fit the bill, it was not funded.

Dyhrenfurth tried to get oxygen equipment funded again on September 2 by rolling it into a request for other high-altitude necessities and using nationalistic rhetoric that emphasized Hornbein's new, "all-American oxygen mask for high-altitude mountaineering," which was, "of somewhat revolutionary and superior design...to any masks of foreign manufacture."[254] Dyhrenfurth justified this request for extra funding by coupling the use of Hornbein's mask with the success of the expedition. The extra costs associated with using a "bayonet-type" attachment and flow-regulator designed to fit with Hornbein's mask would allow AMEE personnel to avoid using the "rather hard-to-attach and unsafe connection" used by previous expeditions, which ensured supplementary oxygen delivery during the crucial high-altitude portions of the expedition such as the summit attempts. Remaining funds would be used toward the acquisition of communications equipment that he characterized as "vital" because it would be used for "the proper coordination of the various scientific programs."[255]

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[253] Melvin M. Payne to Norman G. Dyhrenfurth, June 10, 1962, BCB Papers. The French-made units cost "about $15,000."
[254] Norman G. Dyhrenfurth to Melvin M. Payne, September 2, 1962, BCB Papers.
[255] Ibid.

AMEE's need for advanced communications technology was defined by the extremity of the space of inquiry. The mountain's remote location isolated it from the outside world, and its rough topography and difficult altitude meant that men would also be isolated from each other. To help solve the problem, Payne consulted the Founder and Director of Boston's Museum of Science, Bradford Washburn, who had famously explored Alaskan mountain ranges in the 1930s, 40s, and 50s. Washburn emphasized the importance of "really reliable constant communication with the outside world" and the need for a competent, if not professional, radio operator, and rechargeable batteries. He offered to collaborate with Dyhrenfurth and M.I.T., which was just up the street from the Museum of Science, to see that AMEE secured "the best radio under the sun."[256]

NGS granted this appeal on November 16, adding further technology to an expedition that was already expanding to accommodate the Society's vision. *National Geographic* had previously offered to secure publication rights from some of AMEE's climbers, to which Dyhrenfurth acquiesced even though Ullman had already negotiated first-publishing with LIFE for a $10,000 advance. However, because Ullman did not intend to take part in the climb, *National Geographic* wanted something substantially different than what he could offer. The style of first-hand accounts that the magazine desired pushed AMEE further toward portraying its idealized modern American explorer. That ideal, represented to Dyhrenfurth in a letter from *National Geographic* Senior Staffer Andrew Brown, prioritized the explorer's ability to convey the phenomenological experience of discovery to its readership over all other concerns, including the

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[256] Melvin M. Payne, notes of a telephone conversation between Payne and Bradford Washburn, TS, August 16, 1962, BCB Papers.

communication and dissemination of scientific knowledge:

> [W]e would look to one of the active climbing members of the expedition...in accordance with long-standing Geographic tradition and practice of publishing the eye-witness narratives of explorers and trail-blazers. Thus we would get our expedition story from whichever man can give us the best first-hand account of the undertaking as a whole. This could be you, as expedition leader, or it could be one of the successful conquerors of Everest (which, of course, might be you), or someone to whom varied opportunity gives the best overall experience and understanding of expedition achievements. Possibly we might have a double-barreled coverage, as with the first ascent of Everest, with a lead-off piece by you, and a short by one of the summit men, if you yourself don't get to the top.[257]

As far as popular publication was concerned, *National Geographic* was already framing its rhetoric around the heroics of the climbers, rather than the scientific research.[258]

AMEE science still benefited from its association with NGS, beyond the institution's generous financial support. It raised awareness for the project, by framing it as an effort to "study and conquer" the "world's loftiest peak," which both piqued popular interest and attracted the attention of other research scientists who would alter the planned scientific projects.[259] When Nobel Laureate and Manhattan Project alumnus Willard Frank Libby saw a photo in the October, 1962 issue of *National Geographic* that showed "40 years of clearly identifiable 10" thick annual layers of ice" in the Mt. Everest region, and heard that the University of California would be sending Siri along on AMEE, he wrote to inquire whether AMEE could acquire samples from the layers of

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[257] Andrew Brown to Norman G. Dyhrenfurth, May 23, 1962, BCB Papers.
[258] This discrepancy between *National Geographic*'s priorities and those of Committee for Research and Exploration might be explained by the missions and staff of those two groups. Whereas CRE was comprised of professional scientists who were affiliated with NGS for a variety of reasons, Magazine staff were directly employed by NGS to create and sell magazines.
[259] Melville B. Grosvenor, quoted in National Geographic Society News Bulletin, July 20, 1962, TS, BCB Papers.

glacial ice for his project to determine the terrestrial effects of the sun-spot cycle.[260] Siri, Dyhrenfurth, and Miller received letters from Libby's Institute of Geophysics and Planetary Physics, and Miller committed to retrieving 40 half-gallon samples of glacial ice, "within the limits of our program," to complement prior observations made by Libby in Greenland.[261]

Although University of California, Los Angeles furnished $3,520 to help cover the cost of collecting tritium samples for Libby, the additional project further strained Miller's limited resources. During another bout of the optimism that characterized his planned activities in the Himalaya, he agreed to field-test Lab Geodetics Corporation's new Zenith Star Camera and Varian Associate's new M-49 magnetometer. Both instruments afforded Miller otherwise unavailable means to explore the region's natural history, however, their inclusion also limited his time to pursue his many other projects. He needed declarations of formal assistance from his teammates, or else he worried the lure of climbing Mt. Everest would leave him with too much to do, in too little time, with too few resources.

Miller's inability to secure the degree of assistance he outlined in his project proposal became a matter of concern as the New Year approached. When his first pick for an assistant, Dean "Dee" Molenaar of K2 fame, dropped off the roll in October, Miller found a replacement in Barry Prather. Prather, a 23-year old veteran of Miller's Juneau Icefield Research Program who had assisted Miller on Project Crater atop Mt. Rainier in 1958-59, was selected specifically to be the glaciologist's full-time assistant. Although

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[260] W.F. Libby to Will Siri, October 1, 1962, BCB Papers.
[261] Maynard M. Miller to W.F. Libby, October 7, 1962, BCB Papers.

Miller initially wanted two additional full-time research aids, and NGS provided $20,000 to that effect, those monies were used for the general expedition costs of two team members without any provision by Dyhrenfurth or Siri that those men would assist Miller. Miller expressed his concerns to Siri in October, hoping to drum up "a certain amount of group appreciation and team cooperation" for his research project, but nothing happened.[262] Miller's alignment with CRE's expectations for the expedition, and his belief that it was in every man's best interests to provide logistical support-on-demand for his research projects, would prove to be points of contention once the expedition reached the field.

Beside the scientific projects and three climbing objectives, NGS's employment of Dyhrenfurth to shoot a feature motion picture during the expedition further diluted AMEE's mission and stretched its resources. Dyhrenfurth's original budget for cinematography was $6,200, but, at his insistence, NGS had provided another $24,460 for film costs by the end of 1962, which included acquiring and "winterizing" the cameras, microphones, and tape recorders for use in the sub-tropical and sub-arctic conditions they expected to find on the mountain.[263] Dyhrenfurth had convinced NGS Television Chief, Robert "TV" Doyle, that a feature for broadcast on a major network was a major opportunity to enhance NGS brand, promote its ideology of exceptional American exploration, and ensure fame and prestige for AMEE men. A portion of the extra cost went toward the inclusion of Dan Doody as a climbing assistant-cameraman. Like Prather, Doody had never climbed outside the United States. Indeed, the apex of

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[262] Maynard M. Miller to William E. Siri, October 20, 1962, WES Papers, 1961-1966.
[263] Norman G. Dyhrenfurth to Robert Doyle, November 28, 1962, BCB Papers.

their highest ascents, Mt. Whitney (4421m) for Doody and Mt. Rainier (4392m) for Prather, were still over a kilometer below the elevation planned for AMEE Base Camp (5425m). If either of these assistants reacted adversely to high altitude, then their projects would be in trouble.

Along with the grants for Miller and Bishop's research projects, Hornbein's French-made oxygen canisters, and the communications equipment recommended by Washburn, NGS support totaled $114,719 by December 31, 1962. Combined with $111,450 from federal institutions, external support for AMEE's scientific projects made up for $226,169 of its $403,307 pre-departure budget. These funds allowed Dyhrenfurth to field the most expensive, extensive, and best-equipped expedition to have journeyed to the Himalaya. All these preparations would be for naught, however, if Kathmandu chose to revoke permission to climb the mountain because of the actions of another American with his own connections to the federal government.

WOODROW WILSON SAYRE AND THE SINO-INDIAN WAR

Beyond his knowledge of communications technology, Bradford Washburn proved to be a boon to AMEE in another matter that illustrated the extremity of Mt. Everest's locale: Woodrow Wilson Sayre's 1962 attempt to climb the mountain from Tibet with three companions, but without permission from either the Nepalese or Chinese governments. This incident, and the actions taken on behalf of AMEE to insulate its projects from potential political fallout at the height of the Sino-Indian War, illustrate a dimension of political instability that AMEE climbers and scientists faced during the run-up to their expedition. That instability generated its own quasi-scientific collaboration between the Indian Air Force and AMEE to conduct an aerial reconnaissance flight along the southern side of the Sino-Indian border in the Everest region for their mutual benefit. It also raised concerns for the expedition's security, which were resolved in a way that validated Emerson, Lester, and Siri's use of their space of inquiry as an analog for foreign battlefields.

Woodrow Wilson Sayre, grandson of American President Woodrow Wilson, was an amateur mountaineer with no Himalayan experience who wanted to climb Mt. Everest with his friend Norman Hansen. They brought on a Tufts student, Roger Hart, and a Swiss schoolteacher named Hans-Peter Duttle before embarking to Kathmandu in spring, 1962. Thence they marched to Namche Bazaar and into China over Nup La, under the pretense that they were climbing Gyachung Kang (7952m). Sayre's band spent the next six weeks in China, attempting to climb Mt. Everest via its North Col without permission, without Sherpas, and without oxygen. Dyhrenfurth, who was in Kathmandu on business for AMEE when Sayre's attempt faltered around 7740m, hopped aboard the American Embassy helicopter that had been dispatched to extract the foursome from Namche Bazaar on June 3. He hoped he might be able to offer some help to the stricken Americans.

However, when Sayre confided his true purpose to AMEE's leader, Dyhrenfurth was "aghast." Later, when Washburn caught wind that Sayre planned to publish an account of his adventure in *LIFE*, Dyhrenfurth and NGS immediately began a campaign to gag Sayre in a series of events that underscore the geopolitical significance of AMEE's space of inquiry during this stage of the Cold War. To NGS, *LIFE*, the State Department, the U.S. Embassy in Kathmandu, the Central Intelligence Agency, and the American

Alpine Club, Dyhrenfurth leveraged Mt. Everest's strategic importance against Sayre and company. In a letter to *LIFE*'s editor dated October 17, 1962, Dyhrenfurth emphasized that he was "fighting not just for our expedition, but for the U.S. position in that part of the world as well. In view of the increasingly serious border incidents between India and China, Sayre's ridiculous story might be the very thing to break the camel's back."[264] A recent skirmish between Chinese and Indian soldiers on October 10 served as a prelude to the Chinese offensive along the McMahon Line on October 20. Dyhrenfurth was concerned that the incursion of Sayre's party into China might spark a similar Chinese response in the Everest region if China was made aware of it, which would have dire repercussions for AMEE's plans.

In light of this volatile situation, Melvin M. Payne telephoned Dennis Kux, who was then serving as the Desk Officer for Nepal and Assistant Desk Officer for India at the State Department in Washington D.C. to discuss a course of action over the Sayre story. Kux's opinion was somewhat alarming. Payne reported that Kux believed Sayre's story, if published, could "have a bad effect in Nepal and could lead to the Chinese Communists' bringing heavy pressure on the Nepalese government to retaliate against other American grounds--the first and most logical of which would be [AMEE]."[265] Indeed, the Deputy Assistant Secretary for Public Affairs had suggested to *LIFE* that Sayre's trip "would not be in our national interest."[266] Because the State Department could take no further action against Sayre, since it did not wish to be seen as "muzzling the press," it took a different

[264] Norman Dyhrenfurth to *LIFE* Magazine, October 17, 1962, BCB Papers.
[265] Melvin M. Payne, Memo, TS, October 17, 1962, BCB Papers.
[266] Ibid.

approach to the affair; Assistant Secretary of State Phillips Talbet wrote to Dyhrenfurth that the Kennedy administration was also interested in keeping Sayre quiet, but, failing that, it would treat his adventure as "low key" so that it did not become a matter of international concern. Although Talbet anticipated "some embarrassment," the administration hoped that an incident with China could be avoided simply by not acknowledging Sayre's border transgressions as something worth noting.[267]

Luckily for Dyhrenfurth, however, it would not come to that. NGS and the state institutions mentioned, above, pressured *LIFE* into postponing publishing Sayre's story until March 1, 1963. This gave AMEE time to get "well up on the mountain before publication and, hopefully, beyond the reach of any difficulties that might possibly follow such publication." Even though AMEE would still be in Nepal and under Nepalese jurisdiction, it would be safe from any decrees coming out of Kathmandu by virtue of Mt. Everest's isolation and inaccessibility. Once upon the Khumbu, who in Kathmandu would trek beyond all civilization to pull them down?

On the other hand, the perceived threat of Chinese aggression or retaliation made some worry that the same remoteness that protected AMEE from Kathmandu's meddling might also expose the expedition to risk from the north. As a contingency against such action, Payne recommended General Ed Lansale of the Office of Assistant Secretary of Defense's Special Forces Unit as "a good man to keep in mind for help" in the event of "an emergency situation requiring the evacuation of expedition personnel."[268] Of course, that the Department of Defense might have to deploy Special Forces to the Himalayan

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[267] Phillips Talbet to Norman G. Dyhrenfurth, ND, BCB Papers.
[268] Melvin M. Payne, Memo, TS, November 30, 1962, BCB Papers.

frontier to protect Americans at Mt. Everest only confirmed the analogy between the mountain and foreign war-zones.

Indeed, Chinese aggression derailed one of AMEE's tertiary projects in the early months of 1963. Dyhrenfurth, who had hoped to conduct an aerial photographic survey of Mt. Everest, Lhotse, and Nuptse for the purpose of planning climbing routes, had been denied permission by Nepal to do so. In late 1962, he approached NGS to help fund and organize a similar project targeting the Indian Himalaya. Seeing such photographs as potential accompaniment to *National Geographic*'s planned AMEE stories, NGS contacted the Indian Armed Forces for permissions and to charter a flight. In reply, Information Officer C. L. Bhardvaj wrote that the Indian Air Force would assist with the survey, under the condition that NGS photographers stayed away from the international frontier, and were guided "in matters relating to military security" by an attending officer.[269] Since the Everest massif lay on the international boundary, and well within Nepalese airspace, it could not be a part of the survey. Nor would the contested area along the McMahon Line, or any other region bordering China, be documented. In the wake of the Sino-Indian War, published photographs of those areas would depict the topography south of the border, and the disposition of Indian defensive fortifications, which would benefit India's northern rival.

Documentation of the areas permitted by India was not particularly useful to Dyhrenfurth, nor would *National Geographic* find reason to include distant photos of the Indian Himalaya in its accounts of AMEE. However, that did not stop Assistant

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[269] C.L. Bhardvaj to Mr. Garrett, Assistant Illustrations Editor, February 28, 1963, BCB Papers.

Illustrations Editor W. E. Garrett from suggesting to his boss, Herbert S. Wilburn, Jr., that they "confer with some of the [U.S.] Air Force photographic intelligence experts to determine the value and possibilities of such a picture, and to do the photography if practical." This cavalier propensity of NGS officials to spy on behalf of USAF along the Sino-Indian border is not the last instance presented in this story of NGS' continued alliance with state interests in this sensitive region, but it is indicative of the ways in which this popular scientific establishment worked on behalf of the American Cold War state.

FINAL PREPARATIONS

Thanks to the generous support of American industry, who saw AMEE as an opportunity for brand advertising and field-testing, Dyhrenfurth's expedition was prepared to deploy cutting-edge technology upon its arrival in the Himalaya. Aside from new scientific instrumentation and the Hornbein-Maytag oxygen apparatus, AMEE benefitted from newly-designed nylon and aluminum Draw-Tite tents by Eureka Tent and Awning Company, developed in collaboration with Barry Bishop and Jim Whittaker. Universal Services Inc. packaged ten tons of food, freeze-dried in the style developed for space travel, in polyethylene bags. J. P. Stevens & Company provided nylon--first introduced at the New York World's Fair in 1939--for fabrics, ropes, and slings. Sets of goose-down outerwear, with baffled insulation originally designed for bomber crews by Eddie Bauer, were custom made for AMEE climbers and Sherpas. Bell Aerosystems lent the team experimental backpacks, and Hughes Aircraft a transmitter-receiver.

All of these systems, along with many others, were tested during a weeklong dress-rehearsal on Mt. Rainier, which required special sanction from the Department of the Interior since it took place after the National Park's seasonal closing date. Eighteen of AMEE's twenty Westerners were on hand for the shake down, and its researchers did what they could to prepare themselves and their projects for Mt. Everest's extremity. Emerson practiced his data-collection routines using a new tape recorder, which he had chosen specifically because its cartridge-loaded tapes facilitated easy replacement in the field, its hand-cranked rewind would preserve battery life, and its remote-controlled start/stop meant he could use it while keeping it under heavy garments, where his body heat would keep its batteries warm and extend their charge.[270] Bishop, who had arrived at Mt. Rainier some weeks earlier than his compatriots to "undertake a rigorous program of physical conditioning and climbing practice important for the optimum pursuit of my responsibilities on Mount Everest," worked to debug and reacquaint himself with the pyrheliometers that he would use to record solar radiation.[271] Lester learned how to use his ice ax and rope, and other tools required to travel through technical mountainous terrain. Miller ran Prather through his paces. Siri demonstrated the procedures and tests to which he would subject the team, both to familiarize his test-subjects with his methods and to normalize expectations for their compliance. All of the men practiced with Hornbein's new oxygen system, and the bundles of equipment donated to the expedition or acquired through the Recreation Equipment Incorporated storefront managed by Jim Whittaker.

As professional scientists, AMEE researchers were used to relying on specialized

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[270] Richard Emerson to James T. Lester, January 1, 1962, RME Papers.
[271] Barry C. Bishop to Melvin M. Payne, June 15, 1962, BCB Papers.

technology to conduct their research, however, it was made apparent on Rainier how crucial technological aids would be to their ability to conduct research in the Himalaya. Inclement weather prevented the prospective Everesters from even attempting to summit the volcano. Instead, they practiced self-arrest and self-belay techniques, hunkered down in their new tents, and got acquainted with one another.

From the outset, AMEE's social scientists--Emerson and Lester--were interested in how their teammates interacted with each other. Emerson, who knew a number of AMEE's climbers from previous Himalayan expeditions and his seasonal job as the head Climbing Ranger in Wyoming's Tetons, distributed a four-page questionnaire ahead of Mt. Rainier to each team member to rate their "mental preoccupation" and "personal enthusiasm" with each potential mountaineering route or objective. He took the prompt replies from all but four of the team to represent a "gratifying" climate of cooperation between the men who were devoted to climbing and those who shared that devotion with scientific research. Even climber and camera-man Dan Doody noted that he was "going nuts waiting for [the questionnaire] to come after watching Jim [Whittaker]" complete his. However, whether this degree of enthusiasm would wane over the course of a multi-month, physically- and mentally-demanding excursion was another question that worried Emerson.

As the psychologist investigating the acquaintance process, Jim Lester was also interested in the team's getting to know one another during the time up to, and including, the Mt. Rainier shakedown. Prior to meeting on the mountain, Lester had each team member rate his level of acquaintance with every other team member on a scale of zero to 100. These reports, combined with his status as the team psychologist, earned him the nickname "Sigmund" once his subjects met him for the first time. Barry Prather's 6', 210lbs frame impressed his fellows such that he became "Bear," whereas Barry Bishop, at 5'6" and 180lbs, was dubbed "Barrel." Other nicknames were dished out among the team, whose interactions were carefully recorded by Lester via a series of questionnaires that culminated in team-wide convergence at the University of California's Institute for Personality Assessment and Research in January, 1963. Lester interviewed each of his team-members, who also submitted to a battery of psychological assessments administered by IPAR's staff psychologists, and physical examinations by Siri on the northern side of Berkeley's campus.[272]

Siri himself had recently endured Lester's "damn techniques" during a laboratory test that was a part of his research program. He spent four days in a hyperbaric laboratory recording his body's acclimatization for subsequent comparison to observations made in the Himalaya. Lester, who attended Siri off and on for the duration of his simulated stay at 5181 meters above sea level, noted Siri did not feel up to talking after just his sixth hour in the chamber, and did not want to move due to persistent nausea. It was Lester's first time witnessing the degree of hypoxia that he could expect to experience in a few months' time. His observations were worrying. Lester was not a mountaineer, nor was he an athlete. Hypoxia, he thought, might be compounded by poor fitness. So, immediately after Siri exited the hypobaric chamber, he and Lester devoted themselves to another routine designed to accommodate the extreme Himalayan environment: physical conditioning.

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[272] Lester distributed five questionnaires to his teammates between August 24 and November 6, 1962.

In a letter to James Ramsey Ullman, with whom Lester had developed a rapport as the only other man who did not expect to climb much during the expedition, he recounted the special labors he undertook to get his 35-year-old body into shape:

> [Siri] and I have begun this week hiking up a fairly steep canyon behind the campus and he is in about twenty times better shape than I am. While I trudge and slodge [sic], he is dancing up the slope, jumping down and planting both feet on the trunk of a tree, hopping upwards again. Meanwhile my legs burn, my lungs ache, and together we look as though he is in a low-pressure area and I am in a high-pressure one. I keep telling myself that it is better to undergo this kind of torture now, while I console myself with wine, women, and song in the evening, than later when if the climb itself is not uplifting...or inspiring, brother, you got trouble.

A regime of physical training was certainly not included as part of Lester's professionalization as a clinical psychologist. Along with the other scientists, Lester and Siri were part of a program whose research projects must necessarily be "carried out by men who were to go high on the mountain, rather than by a separate group."[273] Without physical strength and stamina, Mt. Everest's altitude and terrain made it unlikely that AMEE's scientists would be able to conduct their research.

A news release written by Dyhrenfurth further cast AMEE's researchers in the role of adventuring climbers. Distributed after NGS publically announced its support for AMEE's scientific program, which raised concerns in mountaineering circles that AMEE's summit effort would be sacrificed if it interfered unduly with the scientific program, Dyhrenfurth stated that three of the scientific programs needed to ascend with the summit teams and that "failure to achieve our summit goals will mean that we fall

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[273] Norman G. Dyhrenfurth and William F. Unsoeld, "Mount Everest, 1963." *American Alpine Journal*, (1963): 1.

short of complete accomplishment in our scientific objectives."[274] In addition to Dyhrenfurth's rhetoric, *National Geographic* also emphasized heroic physical exertion in its Mt. Rainier feature. The article depicted one researcher, Bishop, making a moonlit ascent with AMEE climber Lute Jerstad up a dangerous, unclimbed, direct route up a thousand-foot wall of Mt. Rainier's Nisqually Glacier. Having topped out, they rejoined their fellows the following day to discuss the "countless scientific experiments to be conducted."[275]

OF MEN, MOUNTAINS, AND MOONS

The article recounting Bishop and Jerstad's climb was part of a larger 23-page effort written by Bishop for *National Geographic* while Lester, Emerson, and Siri wrapped up their pre-departure observations. Entitled "Mount Rainier: Testing Ground for Everest," it served to promote AMEE, in which NGS had a significant stake, and Mt. Rainier National Park. Completed in early 1963, Bishop's article framed its readers' perception of AMEE along NGS's ideological lines while explicitly casting Mt. Rainier as a proxy for Mt. Everest. According to Bishop, Mt. Rainier, like Mt. Everest, placed AMEE climbers in snow drifts "deep enough to bury a three-story house, hurtling down in avalanches that can sweep a man away from sight and rescue," against fickle weather which would "beset climbers with chilling fog, hot sun, and blinding blizzard--and all in the space of a few hours."[276]

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[274] Norman G. Dyhrenfurth to Melvin M. Payne, Undated News Release, TS, BCB Papers.
[275] Barry C. Bishop, "Mount Rainier: Testing Ground for Everest," *National Geographic*, Vol. 123, No. 5 (May, 1963): 690.
[276] Ibid., 709.

Against these conditions, Bishop set his "party of expert mountaineers" and their "several tons of equipment," including food items which were specifically chosen to "stem the weakening effects of high-altitude dehydration," scientific instrumentation, and Hornbein's oxygen mask, which Bishop referred to as a "vital device" that was "vastly superior" to other models. He presented AMEE as a technological marvel, devoting the first seven pages of his article to the ingenious technological "paraphernalia" that the Americans planned to bring to the Himalaya, with the final seven pages depicting AMEE climbers as men, undaunted by the adverse elements and dangerous terrain, heroically serving as "guinea pigs" for scientific research. Bishop's celebration of this interface between man and machine was literally illustrated by the photos accompanying his article. One displayed Dyhrenfurth, backlit in profile, booted foot upon a rock in mid-stride, conducting a "radio-communication check" using a hand-held "Handie Talkie." Another showed Bishop clad in a skullcap to which his oxygen mask was affixed, squinting upward into the distance. A third depicted a cluster of men operating a gas-powered winch, half-buried in bright white snow, which they hoped would reduce the high-altitude load-carrying required for siege-style climbing expeditions that taxed porters and climbers. If the winch was a success, then it might obviate the need for climbing-porters in future expeditions.

The article's final photo, taken out of context, presents a scene on Mt. Rainier that is nearly indistinguishable from contemporaneous images captured at Mt. Everest. Three men stand in the foreground upon a snowy glacier. A line of rope running between their harness hints at dangers present beyond the frame. Two tents, partially buried in snowdrifts, are pitched in the background. The weather is inclement; snowflakes streak past the camera lens, and all landscape beyond the tents is obscured by whiteout. The figures are clearly bundled against the cold, and the one facing the camera is breathing through an oxygen mask. Only the lack of supplemental oxygen tanks on their backpacks suggests that the mask is only for show. The monochromatic, oblique backdrop suggests an extraterrestrial otherworldliness to the photo.

Bishop's *National Geographic* coverage of AMEE's shakedown on Mt. Rainier was not the first time he connected extraterrestrial voyages to Himalayan excursions. In the October 1962 issue, released while Bishop was with the rest of the team at Mt. Rainier, he quoted USAF flight surgeon Capt. Tomas O. Nevison, Jr. at length regarding Nevison's project to perfect on-board equipment for monitoring human physiology during spaceflight:

> 'What possible connection can there be between a mountain expedition and space travel?' I asked him. 'Here at 19,000 feet we are subject to a number of adverse environmental factors, much as an astronaut will face in space,' he explained. 'We want to know how the space environment will affect the astronaut's heartbeat, respiration, and brain activity. We must have lightweight, fool-proof electronic devices that will monitor his condition and radio the information back to earth, and this is an ideal testing ground.' And so we found ourselves serving as stand-ins for a spaceman in Tom's experiments...We like to think that our experiences with Tom's fiendish device were of some help to Astronauts John Glenn and Scott Carpenter on their orbital flights months later.[277]

While Capt. Nevison sought to improve the interface between humans and technology for deployment in space, Bishop sought to enhance his work in the Himalaya by associating it with the two astronauts who, unlike Capt. Nevison, were household names in the United States. NGS repeatedly extended this analogy to AMEE in news releases

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[277] Barry C. Bishop, "Wintering on the Roof of the World," *National Geographic*, Vol. 122, No. 4 (Oct. 1962): 528.

distributed in the months preceding the expedition's departure by highlighting the multiple ways that its climbers were just like astronauts in spacecraft.[278]

These connections were very much in the public consciousness during the months immediately preceding AMEE's departure. Indeed, what was perhaps the most historically significant analogy between climbers and astronauts drew upon the mythos of George Leigh Mallory to enhance the status of the American space program. On the day that AMEE's training session on Rainier came to a close, President Kennedy famously announced to a crowd of 35,000 at Rice University in Houston, Texas, "We choose to go to the moon in this decade and do the other things, not because they are easy, but because they are hard." According to Rhetorician John W. Jordan, Kennedy's speech utilized three strategies to sell the $5.4 billion per annum NASA budget to the American taxpayer: space as a beckoning frontier, a "historical moment of urgency and plausibility" that demanded its pursuit, and an appeal to the audience to "live up to their pioneering heritage by going to the moon."[279] To send home the third of these strategies, Kennedy closed his speech by invoking the memory of Mt. Everest's most famous mountaineer:

> Many years ago the great British explorer George Mallory, who was to die on Mount Everest, was asked why did he want to climb it. He said, 'Because it is there.' Well, space is there, and we're going to climb it, and the moon and the planets are there, and new hopes for knowledge and peace are there. And, therefore, as we set sail we ask God's blessing on the most hazardous and dangerous and greatest adventure on which man has ever embarked.

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[278] National Geographic Society, News Bulletin, July 20, 1962; National Geographic Society, News Bulletin, December 7, 1962, BCB Papers.
[279] John W. Jordan, "Kennedy's Romantic Moon And Its Rhetorical Legacy For Space Exploration," *Rhetoric & Public Affairs* Vol. 6, No. 2 (2003): 209-231.

Like Mallory, Jordan wrote, Kennedy's rationale for the pioneering adventure was self-justificatory: "[Kennedy's] spatial progressions redrew the map of human exploration to include our celestial neighbor and enabled Kennedy to dismiss the questions about the practicality of the mission as being contrary to our national character, ultimately transforming the issue into one of initiative rather than pragmatism."[280] By making outer space analogous to Mt. Everest, and astronauts analogous to heroic mountaineers of the past, Kennedy attempted to forestall any call to justify the expenses of the American moonshot. In this, he--or his speechwriters--may have borrowed a page from Norman Dyhrenfurth, whose earliest correspondence with the President sought state sponsorship by alluding to Mallory's statement, using Mt. Everest as an analog for outer space, and deploying Dyhrenfurth's cadre of climbers as proxies for heroic astronauts of the future.

[280] Ibid., 215.

CHAPTER FOUR: "THE FACTS" OF THE ABODE OF SNOW

Before leaving the United States, AMEE's scientists believed that the expedition's field setting was unpredictable to a degree not encountered in normal laboratory-based scientific research. Some, like sociologist Richard Emerson, employed research routines that he believed would help mitigate the locale's uncontrollable variables. Others, like National Geographic geographer Barry Bishop, glaciologist Maynard Miller, and physiologist Will Siri, believed that their previous experience conducting field research had prepared them for whatever they might encounter in the Himalaya. At 8848m, however, Mt. Everest's summit was 1200 meters higher than Camp VII on Masherbrum, where Emerson turned back on account of altitude-related digestion issues in 1960. It was 1992 meters taller than the summit of Ama Dablam, whereupon Bishop stood during his triumphant first-ascent in 1961. Will Siri had never been higher than 6553m during his Makalu venture in 1954, where adverse weather conditions forced the whole expedition off the mountain. Although he had the most field experience of the group, Miller had never been above elevations found in the United States Pacific Northwest, much less visited altitudes comparable to Sagarmatha, where the unforeseen consequences resulting from mundane decisions were magnified by the locale's extremity.

Just getting to the site planned for Base Camp, somewhere around 5180m, would be arduous. It was situated at an elevation that was higher than most of the team had ever been. Some of the climbers hoped that this would not be a problem, believing a then-popular notion that frequent exposure to high altitude facilitated acclimatization to high altitude. Those who were not in ideal climbing fitness (as many as sixteen of the Westerners), hoped that four weeks of trekking five to thirteen kilometers with a light backpack would get them into shape.[281] Likewise, AMEE's scientists intended to use those four weeks to jumpstart their investigations. In a preview of what was to come, their month on the trail was filled with complex and time-consuming logistical headaches, constant illnesses and altitude-related ailments. Adaptation to the harsh settings and climates between Kathmandu Valley and the Lower Khumbu Glacier was harder than they had anticipated, but they developed an aesthetic reverence for the stunning landscape and a more nuanced appreciation for the environment than was previously imagined. They also acquainted themselves with indigenous populations, whom they treated with an uneasy mixture of condescension followed by dependence, as the expedition moved higher and higher and its scientists found themselves relying more and more on those populations to maintain their research protocols. All just in getting to Base Camp.

KATHMANDU

The Americans made their way to Kathmandu in two waves. To coordinate the arrival of men and materiel in Nepal, an advanced group consisting of Barry Bishop, his wife Lila, Dan Doody, Norman Dyhrenfurth, and his wife Sally, departed Los Angeles on January 14. They hoped to have everything prepared so that the expedition could hit the trail on February 20. Preparations included stopovers in Tokyo and Hong Kong to pick

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[281] Although not atypical for the time, these practices would bewilder both modern mountaineers and field scientists journeying to high alpine environments, whose normal training regimens begin six months to a year ahead of their expeditions. This shift in normal practices can be largely attributed to the growing application of scientific research to sport and exercise since the Cold War. See Yuri Brokhin, *The Big Red Machine* (New York: Random House, 1978), and John D. Massengale and Richard Albin Swanson, Eds., *The History of Exercise and Sport Science* (Champaign, Illinois: Human Kinetics, 1996).

up cameras donated to the expedition by Nikon Corporation and film equipment, in Calcutta to receive and clear through Indian Customs the expedition goods shipped by freight, and in Darjeeling to visit Tenzing Norgay and the new Indian Mountaineering Institute. A side trip to Gangtok, near the disputed Sino-Indian border in Sikkim, brought the group past frequent convoys of Gurkha troops and military encampments—evidence of the war that Maynard Miller had used to justify his funding proposal to the National Science Foundation.

On February 6, the Dyhrenfurths flew ahead to Kathmandu while Doody and the Bishops stayed behind in Calcutta to acquire kerosene and gasoline, fuels that the expedition would use to power scientific and communications equipment. Once in Kathmandu, Norman Dyhrenfurth met AMEE's Briton, Col. Jimmy Roberts, and settled in to sights and places so familiar that he commented on how "time had stood still here, nothing seemed to have changed" since his last visit in 1952. Meanwhile, the Bishops and Doody accompanied a truck convoy of AMEE supplies to Patna, whence Lila Bishop and Doody flew with most of the materiel to Kathmandu over the course of three days and seven Indian Airlines charter flights. His wife and leader in Kathmandu, Bishop played the role of supply officer by driving the truckload of oxygen, butane, kerosene and gasoline from Patna to the Royal Hotel in Kathmandu. He completed the run, normally a weeklong, spine-jarring affair over a crowded dirt road, in forty hours.

On February 13, the remainder of AMEE's American contingent, having been escorted to Kathmandu via Tokyo, Hong Kong, Bangkok, and Calcutta by Siri, who Ullman cheekily dubbed "*Obergruppenfuhrer* Siri," joined the advanced group at the Royal Hotel. Altogether, twenty Westerners had come with AMEE to Nepal. Nineteen were American citizens, each with different roles and expectations. As leader and deputy leader, Dyhrenfurth and Siri were the busiest of the bunch. The other researchers, Emerson, Lester, Bishop, and Miller, were eager to begin work during the 320-kilometer overland trek to the Solu Khumbu. So too was Miller's assistant, Prather. On the other hand, the three physicians listed as Siri's "laboratory assistants," Drs. Gil Roberts, Dave Dingman, and Tom Hornbein, thought more about mountaineering than research. Hornbein's friend and AMEE climbing leader, Willi Unsoeld, cleared his desk at the local Peace Corps outpost, where he served as Assistant Director, so that he could join his fellows. Col. Roberts, who also lived in Nepal, arrived with the 32 Sherpas whom he had hired for high-altitude portage. Richard Pownall, James Whittaker, and Allen Auten, who had respectively organized expedition foodstuffs, clothing and climbing equipment, and communications, transferred the supplies that they had requisitioned into boxes of corrugated paper for subsequent transport on foot. Doody, Barry Corbet, Jake Breitenbach, and Lute Jerstad, all members of the climbing team, feverishly assisted with the final packing that occurred in the hotel's compound. James Ramsey Ullman, AMEE's official historian, wrote a dispatch for the families, friends, and sponsors of the expedition to be sent back to the United States. This flurry of logistical activity made most of the men all the more anxious to get out on the trail.

For many, however, it was their first time in Nepal. So, during their five days organizing and packing supplies into boxes at the Royal Hotel, they took breaks to explore Kathmandu:

> As if we had been dropped suddenly into the Land of Oz, we looked around and about us at the 'facts of Kathmandu.' At the brown people and the yellow…with round and almond and Mongolian eyes, with Indian and

> Tibetan and in-between features—walking, squatting, smiling, staring, carrying loads (most of all carrying loads, for here man is his own beast of burden), barefoot and boot-shod, some almost naked, some swathed in rags, in scarves, in veils, in bangles. At teeming bazaars. At pagoda-lined squares. At the dusty-red brick houses, two to four stories high, festooned with ancient and intricate woodwork, that are the indigenous structures of the city; and the huge whitish gone-to-seed *bhavans*, or palaces, which the long-ruling Ranas built, over the years, in imitation of European mansions. At the cows who own the streets, and the dogs (who have the first mortgage) and, now and then, the elephants…At the carved erotica that adorn many buildings: huge phalluses and scrotums and friezes of copulating gods and goddesses. Above all, at the temples. And there are temples everywhere: on the city streets, on the surrounding hills, on the banks of the Bagmati River. Some are Hindu, filled with images of Siva in his many incarnations, of Hanuman the monkey god, and Ganesh the elephant god; and one, called Pashupatinath, is among the holiest places in the Hindu world. Some are Buddhist, with rounded domes, spinning prayer wheels, fluttering prayer flags; and from the two greats of these, called Bodhnath and Swayambhunath, tall towers rise. On each of the four sides of the towers are two vast painted eyes—unblinking, all-seeing—and these are the Eyes of God. 'Who are you?' they ask, as we look up at them. 'What are you doing here? Where are you going?'[282]

Kathmandu was an unsettling place—when its people were not staring at the Westerners, its buildings were—and the Americans reacted to its exoticism in different ways. Some first-timers, like Lester and Doody, had a strong sympathetic reaction to the extreme poverty that they witnessed. In their accounts, the sense of otherness toward the Nepalese illustrated by Ullman's passage, above, was tempered by humanitarian compassion. In contrast, many of the Americans who had already passed through Kathmandu on other Himalayan excursions like Ullman, Dyhrenfurth, and Bishop, maintained a stronger sense of strangeness toward its people. Although their reflections most emphasized the differences between the Nepalese and Americans, they perplexingly seemed the least

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[282] James Ramsey Ullman, "American Mount Everest Expedition 1963 Newsletter #2," TS, Will Siri Papers.

affected by the harshness of existence in Kathmandu. Presumably, for these men destitution had been normalized by their previous visits to Nepal. They reserved their orientophilia for the Buddhist communities of ethnic Sherpas, whose lives amongst the fetishized mountains conformed to the Americans' idyllic ideal: a simple life, free from whatever burdens haunted them back in the United States.

During the layover in Kathmandu, 909 able-bodied men, women, and children began to arrive from the city's streets and outlying villages to the east. Each would haul 30-kilo loads of supplies and equipment into the Solu Khumbu. In addition to these locals, 32 Sherpas, whom Col. Roberts and Dyhrenfurth had handpicked the year before, met the team at the Royal Hotel, and the Nepalese government assigned one Captain Prabakha Shumshere Jung Bahadur Rana to the expedition as Liaison Officer (called "Noddy" by the expedition's Westerners, he was friendly, knowledgeable, and spoke excellent English). Many of the Sherpas had served on other Himalayan expeditions to the Solu Khumbu, and all but three lived in that region. Those who did not, Nawang Gombu, Ang Dawa IV, and Pasang Temba, resided in Darjeeling. Gombu, nephew of Sir Edmund Hillary's summit partner and the globe's most famous Sherpa, Tenzing Norgay, had worked on the Sherpa contingent that had accompanied the American attempt on Makalu in 1954 led by Will Siri. Ang Dawa IV was an old friend of Norman Dyhrenfurth's, having accompanied AMEE's leader on several Himalayan expeditions, and was one of thirteen Sherpas each assigned as orderlies to one or two of the Westerners. Pasang Temba's charge was Dan Doody.

The man selected by Col. Roberts to lead the Sherpas, a *sirdar* named Pasang Phutar, and the assistant *sirdar* named Chotari, both came from the Solu Khumbu's economic center, a village of 50-odd stone buildings called Namche Bazaar. Others from Namche Bazaar included Danu, the cook, Ang Norbu, the mess boy, Kancha, who served Miller and Prather, and Dawa Tenzing, who served Lester. A village just up the hill from Namche Bazaar, called Khumjung, contributed another five Sherpas. They included another cook named Nima Dorje, Will's Siri's orderly, Pemba Tenzing, a local supplier named Angcherring II, Nawang Dorje, who assisted Col. Roberts and Noddy, and Tenzing Nindra, who waited on Hornbein and Pownall. Girmi Dorje, who assisted Bishop during the Silver Hut expedition on Ama Dablam, and would again on AMEE, and Ang Pema, who was slated to help Drs. Gil Roberts and Dingman, hailed from Kunde, a village just ten minutes' walk from both Namche Bazaar and Khumjung. Unsoeld's companion, Pasang Temba, was from Lukla, a day's hike south of Namche Bazaar. A day's hike east of Namche Bazaar led to Pangboche, the home of Nima Tenzing, who was to assist Auten and Emerson. A day's hike West of Namche Bazaar led to Thami, the home of a second man bearing the name Nima Tenzing, who was assigned to Jerstad and Breitenbach. Finally, Dr. Roberts and Dingman's assistant was a man named Angayle from the Solu region.

Col. Roberts had hired twelve more "climbing" Sherpas, who were not pre-assigned jobs other than high-altitude portage. They were Ang Nuru of Lukla, Tenzing Nindra, Phu Dorje, Annalu, Teshi, Ang Gyapu, Urkien, Ang Nima, Ang Dorje, Kalden, Lhakpa Sonam, and Ila Tsering. Col. Roberts characterized his team of Sherpas, whose selection he spent two years tailoring to the needs of the expedition, as "a highly competent bunch of toughs."[283] Like the Americans, they began the expedition with thirteen to fifteen kilos in their backpacks. Unlike the Americans, they took it upon themselves to keep in line the 500 non-climbing Sherpas and Khampas, and 400 Tamangs, who were to carry the supplies.[284] Their preferred instruments for this task were loud voices and wooden switches.

TO NAMCHE BAZAAR

On February 20, 39 kilometers east of Kathmandu in the town of Banepa, before a crowd of journalists, friends, expats, and curious locals, the 909 porters filed past Col. Roberts and the array of numbered boxes. One at a time, each porter had his or her name written in the Colonel's logbook beside their assigned load. They were given a tag to match. After strapping the loads over their foreheads, they hoisted them onto their backs. 24,739 kilograms were transported thus, in a single-file procession "so long that it took two hours to pass a given point."[285] Ullman recounted how the Westerners said their goodbyes, interspersed themselves among the line of porters, and disappeared among the terraced hills, "The adventure on which we had come was no longer a dream. It was a fact."[286] A significant portion of that adventure, now packed and hauled into the hinterland by men and women who could not sign their own names, was science.

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[283] Lt. Colonel James O. M. Roberts, "7. Transport and Sherpas," in James Ramsey Ullman, *Americans on Everest*, 337.
[284] Like the Sherpas, the Khampas and Tamangs are each one of the 103 ethnic groups and castes residing in Nepal.
[285] James Ramsey Ullman, "American Mount Everest Expedition 1963 Newsletter #3," TS, Will E. Siri Papers.
[286] Ibid.

The frontier beyond Banepa contrasted starkly with Ullman's description of Kathmandu. On the first day out, the expedition traveled eight kilometers along a track of compacted dirt and worn flagstones that served as a "main turnpike" out of Kathmandu. The day was warm, and the expedition made good time to the site of the first night's camp, pitched beside a network of converging streams just outside the hamlet of Panchkhal. "For acres around," Ullman wrote, "the cookfires of the porters were burning. In the center of things five expedition tents had been pitched; and in the center of <u>these</u> — looking highly improbable in the wild Nepalese landscape — had been set our gaily colored, garden-party-type tables and chairs."[287] The Westerners had tea, "like an English country club," cold beer, and supper, "professionally prepared and served" by their Sherpas at 6 pm. It was the first of many dinners that the Westerners considered both "ample" and luxurious," and contained selections such as V-8 Juice, "spiced wafers and strawberry jelly," sliced Tillamook cheddar cheese, and Campbell's Chicken Noodle Soup. The extravagance was enough to make Jerstad remark "we sit there eating like kings," while the Sherpas waited on them.[288]

Jerstad did not seem to write this with any hint of the self-consciousness or alarm registered by Dan Doody back in Kathmandu. Instead, Jerstad's early disposition toward the climbing Sherpas was a congenial one similar to those held by most of AMEE's other Westerners who had not visited the Solu Khumbu before. In his private diary, he emphasized the Sherpas' attributes that he personally valued as a professional climbing

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[287] James Ramsey Ullman, "American Mount Everest Expedition 1963 Newsletter #4," TS, Will E. Siri Papers.
[288] Lute Jerstad, *Everest Diary* (Chicago: Follet, 1966), 37.

guide and former basketball star for Pacific Lutheran University: their climbing ability, athleticism, and religious values:

> Born and bred in mountain villages…they adjust to high altitudes easily. They are very religious and pray a great deal; on the trail the predawn calm is often stirred by the chanting from Sherpa tents. They used to be a superstitious race, believing in Bön Shamanism, but with the arrival of Buddhism they have grown more sophisticated in their thinking. They are no intellectual giants by any stretch of the imagination—in fact, few of them can read or write—but they are intelligent men. Physically, they stand on the average between 5 feet 4 and 5 feet 6 and weigh about 125 pounds; they are deep- but not broad-chested, with well-muscled necks and shoulders but thin arms. They have pale brown skin, not dark, and their hair is coal black. It is very amusing to hike alongside Jim Whittaker, for all the villagers point and giggle at his 6-foot-5-inch frame. He is a giant for this part of the world. Gombu told me that some villagers had remarked to him about how much meat they could get out of our well-fed legs![289]

The last sentence, although retold in jest, nonetheless served to further differentiate the indigenous population from both the Sherpas, who lived far beyond Panchkhal, and the Westerners. Over the coming weeks, the Sherpas and Westerners sometimes derided the Tamang porters as pitiful, and sometimes admired their stoicism under difficult working conditions. In contrast, the Westerners' romance toward the Sherpas continued to grow without exception.

After finishing dinner at Panchkhal, sociologist Richard Emerson briefed the team about the diaries they needed to complete for his project. Each Westerner had received one, their name emblazoned in gold on the cover of a hardback bound in blue buckram. Although Emerson ensured that the diaries were bound small enough for easy transport in a large pocket or backpack, they were nonetheless quite bulky. Inside, the top third of

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[289] Jerstad, *Everest Diary*, 38.

each spread contained tabulations to be made by its author. The bottom two thirds of each spread was lined for use as a personal diary. Perforations divided the two sections so that the tabulation data could be separated and sent to Emerson for statistical analysis while its author kept the diary as a memento. The tables of questions tracked team-members' whereabouts, accompaniment, and reactions to the day's activities, to enthusiasm for the following day, for various routes, for the surrounding mountains.

Dyhrenfurth characterized the reaction of his team to the diaries on that first night on an audiotape recording that was sent by runner back to the Hotel Royal in Kathmandu for transcription by his wife, Sally: "the diaries [had] puzzled most of us (I know I felt awfully dense by looking at it). We went into it in some detail. Possibly, we heard more about the diary than we cared to hear on the first evening!" Several members protested that Emerson's diary did not allow enough room for personal entries. Dyhrenfurth was upset that there would not be enough space for his men to provide the primary material from which Ullman would write his history, and Miller and Siri both noted that there was not enough space for them to use the diary as a proper research journal. The layout of each spread meant that personal entries could not overflow onto the next verso, and the books' binding meant that pages could not be added. Nowhere between Panchkhal and Base Camp would have additional notebooks for purchase, so the team would need to find another source. Just one day from Kathmandu, AMEE was already far enough into the periphery to cause logistical headaches.

After discussing the shortcomings of Emerson's diaries, the team's conversation turned toward how to best use its precious supply of supplemental oxygen once it actually began climbing Mt. Everest. The ensuing debate around this additional logistical problem illustrated how the protocols of AMEE's scientific research and the interests of its funding institutions exacerbated tensions within the team. Siri, whose physiological research depended on climbers not using supplemental oxygen below 7620m, was stymied by some of the climbers who thought that this was an unreasonable expectation that, if implemented, would jeopardize their chances of reaching Mt. Everest's summit. As the discussion came to a head, Siri said:

> We cannot use oxygen below 23,000 feet or we're going to muck up the whole business [of physiological research]. The summit of Everest, I agree, is an important objective, but don't forget that the expedition got under way because of scientific objectives as well. Without carrying out the scientific objectives we can't come back with something to justify this trip.[290]

Ultimately, Dyhrenfurth had the make the call. He was worried that, once on the mountain, the team would "get all excited and forget about the science." This, he believed, would be dishonest, since much of the expedition's backing came in support of its scientific objectives. "We'd be crooks," he told his climbers, "downright crooks, if we just threw [science] out the window."[291]So, Siri's scientific imperatives held for the time being, but the expedition had not yet reached the space of inquiry. No one yet knew how its altitude and topography might force Dyhrenfurth to alter his calculus regarding the appropriate use of supplemental oxygen.

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[290] Hornbein, *The West Ridge*, 59-61. Hornbein transcribed this conversation and others from recordings made by Dick Emerson.

[291] Ibid. Later, at Tengboche, the tensions between AMEE's researchers and climbers were again captured on Emerson's tapes, when the climbers' conversation realized that the expedition was short on ladders. Bishop, who was familiar with Miller's glaciological program, mentioned that Miller had "a couple caving ladders along." This prompted climber Barry Corbet to ask, "He won't be able to go caving, will he?" to which Hornbein replied, "If we take his ladder, he won't." Ibid., 68.

Oxygen worries at Panchkhal (853m), five miles from their jump-off point, were the least of AMEE's supply problems. New boots blistered feet—so much that Miller sent a request to Sally Dyhrenfurth at the Hotel Royal that she dispatch a runner with the spare shoes he had left behind. Coleman lamps went missing, even though their burners, mantles, and kerosene were in their proper place. Only 6,000 of the expected 60,000 cigarettes had made it to Nepal. Components of Will Siri's equipment, described only as "special gadgets," had not made it to Kathmandu from New Delhi. Worst of all, it was discovered that the entire team had to share one roll of toilet paper for each day. If it was difficult to pass the roll, "which managed to get itself regularly lost," between team-members along the approach trail, it would be impossible to do so once they were strung out across Mt. Everest. Additional runners were sent back to Kathmandu to procure these supplies.

The runners would be accompanied back to Kathmandu by AMEE's first casualty. AMEE historian James Ramsey Ullman decided to return to the Hotel Royal after the first day's march aggravated his pulmonary condition. This was particularly difficult for Ullman, who had been trying to accompany a large-scale Himalayan expedition to the Solu Khumbu region since applying for the 1952 Swiss expedition to Mt. Everest. He had made a living writing novels about such things, including *Banner in the Sky*, and *The White Tower*, and he had hatched unfulfilled schemes with Dyhrenfurth to climb in the Solu Khumbu during the mid-50s. He applied to go with the British in 1953, and to accompany Will Siri's expedition to Makalu in 1954. But, at 55 and recovering from two unexpected surgeries for peripheral vascular disease, Ullman's continued presence in the spring of 1963 fell to the discretion of AMEE's senior physician, Gil Roberts. He had agreed to allow Ullman to accompany the expedition as far as Dolalghat, so long as the historian rode on the back of a pony (Ullman noted, tongue-in-cheek, that his was the only pony in all of Nepal). On February 21, however, Ullman and his wife, Marian, had decided that to make the four-day return trip from Dolalghat to Kathmandu without a physician or interpreter was too great a risk. When AMEE struck camp, they left the Ullmans behind. From Panchkhal, Ullman and his wife trekked back to Kathmandu, before flying to New Delhi so that he could receive a month of hospital care.[292] They would not rejoin the expedition's rear guard at the Hotel Royal until the middle of March.

After leaving the Ullmans at Panchkhal, the parade of porters and mountaineers followed the downhill track for fourteen kilometers to the village of Dolalghat (642m), on the western bank of the Sun Kosi River. Camp was pitched in a "delightful" grove of trees alongside the river. There, Barry Bishop dictated a letter to NGS Vice President Melvin M. Payne to discuss the logistics of two-way communications with the Society while AMEE was in the field. NGS relied on Bishop's dispatches for news on the status of both the expedition's scientific projects and its mountaineering objectives. For now, Bishop believed that the line of communication, which relied on local mail-runners to return AMEE letters and packages to Kathmandu, from whence they could be flown to Washington D.C., was working out well. As the expedition moved into more remote areas, Bishop planned to make his reports via HAM contact with amateur operators in the United States.[293]

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[292] James Ramsey Ullman would also buy additional notebooks for the team while in New Delhi.
[293] Barry C. Bishop to Melvin M. Payne, February 21, 1963, BCB Papers.

The man NGS funded to conduct geological research, Maynard M. Miller, was already anticipating limited time and resources as a possible source of tension between the demands of science and the spirit of pure adventure that clearly motivated some of the team. Completing qualitative inquiry in his sociological diary at Dolalghat, Miller wrote that if he were speaking with his assistant, Barry Prather, about the expedition's chances of climbing Mt. Everest and Nuptse, he would tell Prather: "Our job is geophysical, so [we] must concentrate on [glaciological] work in the Khumbu and up in the Cwm, relating to our NGS contract." Only once this was completed, Miller wrote, would it be possible for Prather to join a second-team assault on Nuptse. It is unlikely Miller would have made these comments if his young assistant was not already expressing a desire to participate in the climb. But, Miller knew that the expedition's limited time in the field, combined with its expansive geological program, demanded that its geologists devote their energies to scientific research. He certainly turned his own attention in this direction; in his sociological diary, Miller eschewed the section where he was supposed to make daily ratings of his enthusiasm for the various parts of the climb. Instead, he wrote in its margin "my job is geology."

A major reason why Miller had to focus his and Prather's attention in this way was because the subject of their geological projects was the mountain itself, not the humans who would traverse upon it. Because Emerson, Lester, and Siri's subjects were AMEE members, their projects would be completed when the expedition was completed. Their timeline was dependent on the climbing schedule. However, progress on the geological projects was independent from the vagaries and vicissitudes of AMEE's human subjects—if the expedition quit the mountain early for any reason, it was likely that the geological projects would remain incomplete. So, Miller and Prather needed to make sure that they had completed their major objectives before the monsoon's mid-June arrival terminated all human activity at high altitudes.

In Dolalghat, the expedition settled down for its second night on the trail. Although it was still weeks from reaching Mt. Everest Base Camp, scientific research was already well underway. The team did their daily "homework" of completing their diary entries for Emerson's project while Dyhrenfurth looked on. Elsewhere, he saw Siri and Gombu wrestling with "all kinds of weird looking medical equipment," particularly "some kind of hemoglobin meter" that was "on the blink."[294] Dyhrenfurth called the team together that evening so that Lester could direct them in a new research routine. The psychologist wanted each man to submit what climber Lute Jerstad called "a full detailed report of all we dream about," an assignment that was otherwise out of place for a normal approach march. His responded to Lester in much the same way as he did to Emerson's diaries: amenable, if slightly satirical. "I stay awake half the night now worrying that I'll forget the dream I just had!" he wrote.[295]

While at Dolalghat, the expedition had an unexpected encounter with a group of Chinese engineers, whose presence reminded the Americans of their proximity to what they liked to call "Red China." The reactions of AMEE members to this encounter indicates how the United States' regional rivalry with China was felt by the mountaineers whom Dyhrenfurth and Ullman had earlier characterized as "above petty jingoism." On their way into camp, a Nepalese soldier handed each Westerner a slip of paper. Written

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[294] Dyhrenfurth diary, 4.
[295] Jerstad diary, 39.

on the paper, in English, were instructions that forbade them photographing a nearby work camp of Chinese engineers and construction workers, or the bridge over the Indravati River that they were building. The bridge was part of a road that the Chinese were constructing between Lhasa and Kathmandu. When Emerson, Hornbein, and Unsoeld caught sight of the bridge as they swam that evening in the Indravati, they noted that the Chinese surveyors were "identically dressed." Doody and Jerstad believed that the Chinese road, which was to be donated to Nepal after its completion, gave the Communists the means "to launch a three-pronged attack against India."[296] Dr. [Spark] Schnitzler, a Professor of Political Science at University of California — Los Angeles who had been invited by Dyhrenfurth to hike with the expedition into Base Camp, told Jerstad and Whittaker that if China decided to use the road "to move again," the Nepalese situation wouldn't "be too bright."[297] Indeed, the anti-Chinese sentiment was so strong among AMEE members that at least one climber joked about using the Chinese workspace as a latrine.[298]

On the following day, February 22, the expedition left the Chinese behind as they climbed 1200m out of the river valley to the village Chaubas (1975m). The track rolled up low ridges and down valleys over hills terraced for agriculture. The weather stayed cool and, by the 23rd, AMEE arrived at the Buddhist Lamasery of Risingo, where they camped in compound's courtyard, which had served as campsite for many previous

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[296] Jerstad diary, 42.
[297] Jerstad diary, 42.
[298] American climbers who had previously visited the region were also alarmed by China's influence. See Dunmire and Unsoeld, "Makalu, 1954," 12, where Dunmire notes hundreds of schoolchildren near Dharan protested the local school system while waving "communist" flags: "it was saddening to think that this geographically critical sector of Nepal should be the constant recipient of only communist propaganda."

mountaineering expeditions. As the largest expedition to approach Mt. Everest from the south, AMEE brought a larger-than-usual influx of much-needed foreign funds to the Nepalese periphery. Non-climbing porters made six rupees per day, the equivalent of about $0.80 in 1963. At the end of the day, Col. Roberts would discharge a handful of Tamangs. The porters, Tamang or otherwise, cooked their own meals from food acquired locally or cached ahead of time. The caloric needs of the army of hungry laborers was such that, when it descended upon a village, its needs outstripped local supplies. Combined with limited space available at campsites, fear of food shortage caused what Col. Roberts called "a general speeding up on the march. Never have I known such early starts." He described a typical morning departure, like the one at Risingo on February 24, as "organized chaos":

> At about 3 A.M. the sounds of the army bedding down would merge into the morning medley of flickering fires, coughing and spitting, talk, the weeping of children, wood smoke, and the clash of cooking pots. After an hour or so of this racket the *sahibs* could be heard grumbling in their tents, awaiting the first dread flashing of the butane lanterns and the note of Danu's shrill whistle, the summons to Weet-a-bix and fruit juice consumed standing up and shivering in the cold dawn light. On most mornings camp would be clear at 7 A.M., the first loads having left at least an hour earlier. Those of us that could do so would get ahead of the mob. If caught in the crush, it was usually best to sit and quietly wait for an hour or so and bring up the tail.[299]

So it went as the team hiked up and down over the Himalayan foothills. They camped at Chitare on February 24, Kirantichhap on the 25th, and Yersa on the 26th. Some members, including Lester, struggled with dysentery, Siri was administered a dose of morphine to quell painful bursitis in his left shoulder, and Doody broke up a fight amongst the porters.

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[299] Roberts in Ullman, 336-337.

Prather learned the "famous Sherpa dance" in a festival atmosphere while Bishop took photographs, Miller kept an eye open for Pleistocene geology and resolved to test the magnetometer and star-camera loaned to him, and the team began discussing the possibility of pushing a route up Mt. Everest's West Ridge instead of attempting Dyhrenfurth's original "grand slam" pitch to simultaneously climb Mt. Everest, Lhotse, and Nuptse.

Around this time the landscape began to change. The terrain covered by the expedition for the first five days had been intensely cultivated. Ullman recounted how bananas, sugar cane, bamboo, and rice were grown in the subtropical valleys, and winter wheat was grown in terraced carved into the red-earthed ridges, above.[300] As they got closer to the peaks ahead, the topography grew less manageable, and the villages more sparse. Blooming rhododendron trees and icy passes replaced tended crops. After each pass, the expedition made a long descent into the next watershed, crossing its river on a hand-built bridge, each one more dubious than the last, constructed of chain and planks, or braided rope and rough-hewn tree trunks. The Himalayan rampart loomed larger each day in both the minds of AMEE's team-members and the records that they kept.

On February 28, ten days short of what was to be the expedition's first acclimatization camp at Pheriche, disaster struck a string of porters crossing a perilously-ramshackle bridge over the Likhu Khola. A link of chain failed on the bridge, and eleven laden porters dropped twenty feet onto rocks and into the river, which carried them away loads and all. Dyhrenfurth and Doody, who were filming the crossing as the bridge

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[300] Ullman, 60.

collapsed, rushed to their rescue, while climbing Sherpas Nima Tensing and Phu Dorje "took off like lightning" up the canyon to fetch back the expedition physicians, who were two miles down trail. Before the doctors' return, Dyhrenfurth described the bedlam of the scene: porters being fished out of the river, injured men "lying there like dead," moaning and bleeding, the mother of one of the injured porters "screaming bloody murder, apparently thinking her son was dying." He and Doody pitched umbrellas to keep the injured men out of the sun, gave them Empirin, and decided against administering morphine. When Hornbein, Roberts, and Dingman ran back to the river crossing twenty minutes later, they comforted, diagnosed, and treated the injured, who had suffered lacerations, bad bruises, shock, and possible concussions and bone fractures. In Dyhrenfurth's description of events, the doctors' administrations brought order to an otherwise chaotic scene, and got the caravan moving again. Dyhrenfurth also began to see how their interventions might also serve a political purpose, one that he wrote explicitly about later in the week.

In the meantime, all of the porters caught in the bridge collapse were able to finish the day's uphill trek to Changma under their own power. Those who could no longer carry loads were invited to stay on all the way to Namche Bazaar and collect full wages. Lute Jerstad admired their toughness and pride as "something to be desired and envied."[301] Jerstad had the opportunity to witness the porters' hardiness again the following day when a group of Tamangs, who did not own shoes or socks, stoically

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[301] Jerstad, 47.

negotiated a dangerous, snow-covered traverse while crossing a 3650-meter pass between Sete and Junbesi.

At Junbesi the expedition's physicians held their daily sick call, a practice that served both a humanitarian end and, in Dyhrenfurth's eyes, an opportunity to drum up goodwill toward the United States among the Nepalese with whom the expedition came into contact. Dyhrenfurth had remarked to Ullman during the course of previous Himalayan expeditions that the Nepalese he met in the Himalayan hinterlands did not seem to hold Americans in high regard. The sick call's routine performance deployed Western medicine to secure the allegiance of Nepalese populations on a daily basis. In this way, AMEE's physicians functioned in a similar role to the Chinese road-builders that they had seen back in Dolalghat. Given that their encounter in Dolalghat substantiated the Cold War contexts that had been exploited by the expedition before its departure, it is likely that the American physicians were aware of their implied role as Cold War agents, and their medicine as a source of "soft power" to promote the United States in that region of the world.[302] Dyhrenfurth was certainly aware of it; during the march to Tengboche, he explicitly linked sick call to American interests:

> The daily sick-call is really excellent for public relations, and it's the only way these villages have to get to modern medicine…It's depressing when so many of these people come for whom we cannot do anything, but know damn well that they are going to die within the next few weeks or months, but just the psychological impact of trying to do something for these people…is vastly important in terms of American prestige and public relations for the expedition.[303]

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[302] Soft Power is a concept coined and developed in Joseph Nye, *Bound to Lead: The Changing Nature of American Power*, (New York: Basic Books, 1990). Soft power is understood as a means to influence behavior via attraction and co-option rather than via sources of hard power such as capital and violent force.
[303] Dyhrenfurth, Diary, 33.

Until Junbesi, a typical evening of sick call consisted of Drs. Dingman and Roberts treating locals for ailments as serious as tuberculosis. Dyhrenfurth, who attended sick calls to take photographs and motion pictures, noted that the physicians also attracted "phonies who want pills."[304] It was not recorded how often the physicians acquiesced to Dyhrenfurth's phonies, but their requests further illustrate the performative power of Western medicine in that locale—indigenous Nepalese wanted medicine, whether they needed it or not. At Junbesi, however, the locals presented Dingman and Roberts with an exceptional case that demanded an exceptional response from their benefactors.

A woman whose arms and face were completely blackened by third degree burns, such that Dyhrenfurth likened her to "a leper…like the Four Horseman of the Apocalypse, all rolled into one," was led by her family to Dr. Roberts. Certain expedition members recounted that the woman had been severely burned when trying to rescue a yak from a burning shed, while others reported that she had been near a kerosene lamp explosion. Whatever the cause, Dr. Roberts' prognosis was not good: unless she received hospital treatment, she would die. Antibiotics or not, she would not survive being carried back to Kathmandu. The only other possibility was to have her evacuated by helicopter, at the expense of AMEE's meager budget. To Dyhrenfurth's credit, the following day he confided to his audio diary that the singular problem was a matter of contacting Kathmandu for a helicopter, not whether AMEE should spend money to save a Nepalese woman, who at forty-nine years of age had already outlived the average national life expectancy: "I told Al [Auten], by all means let's get cracking and try to…contact

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[304] Ibid., 22.

Kathmandu, knowing full well the chances were very slim indeed. The activity that ensued in the next hour or so was really amazing, with [Auten, Prather, Breitenbach and Corbet], plus a lot of the rest of us trying to set up the antenna, tie it to stakes, get the generator going, and tie it in with the Collins transceiver."[305] Before long, Auten had made contact with HAM operators in Australia and Sweden, but none could establish contact with India or Kathmandu. After hours of standing around in the dark, hoping to raise an operator who could dispatch a rescue helicopter, Dyhrenfurth took sleeping pills to quell his concern and bring some rest.

The Expedition moved on the following morning. Because they never made contact with the American embassies in India or Nepal, Dyhrenfurth wrote a letter instructing his wife to send a helicopter, and gave it to climbing Sherpa Ang Gyapu. Ang Gyapu hoped to make the eleven-day journey back to Kathmandu in three days. "AMEE is willing to pay for the helicopter," Norman told his wife, "once the woman is in the hospital, someone else will have to carry on from there."[306] Drs. Roberts and Dingman gave the woman's family enough antibiotics to last her eight days and showed them how to feed her liquids through a tube, since her mouth was too burnt to eat. The Westerners would have to wait until their return trip to learn her fate.

The expedition departed Junbesi on March 3, pushing eastward over the high col of Taksindu Banyang. They passed through a magnolia forest on its eastern side, and glimpsed 6600-meter peaks on the ridgeline between Kangtega and Kusum to the northeast. "At last," Dyhrenfurth recorded, "we're in God's country." They had crossed

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[305] Ibid., 28.
[306] Ibid., 29.

the Solu River's headwaters and arrived in the Solu Khumbu—home to Sherpas and Sagarmatha. AMEE's Sherpa contingent celebrated their return to the region that night. Fights broke out amongst porters and Sherpas drunk on *chhaang* (a locally-brewed drink derived from fermented barley, rice, or millet), such that one Solu-based porter was found the morning of March 4 "tied up like a wild animal." Despite this, Miller confirmed the Solu Khumbu's reputation as, "a friendly and fascinating area" that was "exciting geologically." Indeed, upon entering the region, he felt that his project was finally underway. There, where the expedition entered the 1500-meter-deep canyon carved by the Dudh Kosi at Khari Kola, Miller observed "the first concrete signs of Pleistocene glaciation."[307]

After nearly two weeks of travel, Miller's eagerness to get underway propelled him along the expedition's track. His teammates described him as the expedition member who was "everywhere, plus several other places, doing everything imaginable."[308] Although he was fighting the persistent cough that chased the Westerners up the mountains, and his assistant, Prather, had come down with bronchitis, Miller ranged up and down the trail, set out cross-country (i.e. off trail) to make qualitative observations of nearby geological phenomena, and ducked in and out of local dwellings. While at camp in Khari Khola, he confirmed his pre-expeditionary expectations toward the region's "unparalleled opportunity for a unique study of a Pleistocene chronology for which morphological evidence is quite the reverse than that in classical lower-elevation

[307] Miller, typescript notes assembled by James Ramsey Ullman. JRU Papers.
[308] Ullman, *Americans on Everest*, 73.

Cordillera."[309] Although he had expressed intentions to take readings between Yersa and the Solu Khumbu using the Varian Associates magnetometer loaned to AMEE by Michigan State University, and the Lab Geodetics Corporation Zenith Star Camera, and in late February expressed disappointment for not completing those measurements as planned, his purposeful wanderings probably led him to cover more ground during the approach march than any other member of the expedition.

That may be why he was the first Westerner to realize that the expedition was travelling through the middle of a nascent smallpox epidemic. Miller described the scene from the village of Phakding on March 6:

> There passing in line with our porters was a boy, perhaps 14, walking slowly, his face hidden partly by a burlap cloth. I caught a glimpse of his mouth and saw it swollen horribly, with a greasy pall over the cheeks and nose. In the midst of our army of porters was a walking case of small-pox. I called Gil Roberts attention to this boy whom he stopped and inspected. He was one of our porters from Kathmandu who for three days had not carried a load and who had existed in isolation outside our camp at night and was shunned by all. But No One reported it.[310]

This incident represents the complex relationship between the lure of Western medicine to the indigenous populations—demonstrated nightly during sick call—and their normal social response to smallpox. Because the World Health Organization did not start smallpox control measures in Nepal until 1962, and because it encountered local socio-cultural resistance to vaccination, only 65% of the population in Kathmandu Valley had the vaccination scar by 1964.[311] It is possible that these same socio-cultural forces

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[309] Miller, typescript notes assembled by James Ramsey Ullman. JRU Papers.
[310] Ibid.
[311] P.N. Shrestha, "Smallpox Eradication in Nepal," World Health Organization, t.s., ND, http://whqlibdoc.who.int/smallpox/WHO_SE_78.107.pdf accessed September 9, 2014.

prevented the other porters from reporting the smallpox case to Col. Roberts, their direct employer, or to the Western physicians. Additionally, because WHO smallpox control measures for Nepal were still in their pilot phase in 1963, it is likely that the boy and the porters who shunned him simply did not realize that AMEE physicians could help.

Whatever the cause, the Westerners' response was immediate. On March 6, Drs. Roberts and Dingman isolated the boy in Phakding, exhausted AMEE's supply of vaccines immunizing porters and the village's inhabitants, and consulted with Dyhrenfurth on a course of action. Since the boy had been symptomatic for at least three days, the physicians worried about the danger of an epidemic among the porters, the vast majority of whom had never been vaccinated.[312] They knew that many of these porters would be released from employment following the expedition's arrival in Namche Bazaar on March 7, at which point they would retreat back to their homes at various points along the trail to Kathmandu. Because AMEE only had a few hundred doses of the vaccine on hand, it would again need to try to radio Kathmandu for assistance to mount a serious immunization campaign for the area.

It was decided that the expedition would try to reach the World Health Organization on March 7 from Namche Bazaar. From their campsite above the natural amphitheater upon which the town's 140 houses had been constructed in terraces, Al Auten unpacked his radio equipment for the second time. This time, he was unable to raise any operators—Nepalese, Indian, Australian, Swedish, or otherwise. Dyhrenfurth

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[312] The Westerners were vaccinated prior to their departure from the United States, and the climbing Sherpas were vaccinated before the expedition embarked from Kathmandu. Since WHO's Smallpox Control Pilot Program only covered three districts in Kathmandu Valley, the Tamang and Solu porters were unprotected.

instead sent a radio message via Namche Bazaar's local military post reporting the situation. The military operator, who broadcast encoded messages twice daily at predetermined times, told AMEE that it could take three days or more for him to receive and decode any reply. That evening, however, Namche Bazaar's operator could not raise his counterpart in Kathmandu. Although this led Dyhrenfurth to fret about the smallpox situation for some days after, he decided to maintain the expedition's predetermined itinerary, rather than wait around to administer aid that might take weeks to arrive.[313]

NAMCHE BAZAAR AND TENGBOCHE

Lester was the first expedition member to arrive in Namche Bazaar. Thus far into the trek, he had noticed some indications of a personal transformation, and he reflected on its manifestations. He began "to find pleasure in the color of a wall, to notice how the angles fit together as you look down a path through a village, or to notice how your mood changes depending on how far you can see—all this is intensely refreshing in a strange way. Some people call it seeing again as a child sees, as if for the first time."[314] Although Lester attributed this new perspective to traveling through a foreign land, and many of his research subjects were experiencing similar transformations, he did not seem worried that these shared experiences might cloud his ability to make objective, clinical observations. Instead, he eagerly allowed the new setting to influence his observations. He described how the village's houses were arranged along terraces that had been cut into the

[313] In addition to smallpox, two additional medical emergencies prompted response from AMEE. The physicians diagnosed Chotari, the assistant *sirdar*, with acute appendicitis, and Ang Gyalmu, cousin to Ang Dawa IV, with double pneumonia. It was hoped that a helicopter could be sent to Namche Bazaar to take these cases to a regional mission hospital. However, because all attempts to establish radio contact had failed, no helicopter was sent. Fortunately, both cases began to abate.
[314] Lester, quoted in Coburn, 106.

mountainside. Two stories of wood and stone, the bottom floor was reserved for livestock and the top floor for human habitation in the form of one large room with an iron stove at its center. Fueled by yak chips and what little rhododendron wood the indigenous population found locally, the stoves were used for heat and cooking. The houses' paneless windows looked out upon the path by which Lester and his companions approached. Faces appeared at the windows to peer at the expedition. Lester peered back, captivated by this alien world.

Arrival at Namche Bazaar was a milestone for both the expedition and the local populace, who celebrated the return of Solu Khumbu-based porters and high altitude climbing Sherpas, as well as the influx of capital represented by the westerners. Even before they sited camp above the village, the Western visitors enjoyed a warm welcome from the guards at the military post, "where there was a minimum of checking and a maximum of chang [sic] distribution." The festivities continued as they made their way further into the hometown of most of the expedition's climbing Sherpas. That evening, expedition *sirdar* Pasang Phutar hosted the Westerners to a dinner of yak soup, yak stew with noodles, "plus generous libations of chang. And later, in the gleam of firelight and veils of smoke, there was signing plus chang and dancing plus chang."[315]

Lester and his fellow researchers partook in the largesse and attentively watched the dancing. Lester found himself observing the big man of Khumjung, Konjok Chumbi, as he moved through a traditional line dance with other local men and women, "He instantly communicated a sense of command. It wasn't pride—at least not as we know

[315] Ullman, *Americans on Everest*, 80-81.

it—that made him so beautiful. It was simply grace and experience and the sharing of these things." Lester, a beach-loving southern Californian, then compared this foreign experience to something familiar, "He made me think of a surfer who both rides on the crest of the wave *and* guides that wave to shore," before romanticizing the entire local population: "His even and subdued movements, and above all the quiet joy in his eyes, spoke of a people who have somehow come upon a quality of living that is hard to find in the world."[316] Lester would eventually form a closer bond with the expedition's Sherpa contingent than any of his Western counterparts due, in part, to his romantic reaction to his first encounter with the Solu Khumbu's center of Sherpa culture.

It also led him to remark that "never had throwing up [seemed] so exotic."[317] Much of the expedition was sick that night, including Miller, who had enjoyed the largess as much as his comrade. The *chhaang* made the climb back to his tent a groggy, arduous affair, however, he confessed that it also made filling out his sociological diary that evening an enjoyable one. In his diary that night, he noted the vibrant costumes worn by the "humble and kind and happy" locals. Like Lester, he concluded that Namche Bazaar was "a wonderful place."[318]

The following morning, which began somewhat later for the Americans, the remaining Tamang porters were paid off and released. They were ill-equipped to traverse the trails between snowbound villages above 3400m, so they were replaced by 300 locals from Namche Bazaar and the neighboring villages of Khumjung, Khunde, and Thamu.

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[316] Lester, quoted in Coburn, 120.
[317] Ibid.
[318] Miller, Sociological Diary tabs, 3/7/1963, RME Papers.

Col. Roberts hired five additional climbing Sherpas, including three veterans of other expeditions named Kami Nobu, Mingma Sherpa, who had previously worked for the Red Cross, and Lukna Tenzing. For the two other climbing Sherpas, Passang Tendi and Tenzing Gyaltso, AMEE was their first mountaineering expedition. Col. Roberts hoped that these green, high-altitude porters would carry heavier and higher in order to earn recommendations to work on subsequent climbing expeditions, since such opportunities for employment were the most lucrative source of income for young male Sherpas and the families that they supported.[319]

While Col. Roberts collected the local talent, the Americans explored the town. Nawang Gombu led Will Siri, Barry Bishop, and two other AMEE men from house to house so that they could make inquiries to purchase locally-crafted rugs for one quarter of the price found in Kathmandu. At every inquiry, the men observed local custom by drinking three cups of *chhaang* each. It's not clear whether these indulgences affected Siri's physiological observations, although they seem to have helped solidify interpersonal relationships amongst the team for the time being. Rugs were purchased with the promise of delivery upon the expedition's return from Sagarmatha.

During the layover, Maynard Miller took the opportunity to climb the 100-meter hill behind Namche Bazaar to catch a view of the Mt. Everest massif to the northeast. For Miller, the 17-day trek in was worth it "just for this view." This practice of ranging beyond the trail, which he had made a habit in his pursuit of scientific specimens between Junbesi and Namche Bazaar, again benefitted his studies that day. In sight of Everest,

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[319] As of 2014 this is still the case for most young men raised in the Sagarmatha Region.

Lhotse, and Nuptse, he made "casual observations" of the local geology, including evidence of features that he hesitated to characterize as "ice cap" on account of the steeply sloping terrain. For the next two hours he photographed these features and the distant peaks, before proceeding farther north to the village, Khumjung, where he visited the school established by Sir Edmund Hillary's Himalayan Trust in 1961. That night, after a meeting with the schoolmaster, he wrote letters to contacts back in the United States requesting that pre-school and first-grade level books in English be sent to the school.[320]

On March 9, after two nights in Namche Bazaar, the expedition trekked to the lamasery at Tengboche (3860m), a small compound of buildings located on a northern spur of unclimbed Kangtega (6782m). It snowed infrequently as the caravan snaked across the lowest flanks of Khumbila (5761m, still unclimbed in 2014), home to the God of the Khumbu, and up the canyon carved by the Dudh Kosi. They crossed the river two kilometers from the lamasery, before beginning a 600-meter climb up the far mountainside to the shelf upon which Tengboche was perched. The snow fell harder during the steep hike to the top; Dyhrenfurth, who completed the stretch in 35 minutes during a 1955 expedition, plodded up the slope in 80 minutes. Watching the rest of the snow-frosted, weary column arrive at Tengboche's gate, he likened it to "the withdrawal of Napoleon's armies from Moscow."[321]

For the Americans, Tengboche represented their first taste of expedition life beyond the trappings of civilization. To the north, across the Dudh Kosi valley, unclimbed Cholatse (6440m) dominated the sky. Looking back over their shoulders to the

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[320] Miller, "March 7/8 Sherpaland," TS, Ullman Papers.
[321] Dyhrenfurth, diary TS, 40.

west, they could see the trail winding along the valley wall and around the ridge that hid Namche Bazaar. To the east, up the Dudh Kosi, they were treated to a view that they described with sublimity: the white shark's tooth of Ama Dablam rising on the right, and, on the left, Mt. Everest towering up from behind Nuptse's rampart, a plume of ice and vapor billowing from its summit. Their reports of the high plateau upon which Tengboche perched were so charged with sublimity that they led Ullman to remark that even the ritual trappings of the Buddhist lamas seemed "to have more validity" in that place "than in the strident twentieth century world of the lowlands."[322]

Although the expedition originally planned to continue its trek toward Base Camp on March 10, inclement weather kept them at Tengboche until March 15. The decision to stay put was in-part influenced by an unexpected accommodation they discovered at Tengboche: a wood and stone hut topped with a tin roof, built with the wages earned by Solu Khumbu Sherpas employed by previous Western climbing expeditions. AMEE's own Dawa Tenzing, who had accompanied the British to Mt. Everest in 1952 and 1953, and as *sirdar* to their 1955 attempt on Kangchenjunga, donated most of the money to the lamas to build the shelter. It was explicitly to be used by travelers and other climbing expeditions visiting the area.[323] During its time in Tengboche, AMEE's Western members

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[322] Ullman, *Americans on Everest*, 85.

[323] The shack at Tengboche was one of the region's first structures constructed explicitly for tourism with capital earned from Western monies spent on tourism, which would soon become the locale's major industry and subsequently alter the indigenous economy and, as a result, its national identity. The sentiments of peoples living in the Solu Khumbu, and especially in the Sagarmatha Region, toward the central government in Nepal reflect an empowerment facilitated by Western adoration of the region's idyllic locale combined with locally-perceived political misrepresentation in Kathmandu. Western adoration has fueled education and the local economy to a degree not witnessed elsewhere in Nepal, which has left some local communities wondering what benefits Kathmandu's governance brings to the Sagarmatha Region. Posters for an independent Sagarmatha can be found in houses and business up to and beyond Namche Bazaar, and although these sentiments spilled over into recent news stories in Western

slept inside the structure, while the climbing Sherpas slept in tents outside. The first night it snowed all night long, leaving a fresh blanket two feet deep by the morning of the 11th.

The new snow was enough to prevent laden porters from continuing up the track toward Sagarmatha. As the weather continued to blow on the 11th, it became clear to Dyhrenfurth that AMEE would be stuck awhile. He made the most of the situation; Tengboche was high enough to allow his climbers to acclimatize to the Himalayan altitudes, even though it was four hundred meters lower than their intended acclimatization camp at Pheriche (4272m). It also allowed Dyhrenfurth and Col. Roberts to pay off another 350 Solu porters, leaving the expedition with 450. Finally, that first snowed-in day seemed to raise morale.

But when weather came in the second day, Dyhrenfurth decided to layoff the remaining 450 porters until the weather warranted their recall, and those AMEE members who were anxious to move toward Base Camp needed to find something to do to keep up their spirits. Some men already suffered persistent headaches and digestive maladies associated with hypoxia, while others continued to fight coughs and colds. Will Siri wrote that "the vast array of joint disorders, gastro-intestinal disturbances, and respiratory infections the team collectively has sponsored are unknown to medical science, and hence untreatable. The wheezing, coughing, blowing, sniffling and squatting are astonishing and chronic." Emerson and Doody were persistently affected by "an inability to acclimatize," manifested in the symptoms of what high-altitude physiologists

media following the high-profile deaths of high-altitude laborers in 2013 and 2014, there is scant scholarship on the relationship between the histories of Western liberalism, wealth, and tourism in Sagarmatha, and their effects on the political landscape and the Sherpa diaspora in Nepal.

eventually coined Acute Mountain Sickness: headaches, nausea, vomiting, and insomnia.[324] Dyhrenfurth, too, began to lose his voice to laryngitis. As a result, he frequently had to leave noisy rooms to voice-record messages for his wife back in Kathmandu.

The indigenous people, too, dealt with their own share of illness, and the expedition's long break at Tengboche gave AMEE physicians another opportunity to lend them aid. On March 11, their principal patient was the Incarnation Lama of the Tengboche lamasery, who was suffering from a toothache. An important Buddhist spiritual leader for the Solu Khumbu, Dyhrenfurth believed that his goodwill could go a long way toward improving relations with the local populace, plus the Western expedition members were eager to help the peoples they encountered along the trail. After examining the Lama, Drs. Roberts and Dingman decided they would need to pull four rotten teeth. Tongue-in-cheek, Dyhrenfurth reported that the physicians-*cum*-dentists figured that if they pulled all of the teeth on their way to Mt. Everest, that "the High Lama might not be very favorably disposed towards us and might throw some 'dorjes' at us" up on Sagarmatha once he ran out of pain-killers. So, Roberts and Dingman reluctantly pulled the worst tooth of the group, administered codeine and Empirin for the time being, and planned to pull the other three teeth when they came back through Tengboche, hopefully sometime in early June.[325]

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[324] Ullman, *Americans on Everest*, 87.
[325] Dyhrenfurth, 43, 50. Dyhrenfurth recorded in his diary: "there isn't much we can do; after all, he is the High Lama, and if he wants his teeth pulled, well, we'd better do it."

When Maynard Miller arrived at Tengboche, he had just overcome the respiratory illness that had haunted him for most of the approach march. His assistant, Prather, was also in good health, although his focus had begun to stray from his scientific duties and toward adventure. For the past week, the team had been discussing the possibility of reconnoitering Mt. Everest's unclimbed West Ridge. Some, like Dyhrenfurth, thought it would be a worthwhile addition to the South Col route. Others, like Tom Hornbein, proposed taking on the route in lieu of the South Col. Prather, whose favorable disposition and enterprising, work-horse attitude had quickly earned him the respect of his teammates, was so taken with the romance of the impending climb that Miller made a note in his sociology diary to tell his assistant to "remember, please, that in spite of your increasing hope to be in a summit team we must keep in mind our obligation to the team and sponsors for full effort on the geological program."[326] The gentle admonishment, administered the following day, kept Prather's mind on his duties for the time being.

At Tengboche, those duties included helping Miller and Bishop prepare their instruments, with Kancha Sherpa offering additional assistance. With the porters laid off, the Westerners and climbing Sherpas had taken on the task of unpacking, reorganizing, and repacking their mountain of supplies. Miller took advantage of the unplanned delay to begin the meteorological component of his geological project. Together with his assistants, he assembled, painted, and erected Stevenson screens to shelter a "full-fledged weather station" that would record climate conditions at Tengboche for the duration of the expedition. They also prepared materials to measure glacial ablation, and tested

[326] Miller, card 18, Emerson Papers.

anemometers, psychrometers, unspecified "radiation gear" (likely for Libby's project on the solar cycle), and Bishop's pyrheliometers, all of which had spent the past few months jostled around in cardboard boxes in the belly of an ocean freighter and on the backs of Nepalese porters. Despite their long journey to the Himalaya, the hardy equipment Miller had chosen for his projects checked out.[327]

Will Siri, too, extracted his research equipment from the piles of boxes, and was soon pursuing his reluctant quarry across the grounds of Tengboche for blood and urine specimens. On March 13, he and James Lester assembled the team for two hours of human experimentation and psychological measurement. That evening, for the first time in twenty days, Siri wrote something other than "hike to next camp" in the section of his sociological research diary labelled "Tomorrow if possible I will ___."[328] Unfortunately, during this time his popularity among the team had started to flag. Dyhrenfurth confessed to Ullman that the team, especially those interested in climbing the West Ridge and the physicians, were all "greatly concerned" about Siri's wellbeing.[329] Dyhrenfurth reported that Siri "shows strange symptoms…almost manic depressive. We wonder whether he's taking dexadrene [sic] to pep him up during the day, because afterwards he's completely knocked out…He's either very low or he goes like mad at a terrific pace and then he starts coughing like crazy, and when he gets to camp he's completely knocked out."[330] Doody confided to his diary that nobody on the team, save Dyhrenfurth, respected Siri's "mountain judgment." This was remarkable since climbers who went to Makalu under

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327 Miller, excerpts dated March 12-14, TS, Ullman Papers.
328 He wrote "write letters" into the space provided.
329 Norman G. Dyhrenfurth, "Suggestions for Chapters 9A through 14A," TS, JRU Papers.
330 Dyhrenfurth, diary, 61.

Siri's leadership in 1954 attributed the California Himalayan Expedition to Makalu's execution "with a striking absence of snags" to Siri's "thorough planning and guidance."[331]

The doubt Siri's fellows had about his "mountain judgment" may have been exacerbated by his resistance to the plan to try to climb Mt. Everest's West Ridge. This plan had so captured the imagination of the expedition's other climbers that on March 10 they divided themselves into two teams: one would attempt Everest's South Col, the others would reconnoiter its West Ridge. A two-route plan complicated the logistics of Siri's physiological study, since he could not be on two routes at once. That Emerson, Bishop, Hornbein, and Unsoeld—all of the American climbers with Himalayan experience except for Dyhrenfurth and himself—had volunteered to push up the West Ridge, also jeopardized Siri's research. If their route was unsuccessful, then the four test-subjects with the highest chance to successfully reach the summit and expose themselves to the locale's most extreme conditions would miss that opportunity. So, Siri continued to argue against the two-route plan on the grounds that its execution would hamper scientific research.

Emerson and Bishop, however, were eager to give the West Ridge a try, notwithstanding its effect on the expedition's research objectives. Although he was one of the two Americans who were the worst afflicted by Tengboche's altitude, Emerson, tasked himself with calculating food and equipment logistics with West Ridge proponents Unsoeld and Hornbein. Bishop, in sight of Ama Dablam, which he famously climbed

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[331] Dan Doody, diary entry dated March 17, TS, JRU Papers. See also Dunmire and Unsoeld, "Makaklu, 1954," p 11.

after living on its shoulder for six months as a physiological test-subject during the Silver Hut Expedition, endured the good-natured teasing of his comrades and spent the layover at Tengboche drafting correspondence to National Geographic.[332] In his letters, he made it clear to his boss, Melvin Payne, that he would abandon the West Ridge route if he thought that the South Col offered a better chance to write a first-hand account of a successful summit bid for *National Geographic*. Based on these letters, Bishop had prioritized his obligations as a photo-correspondent, followed by his personal ambitions. Auspiciously, he did not mention his solar radiation project.

Bishop wrote National Geographic, rather than communicate via radio as planned, because the expedition still had not made contact with Kathmandu. From March 9 to 14, Auten had his HAM equipment set up in the main room of the hut in which AMEE's Westerners slept, and every evening at 4:00 pm he broadcast without success to Col. Bill Gresham at the Hotel Royal in Kathmandu. Even at this relatively early stage of its voyage, contact with the Royal, and beyond, was tremendously important to the team. Auten's failure to raise HAM operators given Tengboche's local topography was unsurprising, however, the breakdown in communication had cost the expedition time, manpower, and potentially the lives of the burnt woman at Junbesi and any number of porters who had been exposed to smallpox between Junbesi and Phakding.

Luckily, the unplanned delay at Tengboche allowed a mail runner named Ang Phurbua, whom Dyhrenfurth had dispatched to Kathmandu on February 27, to catch up

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[332] Dyhrenfurth recorded "much kidding" directed toward Bishop, who was justifiably proud of climbing Ama Dablam, founded upon the mountain's shape: "When we arrived [in Tengboche] everybody sort of belittled it and said, 'What's that little phallic symbol there?' but everybody, of course, had to admit that it's a great climb, a beautiful peak. However, it does look like a phallic symbol, there's no question about that."

with the expedition. With him came news that the burnt woman treated by the physicians in Junbesi had been successfully evacuated to Kathmandu via helicopter after HAM operators in Australia relayed the request to Nepal. Dyhrenfurth was pleased to hear the news, not just for the woman's benefit, but for what he believed would be a boost to American prestige in the Sagarmatha region and "good public relations" for the expedition. In his taped diary, he told his wife that he hoped the U.S. Information Agency had "taken advantage of the situation," which represented a tacit awareness of how United States agents might use the medicine administered by his expedition as a form of soft power in the strategically important Sino-Nepali border zone.

Ang Phurbua had ridden in the evacuation helicopter to Junbesi from Kathmandu, before continuing on foot to Tengboche. With him he brought mail and a packet of fudge from the rearguard, to be shared by the Westerners. The men retreated to quiet places to read letters from the United States, which had arrived at the Hotel Royal between February 17 and 28, and write back to their loved ones. The Americans' replies uniformly described the sublimity of Tengboche's spectacular surroundings. Even Maynard Miller, who had spent years surrounded by the remote beauty of snowcapped terrain in the Arctic and Pacific Northwest, recorded feeling awed by the place in a letter home penned on March 11:

> fresh snow [covers] the ground at this beautiful hill-crest 182onastery [sic] site. The views from here are utterly breathtaking, and the peaks staggering in their dimensions. Tonight at sundown, the sun broke through for a few minutes and lighted the summits of Everest and Lhotse as if they were aflame. With a 110 mph wind whipping plumes of powder snow from their crests it was a sight to behold. Then as dusk settled into the valleys below Ama Dablam, the spire of ice and rock which Barry B. wrote about in the Oct. NGMag., also burst into a flame-orange alpine glow, all framed in a window outline of up-rushing mists. I have seldom

> been so moved by sheer natural beauty in the remote heights of cold blue mountain air.[333]

Remote beauty had its price, though. The temperature dropped to -19C that night, and Miller's reaction to the swing coincided with the reasons he used to justify his scientific projects to the National Geographic Society, even if he was not explicitly aware of this fact at the time; fifteen miles down the valley lay the tropics, and twelve miles up the valley lay "the highest and coldest place one can imagine." The variety of geological and meteorological phenomena compressed into that twenty-seven mile stretch were already affecting his work and that of his teammates—including sociologist Dick Emerson—whose acclimatization jaunts onto the slopes above Tengboche to the southeast were turned back by the waist-deep snow conditions they encountered, there. This may have directed Miller's decision to spend the unanticipated layover at Tengboche working around camp rather than conducting regional glacial geology in the nearby Kangtega Valley, which lies south-southeast of Tengboche.[334] Perhaps the chill on those clear nights also persuaded Miller to put off commencing the Zenith Star Camera survey.

On the morning of March 15, 480 local porters arrived, and AMEE departed Tengboche to ascend to areas beyond permanent human habitation. They left the Dudh Kosi behind, following Imja Khola past the foot of Ama Dablam and toward the river's headwaters, which were fed by glaciers pouring down the Mt. Everest massif's southern rampart. The caravan crossed Imja Khola twice, passed its tributary with Lobuche Khola, and inhabited campsites around the seasonal pastures of Pheriche. Unoccupied this early

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[333] Maynard Miller, "3/11 Thyangboche Monastary," TS, JRU Papers.
[334] Maynard Miller, card 24, Emerson Papers.

in the year, Pheriche was originally slated to be AMEE's first acclimatization camp, however, snowfall at Tengboche thwarted that plan. Now, AMEE members took their one-night layover there to take stock of their supply problems, illustrating the degree to which the Himalayan isolation had disrupted their affairs. They had been fortunate to locate a missing box of Eiger approach boots at Tengboche, but Miller was still missing another crate full of meteorological instruments. Dyhrenfurth was desperate to acquire 60 windproof anoraks for the team of Westerners and climbing Sherpas, and he waxed ambivalent into his tape recorder about 400 smallpox vaccine doses that had arrived in Namche Bazaar too late to be administered to the retreating Tamang porters. Because the anoraks AMEE had packed were too small to fit over the baffled down insulating jackets, Dyhrenfurth hoped that AMEE Treasurer Chuck Huestis, who had discussed meeting AMEE at Base Camp sometime in late March or early April, might be able to quickly buy new, larger anoraks from a retailer in the United States before he left for Kathmandu. As for the smallpox vaccines, Dyhrenfurth said, "unfortunately we had to continue — we had to move on."[335]

Dyhrenfurth shared a tent with Will Siri in Pheriche. Siri coughed so badly through the night that he nearly vomited. Jim Lester, too, "had a little trouble at both ends." Both researchers, along with the fading Dick Emerson and sick-again glaciologists, could have used another layover to acclimatize, however, the expedition did not stop to rest; the next morning they pressed on to Lobuche (4928m), passing the moraine of the Khumbu Glacier—Miller's chief object of study. Emerson and Bishop

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[335] Dyhrenfurth, diary, 56.

took a roundabout route up the moraine to shoot photos for National Geographic, while the others pushed up a steep 250-meter pitch to get atop the glacier, proper. One there, they moved north along the western side of the glacier to avoid having to negotiate the rippled layer of loose-packed rocky earth that covered the glacial ice, whose warped surface sank and climbed chaotically in 10-meter-tall jumbles.

Lobuche was their last major campsite before expedition Base Camp. At nearly 5000 meters, Dyhrenfurth scheduled multiple nights at Lobuche to allow loads to be ferried from Tengboche to Lobuche, and from Lobuche to the area sited for Base Camp. Dyhrenfurth passed this logistical headache, along with the 500 porters' wages, off to Tashi. At 54 or 55 years old, Tashi may have been the expedition's oldest, or second-oldest member (James Ramsey Ullman was 55). He was certainly one of its most distinguished climbers, having summited Nuptse with Les Brown during the British first-ascent in 1961. Although that feat had cost Tashi some toes, Dyhrenfurth admired his remarkable fitness during the approach march, so he charged the Sherpa to lead the porters back to Tengboche, where Col. Roberts waited with another 300 loads.[336] The team's admiration for its Sherpa contingent was growing.

During their first two days at Lobuche, the expedition "loafed" around, "shaving, brushing teeth, cleaning," filling out their sociology diaries, and getting used to the altitude. Siri rested in an attempt to recover from his cold. Miller promised his diary that he would begin working with the Zenith Star Camera, but, with the thermometer dropping to -18C after sunset, he did not manage it. A runner arrived with 100 smallpox

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[336] Dyhrenfuth, diary, 62.

vaccines and a mail packet. The team learned that three Tamangs had died from smallpox, and that Dyhrenfurth's decision to evacuate the burnt woman from Junbesi to hospital by helicopter had been derided back in Kathmandu, where the Americans "were rather scorned" by the Nepalese and Europeans in Kathmandu "for being very silly spending all that money for only one life."[337] This unanticipated consequence to what Dyhrenfurth saw as a prestige-enhancing humanitarian act evoked an indignant response from the rest of the team. "'The hell with public opinion,'" was the consensus, "we have to live with our own consciences, and it was a matter of either letting the woman die, or saving a life." Dyhrenfurth told his wife that "if anybody snickers or makes remarks about stupid Americans who waste all this money of some fool scheme and helicopters and all, just tell them that we don't mind one bit, we were very happy to have done it. Let the people think that we are stupid Americans. I hope that in our country the press will be a little more realistic."[338] The team's reply to their critics illustrated dissonance between the culture that they unanimously romanticized and its actual counterpart, and the gulf between what they ostensibly valued (Nepalese dispositions toward Americans) and actually valued (American perceptions of AMEE).

On March 18th, several members tried to blaze a trail through deep, soft snow to the strip of flat terrain below the Khumbu Icefall in order to site Base Camp. They made it as far as Gorak Shep (5288m), a site of Base Camp for some of the previous Mt. Everest expeditions that was known to Dyhrenfurth as the "old Swiss Lake camp" from his time there with Lambert in 1952. 22 Sherpas broke trail, and six Americans—Jim

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[337] Jerstad, 59-60.
[338] Dyhrenfurth, diary, 66.

Whittaker, Dyhrenfurth, Hornbein, Siri, Miller, and Prather—followed carrying 40-pound loads. That morning, Prather had talked Miller out of bringing the gravity meter on the day-hike, so when Miller came upon Angayle, in anguish from hypoxia and struggling to heft his 40-pound load of canned food, the glaciologist had room to add Angayle's load to his own. He carried the 80-pound load for three miles before dumping it at Gorak Shep. By the time Miller had returned to Lobuche, ten hours after leaving camp that morning, he was exhausted, and he resolved "to avoid such excesses of effort this high again." Still, he felt well enough to consider the day's exercise a rewarding one, and in a letter home he likened the day's adventures to those he experienced in Alaska, except on a grander scale.[339] Although he anticipated that the "high altitude cough" he and Prather shared with the rest of the team would "be tough on us," he was eager to begin studying the Khumbu Glacier, starting with a gravity survey the following morning.[340] That night's entry in his sociology diary was characterized by an anxiety to get underway and a keen awareness of competing interests within the team. Since AMEE had made it to Gorak Shep ahead of schedule, Miller wanted Dyhrenfurth to devote manpower to the expedition's non-climbing programs, *videlicet* the scientific research projects, rather than get a head start on climbing or giving the team time off to recoup.[341]

Dyhrenfurth did not elect to funnel additional resources to his scientists, but during the next two days some of the scientists chose to begin data collection even

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[339] Of Nuptse, which dominated the view to the east, Miller wrote: "Above us towers omnipotently the great peak Nuptse, with a 10,000' wall of granitized sediments, migmatites quite similar to the Juneau Icefield." Miller, "Lobuche: 3/18 (16,176')," TS, JRU Papers.
[340] Ibid.
[341] Miller, card 26, Emerson Papers.

though their field stations at Base Camp had not yet been established. Jerstad recorded that Siri was "playing with blood again and we all cringe — thought of the needle not popular here." Nevertheless, the physiologist managed to survey most of the team, drawing blood from his subjects and weighing all of the Americans who were present on his bathroom scale. Miller, too, began work in earnest. He and Prather set out from Lobuche to cross the Lower Khumbu so that they could establish survey lines lateral to the glacier's flow.[342] These were crowded days for Siri, Miller, and Prather. Having only recently arrived at Lobuche, they were not yet acclimatized to its altitude, much less that of Gorak Shep. Yet, they made the one of the most difficult carries of the approach march, crossing the Khangri Nup Glacier's rough surface at elevations nearly a kilometer higher than the summits of the Pacific Northwest, and they still found the energy to unpack their instruments and administer their routines. Despite the time constraints and small setbacks of the approach march, things were looking up for the glaciological and physiological research projects.

While Siri and Miller scored early successes, their colleagues Emerson and Bishop set out with Dave Dingman and two Sherpas east across the Khumbu Glacier to climb a rock pinnacle of about 5800 meters—likely one of the unnamed peaks along the ridge between Pokalde (5794m) and Mehra (5817m), or perhaps Mehra itself, which had not yet been climbed.[343] They camped on the mountain the night of March 18th, hoping to summit the following day and meet the rest of the team at Mt. Everest Base Camp on

[342] Miller, card 27, Emerson Papers.
[343] Dyhrenfurth, 65. He does not name the Sherpas, but it is likely that Girmi Dorje, Bishop's friend, was one of them.

the 19th. Bishop and Dingman reached the summit after a tough climb due to the wintery snow conditions.[344] Unfortunately, Emerson "became quite ill." The altitude was too much too soon, the food seemed to disagree with him, and he spent much of the jaunt vomiting. By the time the group rejoined the rest of the team (at Gorak Shep, rather than Base Camp, since no one had yet made it that far) Emerson's condition had worsened. Drs. Dingman and Roberts examined him, but there was little to be done; Emerson had gone too high, too soon. Although his diary research-routine collected data regardless of his whereabouts, if he remained ill for too long or if he pushed himself beyond his physiological limit again, he could jeopardize his entire program; no one was trained to deploy his other research routines, or use the data that they collected if he succumbed to pulmonary or cerebral edema brought on by rapid ascent to high altitude.

Lester fared somewhat better on the approach march than his colleagues. Unlike Siri, whose erratic behavior on the trail likely exacerbated his illnesses, or Miller and Emerson, whose excesses of exercise at high altitude left them exhausted, waylaid, and stricken, Lester approached the high altitude environment with the caution of a man in an unfamiliar place. At Lobuche, he was already half a kilometer higher than he had ever been before, and the Abode of Snow had little in common with his native Southern California. He was awed by the view, and he remained subdued amongst the mountaineers and his fellow researchers, all of whom had informed opinions regarding the expedition's progress and prospects. During the approach to Base Camp, Lester interviewed his Western teammates in his tent, distributed and collected the occasional

[344] Again, Dyhrenfurth does not mention whether either of the Sherpas summited in his diary, 67.

questionnaire, and fought the same respiratory and digestive ailments that plagued his colleagues. He also worried about crossing the Khumbu Icefall, which, like everyone else on the team except for Dyhrenfurth and Col. Roberts, he had never actually seen.

Lester was on hand with most of the team at the old Swiss Lake Camp at Gorak Shep to meet Emerson when the sociologist trudged back across the Khangri Nup Glacier on March 20. Of the twenty Westerners, only four stayed behind at Lobuche while the others sought to establish Base Camp: Al Auten, Col. Roberts, Miller, and Prather. Auten had finally raised Col. Gresham on the radio, so he stayed put to keep open AMEE's communication lines. Col. Roberts was still coordinating the delivery of supplies to Lobuche from Tengboche, and he needed to be present to pay off all but 175 of the porters, and to organize the movement of those 175 to Gorak Shep and Base Camp over the course of the next few days. Miller and Prather stayed in Lobuche with Kancha, Nima Tenzing of Pangboche, and Kami Nobu to continue research on the Lower Khumbu Glacier. On March 20, this team of five men set out to follow the route that Miller and Prather had reconnoitered the previous day. They negotiated the glacier's debris-charged ice surface, which Miller characterized as a "no-man's land" of hidden crevasses, treacherous ice ponds, 10-meter high radiation pinnacles—called *nieves penitentes*—and constantly sliding ablation moraine.[345]

Into this surface, they bored eight 150-centimeter holes by hand auger to plant four-meter stakes into the ice. The stakes, which porters had hacked out of the

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[345] Maynard M. Miller, "Sketch of the Geology of the Mahalangur Himal with Preliminary Comments on the Glaciology of Mount Everest and Some Related Problems of High Altitude Research," 17, TS, Will E. Siri Papers, Bancroft Library.

rhododendron forest below Namche Bazaar, were erected in a 900-meter long line about 1600 meters above the glacier's snout. From a consolidated moraine ridge west of the glacier, they then completed a round of theodolite surveys on the line of movement stakes; Miller hoped to use this baseline to create a movement profile. They also cut eight small platforms on the glacier upon which they could use the gravity-meter to calculate the Lower Khumbu's depth. These transections of the Khumbu, just southeast of Lobuche, were denoted PI. It was arduous and exhausting work, but Miller was pleased with their progress despite his diary's closing remark for the day: "So tired."[346] He had an eye to establish PII up near Base Camp, once it was sited.

On the 21st, the day that Dyhrenfurth hoped to site Base Camp, Nima Tenzing moved up with Al Auten to Gorak Shep. Miller, Prather, Kancha, and Kami Nobu again journeyed onto the glacier to complete another transect line across the Khumbu. With one less Sherpa assistant than the day before, Miller found his work output suffering more than he had anticipated it would:

> At this high altitude…one can only do about 1/4 as much work as is possible at the elevation of Lansing or Seattle… Today when Barry and I went out on the Khumbu Glacier to make depth-of-ice soundings with the seismograph we had 2 sherpas with us to help carry the loads but even at that every step I took was equivalent to 10 fast steps running up-stairs. It is hard to do equal work when one's heart races at 130 beats per minute after only several minutes of normal walking up a moraine.[347]

After returning to Lobuche that evening, Miller continued to experience signs of Acute Mountain Sickness even as he lay prone in his sleeping bag to pen a letter home to his son, Ross. Every few minutes he was forced to stop writing by an onset of what he

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[346] Miller, card 29, Emerson Papers.
[347] Miller, Excerpt from a letter to Ross dated "3/21 Lobuche," TS, JRU Papers.

characterized as Cheyne-Stokes respiration, which involved progressively deeper and faster breathing (but without the apnea associated with Cheyne-Stokes at sea level). He used these experiences to illustrate a cautionary tale against hubris directed toward his son:

> Yes, man has rather narrow limits of oxygen supply and temperature ranges within he must live…otherwise he will die… We are subject to controls in our lives outside of which we cannot step and which we must thoroughly understand, regardless of how 'tough' and 'self-sustaining' we may think we are. And so we must have humility and faith to give us the strength we need in this world of limits.[348]

Before arriving at the Khumbu Glacier, Miller drew upon his vast experience working in harsh environments and at altitudes above 4300m to guide the daily workload he had planned for the expedition. The Himalayan locale had belied those expectations, and Miller found himself falling behind schedule. As an illustration of his mental state in that moment, the letter represents resignation to a power greater than human agency; in this case, the environmental conditions of Mt. Everest forced certain actions (e.g. halting research to breathe), or certain inactions (e.g. not suffering the extreme cold to conduct a night-sky survey). Moreover, these weren't the only external forces exerting control over his research schedule. In a conversation with Col. Roberts that evening at Lobuche, Miller expressed concern that their roles as scientific and logistic personnel would shift toward supporting the climbers during summit assaults, especially now that they planned to push two disparate routes to the summit rather than one.[349]

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[348] Ibid.
[349] Miller, card 30, Emerson Papers.

The concerns expressed by Miller that night were made manifest the following day by Siri's actions at the yet-unestablished Base Camp (5425m). On the 21st, he had advanced from Gorak Shep to the site for Base Camp with a vanguard consisting of Dyhrenfurth and Ang Dawa, and AMEE's strongest climbers, including Willi Unsoeld, Jim Whittaker, Lute Jerstad, and Nawang Gombu. As he readied to bed down that night, he anxiously wrote about assisting the climbers the following day during the expedition's first exploratory foray into the Khumbu Icefall, although the 22nd would have otherwise been a suitable day to set up his portable laboratory at the Base Camp site.[350] So, after breakfast on the 22nd, he ascended 160 meters with Dyhrenfurth and Ang Dawa to a vantage point between two avalanche cones, against a sheer rock overhang on a lower slope of Lho La (6026m). From there, the trio used binoculars and a walkie-talkie to help the small team of Icefall pioneers, made up of Unsoeld, Whittaker, Jerstad, Gombu, and Nima Tenzing (of Thami), discover passage up the glacier to the hanging valley above, known as the Western Cwm (the western terminus of the Cwm lies at 6217m, the eastern terminus at 6828m). Whenever the climbers reached a problem in their route, Unsoeld would bellow one of his signature yodels, signaling Siri and Dyhrenfurth to turn on the walkie-talkie, through which they conferred on route options. Due to the chaotic nature of the Icefall's shifting topography, Dyhrenfurth and Siri regularly advised the climbing party for nearly five hours, until it disappeared in a jumble of seracs and crevasses. The expedition leaders then trekked down from their vantage point back to the site for Base

[350] Siri, card 30, Emerson Papers.

Camp to meet another contingent of Americans, climbing Sherpas, and porters who were on their way up from Gorak Shep.

Bishop was among them. The day before, he had ascended part of a southern spur of Pumori that rises directly north from Gorak Shep.[351] From its slope, he looked out toward Mt. Everest's West Ridge. He described the dead-on view of the proposed new West Ridge route, which he hoped to help establish over the next few weeks, as "a little discouraging." From that angle, the west shoulder of Everest towered over the Khumbu Icefall, and Nuptse's western wall totally obscured the Western Cwm. As a result, Everest's monochromatic summit pyramid was harshly foreshortened, and Bishop did not have a clear view of the West Ridge's topographic connection to either the west shoulder or the Western Cwm. His thoughts, which were already occupied by climbing and photography, turned away from scientific investigation and toward the imminent challenges of the climb.

When Bishop arrived at the site for Base Camp on March 22, Siri had just returned from helping the first Icefall party stake a path 3/4 the way through the Icefall, and was ready to start sorting through boxes to assemble his portable laboratory the next morning. Emerson was still at Gorak Shep with Dr. Dingman, sick from the altitude. Lester was there, too, noting social interactions in case they turned out to be significant to the acquaintance process, but finding his attention increasingly drawn to the surrounding landscape. Farther down the Khumbu, in Lobuche, Miller and Prather made daily surveying excursions amongst teetering boulders atop the glacier's shifting surface as

[351] This spur was eventually named Kala Pattar (5730m), after its popularity as a vantage point for trekkers grew in the 1970s.

Col. Roberts and his porters ferried supplies through their camp toward Gorak Shep. The army of 909 porters that set out from Kathmandu had been reduced to 200 Sherpas whose willingness to carry all the way to 5425 meters had exceeded Col. Roberts' expectations and further enhanced the Americans' admiration of the Sherpa.

On March 22, the first 100 porter loads were dumped at the foot of the Khumbu Icefall. The team's mountaineers were ready to establish Base Camp. Its scientists professed their readiness, too, although they were already contending with local forces that destabilized their research. Siri's deteriorating psychological state alarmed his fellows, including those who knew him best. Those most put-off by his behavior were the physicians, who were also totally uninterested in assisting his research routines. Hypoxia prevented Emerson from keeping food inside his body long enough to digest it, and the resulting caloric deficit further weakened him to the point that he could not keep up with the ascending caravan. Lester continued to feel drawn to the group identity of his subjects, which raised questions about his objectivity as a detached observer. Miller realized that the atmosphere at Lobuche, which was 550 meters higher than his highest field site to date, was too thin for him to stay on schedule; he knew that it would only get worse, since Lobuche's altitude was also 1550 meters lower than the minimum elevation he needed to attain to complete his glaciological research program. His young assistant, Prather, was so star struck by his companions and taken by the thought of climbing Mt. Everest that he was neither focused on, nor particularly interested in glaciology. Even worse, Bishop's own inclinations toward challenging mountaineering had been piqued by Hornbein and Unsoeld's talk of a West Ridge route, to the point where his involvement in scientific research seemed less and less likely.

The scientists responded to these early challenges as best as they could. Unfortunately, conditions were about to get a lot worse.

CHAPTER FIVE: THE REALITIES OF REALITY-TESTING

AMEE's researchers believed that they had an accurate approximation of the challenges that faced them long before they arrived at the foot of the Khumbu Icefall. Emerson heavily modified his normal data collection routines to accommodate what he expected to encounter at Mt. Everest. Lester tried to improve his physical fitness to ensure he could stay in proximity to the climbers who were under the most stress so that he could hold weekly interview sessions with them. Siri chose easily-transportable instruments that would function reliably for the mountainside laboratory that he hoped to establish. Miller had enrolled Prather--his strongest, most dependable, and most experienced assistant--in the hope that between the two of them they could maximize their coverage on the Khumbu for their ambitious geological research schedule. Bishop decided to prioritize his photographic obligations to the National Geographic Society over his research commitments, although he would endeavor to pursue both. Together, after years of planning, these six men would finally have the chance to test their methods and expectations against the realities of scientific exploration conducted above 5400m. Chief among their discoveries was a shared sentiment that the higher they pushed their lines of inquiry up Mount Everest, the more the mountain resisted those inquiries.

This chapter focuses on how and why that shared sentiment was born during the fifteen-day period from March 23 to April 7, 1963. As their test-subjects probed the mountain's lower flanks in hopes of finding a route to its summit, the scientists perceived and constructed "the environment" of Mt. Everest according to their particular social contexts and professional norms, and in response to events that occurred within the space of inquiry. On the whole, the scientists' initial perceptions of Mt. Everest's environment varied from a banal response to the conditions to a sense of awe at the mountain's sublimity, but as tragedy unfolded within the Khumbu Icefall those perceptions were altered by a sense of bewilderment and defiance. The emotions generated by the place shaped the scientists' perception of the site, which in turn spurred the development of new practices of place that would ultimately jeopardize their adherence to the contemporary scientific values of objective detachment and precision. As we will see in subsequent chapters, this process became increasingly pronounced as bewilderment and defiance transformed into frustration and, eventually, desperation.

TRAGEDY IN THE ICEFALL

Early on the morning of March 23, three tremendous avalanches poured ominously toward Base Camp from the heights above. One fell from the west face of Nuptse, one from the west shoulder of Sagarmatha, and one directly north of camp from the col between Pumori and Lingtren (6749m). None of the avalanches threatened the camp, and if any of the men were cowed, none recorded it. Instead, a small contingent of Americans and Sherpas were readying themselves to enter the Khumbu Icefall. Jake Breitenbach, Dick Pownall, Dr. Gil Roberts, Ang Pema and Ila Tsering set off after breakfast, hoping to improve the route pioneered on March 22, and, hopefully, extend it another 275 vertical meters to the top of the Icefall, which lay at the foot of the Western Cwm. Barry Bishop, who was then at Base Camp, recalled how the Americans present at Base Camp that morning were "all full of beans for pushing ahead. We had visions of knocking off our mountain in a big hurry, and everything was going just right."[352] Having entered the Icefall a full three weeks earlier than the British had in 1953, the Americans felt that they were ahead of schedule.

As Pownall led his group into the Icefall, the others set about establishing Base Camp. At the chosen site, the Lower Khumbu Glacier hooks south-by-southwest towards Gorak Shep. Looking back the way his team had come, Dyhrenfurth could see the *nieve penitentes* of "Phantom Alley," a part of the terrain nicknamed for its unusually uniform columns of blade-shaped ice towers progressing atop the Lower Khumbu's chaotic, detritus-charged surface.[353] Groups of porters carried their loads of cardboard boxes through Phantom Alley before depositing them onto the glacier at Base Camp and retreating back to Lobuche. Sherpas and Americans organized some of the boxes and unpacked others. Four-man tents were erected beside the glacier on flattened sections of rock and earth that had been cleared of snow. Will Siri did not bother climbing Lho La again on the 23rd, electing instead to put up the 10-foot by 10-foot tent that would serve as his laboratory. As hypoxia sapped his motivation to assemble the instruments that it would house, he realized that it would be days before his laboratory was ready for its first specimens.

At around 2:00 pm that afternoon, sunlight in the Icefall had driven temperatures there above 32C. Pownall's team was just below the high point established the day before, staring at a 10-meter ice wall that they needed to surmount. Ang Pema and Breitenbach shared a rope with Pownall, while Dr. Roberts and Ila Tsering waited 12

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[352] Quoted in Ullman, *Americans on Everest*, 107.
[353] Dyhrenfurth, diary, TS, 70.

meters below and to the side, offering route advice to Pownall from their vantage point. Pownall turned toward the wall, drove his ice ax and crampons into a rib of ice on its left side, and began to climb. After a few moments, Ang Pema started up after Pownall. Breitenbach stood in a narrow gully beneath, waiting his turn.

Above Pownall, an ominous rumbling, followed by a "shattering roar" split across the icefall. "Everything under, around and above us started moving. Since we had been climbing over similar terrain all day without the slightest movement, my first impression was shocked disbelief. My next was the knowledge that I was falling and the thought, 'so this is death,' or 'this can't be death,' I don't know which."[354] Dr. Roberts, who had momentarily stopped walking toward the first rope to wipe condensation from his goggles, whipped his head up in response to the commotion and saw a section of the wall "about two railroad cars one on top of the other" in size collapse atop Breitenbach. Its concussive force knocked Dr. Roberts onto his back and sent him sliding ten meters across the ice.[355] He regained his feet, shouted down toward Base Camp for help, and rushed with Ila Tsering to the debris. Together, they dug in search of the three missing climbers.

Ila Tsering spotted Pownall first. His head and one hand were visible, but the rest of his body was buried beneath a half-ton chunk of ice. His chest compressed, he had difficulty breathing as the two men chopped at the block with their ice axes in an effort to free him. It took ten minutes of hacking to cut Pownall loose.

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[354] Roberts, quoted in TS notes from JRU Papers (also *Americans on Everest*, 108).
[355] Pownall diary, March 23, TS from Ullman Papers.

Following Pownall's rope, they found Ang Pema lodged upside down under another massive block of ice, "squirming and turning blue. The side of his face was tipped with pink where the edges of the ice had gashed him. Looking up at [Dr. Roberts], the injured Sherpa sobbed, 'Ang Pema finished, Sahib...Ang Pema finished.'"[356] For the next fifteen minutes, the ambulatory men cut a 30-centimeter hole in the ice, just large enough to extract the bleeding Sherpa. Ang Pema had taken severe blows to the head, and one of his arms hung limply at his side. He needed immediate attention, but Breitenbach was still unaccounted for.

The rope that bound Pownall to Ang Pema led straight down toward the narrow gully where Breitenbach had been standing when the ice collapsed. That gully was now filled with automobile-sized chunks of ice. To Dr. Roberts and Ila Tsering, it appeared that Breitenbach had died instantly, and so Roberts made the decision to triage. They cut the rope to Breitenbach, and gingerly began crutching the two injured men down the route through the Icefall toward Base Camp, shouting for help all along the way.

The Americans at Base Camp were alarmed by the faint shouts that they heard emanating from above. When Col. Roberts trained his binoculars on the descending team, he saw four men where there should have been five, and two of those were clearly hurt. Dyhrenfurth tried to raise the team on their walkie-talkie, but no one answered his call. A rescue team, consisting of Dr. Dingman, Bishop, Whittaker, Unsoeld, Nawang Gombu, Girmi Dorje, Jerstad, and Col. Roberts, was dispatched, however, even before they arrived Dyhrenfurth suspected Breitenbach was the missing man since he had been

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[356] Jerstad Diary, 68.

carrying the team's walkie-talkie. This was confirmed when the rescue party reached the stricken climbers at about 5760m, 120 meters below the site of the accident. By then, Ang Pema was in shock, and could no longer stand. The Sherpa's head bled and he jabbered deliriously as Whittaker hoisted him onto his back to carry him down to Base Camp.

Rescuers and rescued descended in a coordinated fashion through the jumbled terrain. Part way down, Whittaker unloaded Ang Pema onto a stretcher that had been sent up from Base Camp. With Unsoeld, Jerstad, and Nawang Gombu, he returned to the scene of the accident "to make certain Jake was really dead--and we cried all the way up there."[357] They tugged the rope, they yodeled and hollered, and they excavated over a meter of hard-packed snow, but there was no sign of the young climber. By the time they returned to camp, night had fallen. The morning's excited optimism had turned into sober mourning, recorded in sociological diaries that night: "Stupid goddamned gentleman's sport that gets people killed in their prime of happiness," wrote Breitenbach's friend Barry Corbet, who was down at Gorak Shep when the accident occurred, "How about Ang Pema, who only wanted to make a day's wages?"[358] Lute Jerstad contemplated humanity's impotence in the locale: "How absurd is man in the face of nature--like ants chewing on the leaves of eternity."[359] Whittaker ended his entry for the day, "very sad and discouraged."[360]

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[357] Jerstad diary, 71.
[358] Corbet diary, quoted in Ullman Papers.
[359] Jerstad diary, 72.
[360] Whittaker diary, quoted in Ullman papers.

AMEE's researchers felt Breitenbach's death as sharply as his climbing partners. Emerson wrote that the mountain "hadn't played according to the rules. Surely it should have allowed us to bury our own, in our own way, but it left only absence for us to mourn." Jim Lester noted how the team at Gorak Shep--himself included--asked themselves "silent, stupid questions." Miller and Prather, who were out installing movement stakes and running a gravity traverse of the lower Khumbu Glacier when news came down about Breitenbach's fate, decided to trek up to Base Camp the following day to help out in whatever way they could. Siri, too, stopped assembling his laboratory for March 24.

Dyhrenfurth also canceled all climbing activities for the 24th to convene a brief inquest into the causes of the accident, which was tape-recorded and transmitted to the Royal Hotel for subsequent delivery to the National Geographic Society. The team faulted no one for Breitenbach's death, instead attributing it to an "act of God." That evening, Corbet, Roberts, and Pownall drowned their sorrows in beer and bourbon. The others, leaning on each other for support, transformed their sense of mourning into grim determination and renewed purpose. In a letter home to his wife, Climbing Leader Willi Unsoeld noted the resolve of his teammates, calling their collective psyche "marvelous resilient."[361] Jerstad justified this resilience in his diary when he wrote that the team would "bounce back" from Breitenbach's sudden death because "Jake would want us to." Lester tried to note his test-subjects' responses to the obvious stressors, however, he found it difficult to detect meaningful variance among their reactions. Nor did he yet

[361] Unsoeld letter to Unsoeld, dated March 26, 1962, JRU Papers.

realize that his growing personal affinity for the group was clouding his ability to distinguish his emotions from those of his test-subjects.

Before returning to Gorak Shep to continue his studies of the Lower Khumbu Glacier on March 24, Miller sensed a shift in the team's attitude, including his own:

> We cannot help but feel that Jake died as he would want to, since he was where he most wanted to be... Already I sense a purpose and increased challenge in the minds of this team as a result...It has bound this team together in a way that I cannot describe...the binding spirit being the full knowledge that Jake is still with us, and that his spirit is guiding us upward...Our mandate is to now make this expedition so fully successful in every way that it will stand as a lasting monument to Jake, who so wanted to go high.[362]

Miller's description of the team's reaction depicted the Americans taking an event that they had initially understood as pointless and without purpose, and using it to add meaning to their actions on the mountain. Phrases like "We won't be climbing the West Ridge without Jake. We'll be climbing it for Jake," and "what kind of friends would we be to give up the thing he died for?" both impelled the Americans up the mountain and reflexively lent purpose to their friend's otherwise purposeless death.[363] As Miller recorded in his sociology diary on March 25, he wanted to tell Corbet, "We have a mandate now to climb this peak especially via West Ridge, as a monumental memorial and testimony to dear JAKE."[364] Miller's response to Breitenbach's death was especially poignant, since it represented a reversal from his proposition that the team take advantage of their early arrival at Base Camp by devoting itself to scientific research. This change was due in part to a shift in Miller's perception of the environment in which he and his

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[362] Miller, diary entry March 24, TS, JRU Papers.
[363] Unsoeld letter to Unsoeld March 26; Corbet JRU Papers.
[364] Miller, card 34, Emerson Papers.

teammates operated. Like his colleagues, Miller's reevaluation of Mt. Everest cast its environment in an adversarial role. Whereas before it had been an object of impartial study, and then a sublime landscape, now it was a challenge that needed to be overcome in the most ambitious style in order to memorialize the man it had slain. Even if that meant waylaying AMEE's research programs.

Miller and Lester's reactions seemed to contravene their professional commitment to emotional detachment, a major component of their commitment to their ideal of scientific objectivity.[365] Miller and Siri's decisions to postpone their research activities on March 24 were both humane and understandable, however, in so doing they betrayed an emotional investment toward both the men and mountain that they sought to study. This emotional closeness was also found in the diaries and letters of the others in their cohort, quoted above. Emotional attachment was an unpredicted consequence of reality-testing; where there was little actual distinction between observer and observed, and shared experiences under harsh conditions solidified the team's social dynamic, as the scientists empathically shared their test-subjects' grief at the absurdity of Breitenbach's death. In their research proposals a year before, they had constructed Mt. Everest's extreme environment as an ally to help them observe exceptional phenomena. Now, they reconstructed that environment as a senseless antagonist. By climbing the mountain they would defy it, and find closure for their grief.

Over the following days, the sentiment expressed by Miller became consensus amongst the Americans, although it took some longer to recover from the tragedy.

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[365] Lorraine Daston and Peter Galison, "The Image of Objectivity," *Reflections*, No. 40, Special Issue: Seeing Science (Autumn, 1992): 82.

Pownall was nearly counted out of the expedition on March 24 when the rest of the team feared he might "become a mental case."[366] Corbet, too, was deeply affected by his friend's death; he recorded the nature of his own emotional recovery: "three days of grey swimming just waiting to learn all over again how to feel, three days of waiting to be able to feel, like waiting to vomit...the only thing that remained to determine whether I would ever climb again, was my ability to push a route over Jake's body on into the Icefall."[367] But, by the 26th, both men had returned to their tasks. Pownall was up and about at Base Camp, organizing and packing foodstuffs to be sent up through the Icefall, while Corbet helped Whittaker, Unsoeld, and Jerstad finish pioneering the route into the Western Cwm. Ang Pema, too, was "up and around" at Base Camp, even though his head was still full of sutures and badly bruised. "It appears that the nightmare of a few nights ago is about over," Doody wrote on the evening of March 26, "we're a climbing team again."[368]

The series of events beginning with Breitenbach's sudden death and concluding with the team's transformation of tragedy into a sense of purpose were, for better or worse, precisely the kind of unpredictable stressors upon which the reality-testing of AMEE's physiological, sociological, and psychological research projects was based. Although Siri and Emerson stuck to their predetermined observation routines, Lester's research design had the latitude to allow him to immediately draw qualitative conclusions from the reactions of the team. He found this difficult, however, because in the days following the accident, he discovered that scrutinizing his teammates led to empathizing

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[366] Doody, March 26.
[367] Corbet, March 26, transcribed into March 23 by JRU.
[368] Doody, March 26.

with them, which clouded the objectivity of his observations. In late March, while trying to sort out the effects of the accident on his subjects and their reaction to the stress that it caused, his notes waxed philosophical:

> It seems that in ordinary life, death always comes as something unnatural. For one or two days it seemed terribly wrong, a miscalculation on someone's part. And then the accident took its place among the natural things of the world. It just *was,* and there was no hidden meaning to be found in it. Life is an unending stream of events and no one is sure of the meaning of any of them, really. It was easier to reach this way of feeling because we were living close to the earth, close to simple, important things.[369]

Lester did not immediately know what to make of his conclusion that the raw lifestyle demanded by Mount Everest's locale allowed the team to more easily come to grips with Breitenbach's death, though he had discovered one psychological feature since the accident: he was now "scared silly" of the Icefall that then stood between him and the climbers establishing camps higher on the mountain.[370]

The tragedy in the Icefall raised the stakes of the expedition for all of its members, even for the scientists whose objectives were ostensibly less dangerous than their fellows who harbored summit aspirations. Breitenbach's death made explicit both the appeal and the hazards of reality-testing: in one stroke the research site both evoked the phenomena to be studied and killed a test-subject. It is difficult to imagine that the death of a healthy, white, male test-subject slain by psychological, sociological, or medical stimuli in a laboratory setting would have gone unscrutinized. That Breitenbach's death did not incur injunctions or inquiries from AMEE's sponsors further illustrated how

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[369] Lester, quoted in Coburn, 138-139.
[370] Letter from Lester to JRU dated April 7, 1963.

norms and expectations differed for laboratory-based testing and field-based, non-simulated experimentation. Although it certainly magnified the scientists' perceived risk of pursuing their projects above the Icefall, none of them reflected on Breitenbach's death as that of a test-subject. Instead, they mourned him as a friend.

Here, then, was another wrinkle in the reality-testing paradigm that went unacknowledged by Siri, Emerson, and Lester. By formulating their research designs according to the reality-testing model, this trio of human-subjects researchers created projects that deviated from certain normal research practices regarding the objectivity of the observer, the perception and construction of the environment, and the consent of test-subjects and rules for experimental safety. As illustrated above, diary entries made in the wake of Breitenbach's death highlighted their digressions regarding scientific objectivity and the perception and construction of the environment in which they conducted their research. However, the scientists did not record any thoughts regarding the implications of reality-testing for contemporary controversies concerning the informed consent and subsequent safety of test-subjects, although these topics had returned to prevalence following the highly-publicized trial of Albert Eichmann for war crimes in 1961.

The scientists' reaction to Breitenbach's death was indicative of their complex relationship with both their subjects and space of inquiry. Implicit ethical guidelines for the use of human test-subjects, which were enshrined by the American Medical Association during the Nuremberg Doctors' Trial in 1946, and expanded by their author for a 1948 article in *Science*, included prescriptions to obtain the informed consent of test-subjects, and design experiments to avoid "all unnecessary physical and mental suffering and injury."[371] Although these selected precepts of the so-called Nuremberg Code were not widely adopted in a formalized manner for over a decade after AMEE's conclusion, they were nonetheless part of Siri and Emerson's normal conduct in previous laboratory experiments using human subjects. In AMEE's case, however, none of the granting institutions required the scientists to secure written consent from their test-subjects because the nature of reality-testing obviated the precepts' applicability to the scientists' research at Mt. Everest.[372] Contemporary mountaineering on 8000-meter peaks was so fraught with "unnecessary physical and mental suffering and injury" that in 1961 the eminent French alpinist Lionel Terray famously dubbed its enthusiasts *les conquérants de l'inutile*--the conquerors of the useless. AMEE's climbers eagerly subjected themselves to the dangerous phenomena that were under study. As test-subjects, they were not unwitting enrollees like the victims of the 1932-1972 Tuskegee syphilis experiment, nor was the context of their voluntarism circumspect like the American servicemen subjected to the physical and psychological effects of nuclear test shots during Operation Plumbbob in 1957. Siri, Emerson, and Lester's studies were incidental to climbing the mountain, and the realities of contemporary mountaineering

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[371] A.C. Ivy, "The History and Ethics of the Use of Human Subjects in Medical Experiments," *Science*, New Series, Vol. 108, No. 2792 (Jul. 2, 1948): 3-4.

[372] Gere investigated the lackluster formalization of informed-consent procedures in *Two Sovereign Masters*, Chapter One, section entitled "Therapeutic Optimism and Informed Consent in America after Nuremberg." Although AEC "issued a document outlining the informed consent requirement in 1947," it did not enforce this requirement for the AMEE projects that it supported. For a taste of Emerson and Siri's practices regarding consent, see Emerson's work with the Minneapolis Boy Scouts in Richard M. Emerson, "Power-Dependence Relations: Two Experiments," *Sociometry*, Vol. 27, No. 3 (Sep., 1964): 282-292. Siri's unpublished studies of total body water, density, and blood volume of 300 subjects made in the early 1960s, Will E. Siri Papers. As a clinical psychologist, Lester was not as familiar with the norms of experimental research using human subjects. Loss of his records make it difficult to assess his use of these "common" ethical standards in his graduate research, however, his questionnaires to AMEE members assumed their cooperation and consent.

included the high risk of death. As such, the scientists did not express any sense of responsibility after Breitenbach died. They also never acknowledged the impossibility of ethically replicating their experiments, given that their results were now partially stimulated by the death of a test-subject. Even though the scientists' grant awards made it possible for the young climber to explore the Khumbu Icefall, Dyhrenfurth made it clear in the days after the accident that he alone would carry the accident's onus.[373]

Dyhrenfurth lifted his moratorium on climbing on March 24, only to have it extended by a day due to a snowstorm that prevented further exploration of the Icefall. This two-day interval allowed the team to unpack and set up Base Camp on the Lower Khumbu, activities that Miller and Lester independently believed helped the team cope with Breitenbach's death. The lull afforded the team a chance to contemplate the gravity of the "immense maneuver" that lay ahead. For half of its climbers, this consisted of establishing six camps along the South Col route, starting at the top of the Icefall at 6156m and extending above the South Col to the vicinity of 8366m. For the other half, it meant route-finding a path to the top of Mount Everest's West Shoulder, where no person had ever stood, and then continuing up a ridge whose technical difficulty was emphasized by rocky, snowless features, hoping to find suitable sites to establish three or four additional camps along the way. Facing the scale of these tasks, Jerstad recorded an entry that was equally applicable to AMEE's dedicated mountaineers and the researchers who intended to follow them up the slopes:

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[373] Further investigation into the correlation between more stringent ethical demands following the Nazi Doctors' Trial and the emergence of publically-funded reality-tests in extreme environments during the early Cold War might reveal a strategy developed by researchers to circumvent issues of consent and safety.

> All of us know we are stepping into a world of the unknown, of the misery of high altitude, of heat and cold, and of men living at close quarters for months at a time. We are prepared to face these obstacles, for all of us have been on expeditions before and are trained and conditioned to meet them. We realize that we are pitted against an enemy which never relaxes its guard and is always conjuring up new and more horrendous trials.[374]

That AMEE's scientists believed they could transport their epistemological norms and research procedures, unpackage their instruments, and attempt to bring this environment and the phenomena it produced into scientific order was testimony to the confidence that they had in their methods and ability to operate in the hostile locale. As the scientists spent more time in the environment and watched their tapestry of carefully planned studies begin to fray, their confidence was bolstered by their peers' teamwork and camaraderie. Jerstad discussed these practices in a subsequent passage that seemed tailored to Emerson's project on group motivation and goal orientation:

> Personally I know there are going to be moments when I will want to quit, when the odds will seem too great. I also know that I cannot quit. I owe it to my teammates to go on. If I should let down even for a minute, someone else might die--and we have already lost one man! It would be so easy to quit, and difficult to spur others on, but each of us has silently vowed to carry the ball if someone fumbles it, and to do our very best to get the fallen man up and going again.[375]

This spirit of teamwork was not only essential for the mountaineers seeking to "carry the ball" to the mountain's summit, it also kept the researchers moving forward in pursuit of their research. Although the Icefall was the first significant hazard that the scientists faced above Base Camp, it was not the last. During their first week at the foot of the mountain, it demonstrated multifarious means of resisting scientific study.

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[374] Jerstad, *Everest Diary*, 74.
[375] Jerstad, *Everest Diary*, 74.

STABILIZING AN UNSTABLE ENVIRONMENT

From Base Camp, the whole team could see the intermittent avalanches that fell from Pumori to the west, Lho La to the north, Everest to the east, and Nuptse to the south. According to Bishop, they were "incessant," and they "usually sounded like an express train rolling through the night." Those following snowstorms consisted of freshly fallen snow, others contained huge blocks of ice as cornices collapsed. The largest avalanches fascinated the Americans, who rushed from their tents to watch, standing transfixed by displays they described as "stupendous."[376] Base Camp's location--where Miller and Siri had begun to construct their field stations--afforded a sense of safety that would vanish once they departed for their duties higher up the mountain, wherein they could rely only on their good fortune, mental and physical stamina, and teammates' assistance.

The altitude at, and above, Base Camp was also causing problems for the researchers and their charges. Most of the team still dealt with the deleterious effects of hypoxia that they experienced during the latter stages of the approach march. Emerson and Doody, who had been miserable a vertical mile below Base Camp when the expedition stopped in Tengboche, were feeling worse at the foot of the Icefall. Their colleagues, who were working to improve the route through the Icefall, encountered another altitude-related problem particular to extremely high elevations; at 6000m, the troposphere in the equatorial latitudes contains less than ten percent of the amount of water vapor found at sea level.[377] The dry air both dehydrated climbers and exacerbated

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[376] Bishop interview with McDade, BCB Papers.
[377] K. Parameswaran and B. V. Krishna Murthy, "Altitude Profiles of Tropospheric Water Vapor at Low Latitudes," *Journal of Applied Meteorology* Vol. 29 (August, 1990): 666.

the intermittent coughing that debilitated all of the Westerners as they went about their day. The climbers remedied dehydration by sucking down quarts upon quarts of hot tea and fruit juice mix, but there was little anyone could do about the coughing fits. In a letter to his wife, Dyhrenfurth described this problem and its remedy: "You keep coughing and coughing and finally you have to throw up, even though you are not really sick. It's this altitude cough, this irritation; you can't get any air and the only solution is just to throw up."[378]

The temperature swings at Base Camp were also problematic. The extreme high further exhausted dehydrated climbers, and the extreme low wreaked havoc on scientific instrumentation and supporting machinery. At night time, the mercury dipped as low as -30C and froze some of the equipment. Emerson's tape recorders, necessary for the completion of his "Participant Observer" and "Experimental" research routines, were so cold that they would not operate, and their batteries were too cold to provide power. Siri's four bottles of collodion membrane filters, which were made of a viscous solution of ether and pyroxylin, needed to be kept warm during the freezing nights to preserve their integrity. His only option was to stuff the bottles into his down sleeping bag at night so that his body heat kept them warm, a practiced that he noted was "good for filters but hard on me."[379] On March 26, the morning chill prevented Al Auten's gasoline generator from turning over. This both inhibited radio contact with Kathmandu and persuaded Dyhrenfurth to draft the mechanically-minded Prather out of Miller's service for March

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[378] Dyhrenfurth, diary, TS, 77.
[379] JRU, *Americans on Everest*, 115.

27 so that the glaciologist's assistant could build a small shack for the generator to protect it from subsequent cold nights.[380]

Prather had originally been slated to help Miller prepare their apparati for their research around Base Camp on the 27th and 28th. Bishop, too, might have helped Miller unpack and sort through glaciological, meteorological, and radiological gear, however, on the 27th he was up in the Icefall lashing tree trunks together and installing them as bridges over crevasses with Corbet and Gil Roberts. The other Americans were also busy in the Icefall; Hornbein and Emerson marked the route with willow wands, Whittaker, Unsoeld, and Jerstad pushed the route through to the Western Cwm, and Dyhrenfurth and Doody filmed the ordeal. So, it fell to Miller to install the meteorological and radiological stations at Base Camp, which by then had begun to resemble a "tent city." As Miller began putting his instruments in order on the morning of March 27, the final relay of 140 low-level porters arrived and began unloading materiel from their backs. Once finished, they departed for home. Base Camp was finally fully stocked and occupied.

Until Advance Base Camp was established in the Western Cwm, Base Camp would serve as the expedition's center. Its scores of tents were anchored in the snow on an uneven area of "rubble-strewn ice," on a moraine formed by the meeting of the Khumbu and a smaller glacier that drained Lingtren and Pumori, which Miller called the Lingtren Glacier. Paths from tent to tent threaded their way through moraine debris ranging from "huge boulders down to gravel." With 18 Westerners, 37 climbing Sherpas, an additional 12 local Sherpas hired to ferry supplies through the Icefall, 216 cylinders of

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[380] Dyhrenfurth, Diary, TS, 75.

oxygen, 2 miles of nylon rope, and hundreds of cartons of food and drink, each tent housed people, supplies, or both. The center of life for the Westerners was a pair of 12-foot by 12-foot tents that faced each other with their awnings united to form a dining, medical, and recreation area. Al Auten had set up his radio mast and equipment just outside the covered space, from which he made daily contact with Kathmandu with growing reliability. A supply dump stood between this area and a large cooking kitchen made from a ridge pole, a large tarp, and walls constructed of moraine stones and food boxes. Inside, the expedition's first cook, Danu, "ran a very tight shift." The Sherpa cook had organized the Westerners' unprepared meals in orderly stacks of food boxes, staple canned goods could be found in several sections, complemented by other sections devoted to hot teas, fruit juices, and other ingredients for the team's three daily meals.

Nearby, a similar tarp-and-stone-wall setup was erected for the Sherpa cook tent, where "the Sherpas ate and congregated." Barry Bishop described the scene: "One would go down to socialize with them on occasion and duck under the flap of the tarp into a smoke-filled dark, or barely lit, interior and find a dozen or so Sherpas squatted around the fire eating their main staple of *sampa* rice with their fingers; or if [the Sherpas] were down for R&R, perhaps getting quite potted on *changarachi* that some fellow's wife or sweetheart had brought up from the lower villages."[381] Unlike the Americans, the Sherpas at Base Camp were not on any sort of vacation from their normal lives. They labored within a day or two's walking distance from their homes, and so they did not share the Americans' sense of isolation in Base Camp. They passed the time playing cards, a "very,

[381] Bishop recording, TS, Barry C Bishop Papers, tape-recorded interview with McDade.

very noisy affair, where the Sherpas slap their cards down with real vehemence and appear to get a maximum kick out of the game," or visiting with wives and sweethearts who made the trek up to Base Camp.[382]

Finally, on the periphery of camp, a small, Draw-Tite tent shaped like "a small beach cabana" was pitched over a deep crevasse. The seat of a Western-style toilet had been placed over the crevasse for the convenience of Base Camp's occupants. Unfortunately, the seat had a tendency to rock dangerously when in use. Whether the men feared physical or psychological injury from falling into the makeshift latrine, they did not say, however, after using it a few times most of the Americans had given it up in favor of using "the great outdoors."[383]

Surrounded by this hubbub, it took Siri three days to unpack and prepare his laboratory and instrumentation for the physiological study. It took only one afternoon for his project to destabilize. On March 26, 27, and 28, he assembled his gear in a 10-foot by 10-foot tent erected specifically to house to his studies. On March 29, he began pursuing his reluctant test-subjects around camp; the locale's cold temperatures led to unforeseen consequences in Siri's data-collection routines, including resistance from his test-subjects. Urine collection was achieved via portable plastic urinals for the men to use, however, it got so cold at night that the test-subjects were reluctant to leave their sleeping bags, much less their tents, to "answer nature's call." Instead, they urinated into these small bottles inside their sleeping bags. Whenever anyone "upset" a urinal during his sleep, which was

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[382] Bishop marked the latter by the "delightful giggle of a sherpani" that occasionally emanated from the Sherpas' tents.
[383] Dyhrenfurth, Diary, TS, 78.

a common occurrence considering their cramped quarters and fitful sleep, Siri lost a datum point.

The American climbers were comfortable assisting with urine collection, even though it was often messy, always inconvenient, and the Sherpas teased them about it.[384] Collecting blood, however, was another matter. "Thoughts of the needle are not popular up here," Jerstad wrote, "When [Siri] starts playing with blood we all cringe...The thought of needles up here is revolting." While it was simpler since the invention and production of the Rochester Needle less than twenty years before, drawing blood for hematology and recording his subjects' iron turnover was both difficult and "not pleasant" for Siri's test-subjects; they still needed to strip off their warmest layers of clothing to submit their arms to Siri's needle, the blades of which were often below freezing temperatures, which made their being "shoved" into a subject's arm a disagreeable experience for everybody involved.[385]

Additionally, the expedition physicians who had been listed as Siri's "Laboratory Assistants" on his successful grant application--Gil Roberts, Dave Dingman, and Tom Hornbein--were not at all interested in helping Siri with his research. They, too, were subject to the realities of reality-testing; to men who identified as mountaineers, the allure of the proximate mountain was far more attractive than Siri's syringes and centrifuge. This problem manifested once Camp I was established above the Icefall on March 30. The climbers--physicians included--wanted to ascend, but Siri was in the midst of his first

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[384] Jerstad recorded the Sherpas' amusement in his diary: "I can imagine them saying to each other: 'With all the outdoors up here--and the stupid sahibs collect urine in bottles!'" Jerstad, *Everest Diary*, 76.
[385] Jerstad diary, March 30, 1963, TS, JRU Papers.

major round of data-collection. The physicians excused their lack of interest in Siri's project by citing the "tremendous amount" of medical work that they had done on the march in, and were expected to perform for the duration of the climb. The fact that their medical supplies, which were supposed to have lasted through June, were so exhausted that they needed resupply before the end of March, testifies to their workload. More to the point, their ambivalence toward Siri's work was as much a result of their desire to mountaineer as it was their medicinal commitments. Tom Hornbein had foreseen this, which was why he joined AMEE under the condition that he would not be asked to invest his time and energy into activities other than climbing Mt. Everest; Dyhrenfurth was forewarned of it, too, when Dr. Charles Houston wrote to him on the matter exactly one year before.

As climber Richard Pownall recorded, "our climbing is going faster than our science program."[386] Most of the climbers had dealt so effectively with the stresses of acclimatization, carrying loads through the Khumbu Icefall, and Breitenbach's death that they were outpacing the programs that sought to study their reactions. Siri needed an assistant for the next five days--through April 4--but each of the three physicians was scheduled to ascend above the Icefall on either March 31 or April 1. Additionally, the senior physician, Gil Roberts, was one of a few men whose morale had been severely dented by Breitenbach's death. According to the climbing leader, Willi Unsoeld, Dr. Roberts was so affected that his sentiment toward the expedition had shifted to "'climb the damn mountain as quickly as possible and get the hell out... get back home.'"[387] Dr.

[386] Pownall, March 30 diary, TS, JRU Papers.
[387] Dyhrenfurth, Diary, TS, 83.

Roberts was upset enough to pull Dyhrenfurth aside to talk about the issue, but Dyhrenfurth favored Siri's physiological program over the physician's personal feelings. He reminded Dr. Roberts that "there might be a time when there would be a choice between climbing and doing medical work, and that he would have to give up the climbing if there is a choice to be made, and the same applies to Dave Dingman."[388]

Indeed, Dingman resolved the dispute with Siri by volunteering to stay behind at Base Camp to help. This did not mean the Siri's worries were over; it was clear that the variable of human motivation, which was a crucial component of his and his colleagues' reality-testing protocols, could unravel his ability to maintain his research schedule. Nor did Dingman's choice to stay behind alleviate the destabilizing effects of the extreme environment upon Siri's projects. Within the first few days, his makeshift laboratory had become "a shambles of lab equipment, bottles of urine and tubes of blood" in which it was "a fearful struggle to get anything done."[389] Even with two "Tiny Tiger" generators rumbling at full power throughout the day, Siri reported that "Most of the time everything in the place, including me, is frozen solid and must be thawed before use--even my ball-point pen, which I have to hold over a candle after writing each sentence."[390] Worse than this, Siri's pool of test-subjects was suddenly diminished after the climbers established Advance Base Camp (Camp II, 6507m) on April 1. There was a general exodus of Americans heading up the mountain, leaving Siri with little choice but to assemble and repack his instrumentation for a journey through the Icefall, because the topography over

[388] Ibid., 85.
[389] Siri, April 4 diary, TS, JRU Papers.
[390] Ibid.

which his test-subjects were dispersed prevented him from continuing his data-collection routines from Base Camp.

Siri was not the only researcher who had to adapt his schedule to the early successes of the climb. On the evening of March 29, Dyhrenfurth asked Miller if he would release Prather from the glaciological program for a week so that the assistant glaciologist could "help fill in [the] gap left by Jake's death" to establish camps in the Western Cwm.[391] Miller acquiesced, and on March 30 Prather found himself threading his way up the Icefall toward Camp I while Miller prepared instrumentation back at Base Camp with Kancha and, unexpectedly, Drs. Roberts and Dingman's orderly, Angayle. Angayle had never been on an expedition before, but his limited education would make him indispensable to Miller. From the outside, however, it appeared to some of the climbers that Angayle was just avoiding work. Dan Doody, who was virtually bedridden from poor acclimatization, wrote that Angayle was "always clean and his clothes are so neat [that] Gil claims he has an iron hidden in his gear," described him as "a real opportunist," and asserted that he was only helping Miller paint glacial movement stakes so that he could listen to the radio and avoid carrying loads up the mountain. Although Doody may have felt that "everyone's looking forward to getting [Angayle] up the mountain to give him a taste of what Sherpa work really consists of," Angayle's familiarity with Miller's work may have saved crucial components of his projects, as we shall soon see.[392]

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[391] Miller, April 31 sociological diary, card 40, Emerson Papers. In this entry he explicitly acknowledges that releasing Prather to the climb was against his agreement with his sponsor, the National Geographic Society.
[392] Doody, March 30 diary, TS, JRU Papers.

Doody's writing reflects his expectation of the division of labor amongst the Sherpas. Rather ironically, too, since Doody himself had so much trouble with acclimatizing to the altitude that he was unable to carry out his duties as assistant cameraman to Dyhrenfurth, leaving Dyhrenfurth saddled with shooting film in addition to his leadership duties.[393] As a result, Dyhrenfurth increasingly relied on his old friend Ang Dawa to fill Doody's role. Miller, too, trained and employed a handful of Sherpas during Prather's absence. Kancha and Angayle, the first of Miller's *ad hoc* assistants, would soon play an essential role in saving Miller's research program.

As March drew to a close, Lester, like Siri, watched his test-subjects ascend out of reach. As the only Western expedition member without mountaineering experience, he could not simply adapt his schedule to ascend with his subjects. He had been advised to wait for the route through the Icefall to be well-established by the weight of a few dozen carries before attempting to pass through, however, his determination to overcome his fears and mountaineering inexperience challenged his better judgment. On March 27 he ventured into the Icefall, accompanying Dr. Roberts on a carry to the dump. Dyhrenfurth, who, with Ang Dawa, was close behind Dr. Roberts and Lester during the morning carry, recalled the challenges Lester faced on a rope through the Icefall during his first foray onto the mountain:

> There was one place where there is an ice tower, which sort of threatens the route. And Gil [Roberts] told Jim [Lester], 'When we get to that point I want you to keep up with me and do not stop until we are past the danger zone.' ...I saw them dash ahead, and we kept climbing the steady pace and I caught up with them. There

[393] Dyhrenfurth vented his frustration at this situation in his diary: "He's never there when things happen; he seems to have no eye at all for human interest, at least up to now." Diary, TS, 78.

> was Jim, a bit flustered. It seems he had tried to keep up with Gil and he finally had to yell out, 'Sorry, but I'm peeing in my pants!'[394]

When Dyhrenfurth stopped to ask after Lester, the psychologist told him "God, it was just that the pace was too fast." To Dyhrenfurth, Lester had performed exceedingly well considering he had never climbed a mountain before, "and here he is all of a sudden in the Khumbu Icefall, a well-known danger zone, and lately a killer." [395] Discouraged, Lester returned to Base Camp believing that he would never make it up to the Cwm, but still determined to try again once his strength returned. In the meantime, he inherited "food detail" when Pownall ascended on April 1. Food detail had little in common with his psychological research program, however, when Lester was not sorting and packing food supplies for transport to the high camps by the all-Sherpa Icefall team, he conducted infrequent interviews with the few remaining Western climbers who passed through Base Camp.

Unlike Siri, Miller, and Lester, Emerson had ventured into the Icefall early to help mark the route through the chaos. As one of the team's most experienced climbers on technical terrain, he was eager to ascend to the Cwm and help out with the West Ridge effort. He occupied Camp I the day after it was established, and moved up to Advance Base Camp on April 2. Unfortunately, the altitude sickness that had plagued him during the approach march struck again, forcing the sociologist to retreat from his test-subjects' interactions with the unknowns ahead, thereby hampering his participant observer routine.

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[394] Dyhrenfurth diary, TS, 81.
[395] Ibid.

Thus, in early April, four of AMEE's principal researchers were in Base Camp, accompanying Dyhrenfurth, Auten, Doody, Col. Roberts, and a host of Sherpas, a dozen of whom made daily supply trips to Camp I and back. Doody, who felt too ill to climb higher than Base Camp in early April, characterized the activities of those who inhabited the camp as routine:

> At night temps. drop to zero degrees plus or minus 10 degrees. We burrow deep into our down sleeping bags and are aroused in the morning by two delightful words "Sahib, tea." One has merely to open the tent entrance and there is a brown hand holding a steaming cup of tea. While still in the sack one drinks this wonderful brew which differs from regular tea in that the tea, milk and sugar are all put in the pot and then cooked. Following the tea one lies there till about 8, at which time the sun hits the tent, the thermometer jumps ten degrees and a whistle blows for breakfast. Then a bit of struggle, pulling on a wool shirt, down parka, long johns, ski pants, three pair of socks and Eiger boots with their felt inner boot and leather outer. Then down to the dining tent for cereal, eggs, maybe freeze dry sausage, canned bread, butter, jelly and coffee, tea, cocoa or ovaltine. About 11 the whistle blows again for something to drink, bread, cookies and about 1 p.m. comes lunch which is a pretty full meal. About 4 it's tea again and cookies (should you not respond to the whistle this time the kitchen boys will seek you out at your tent and serve you). And finally, about 5:30 comes dinner, possibly a bit bigger than lunch: soup, meat, potatoes, vegetable, maybe pickles followed by canned fruit and a variety of drinks
>
> Other than that we make up loads for the sherpas to carry, Miller drills holes in the ice and puts in stakes, then measures movement. I take pictures, Will does physiological work and some play cards and we all read and write letters.[396]

Doody's description of the Base Camp routines was remarkable because it underscored the kind of support the Sherpas provided to the Westerners, and the degree to which the Westerners relied on that support. For example, Miller's glaciological program, which he already considered "too extensive" just nine days after arriving at Base Camp, would

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[396] Doody, March 28 diary entry, TS, JRU Papers.

have been nearly impossible to pursue without the rotating roll of ad hoc Sherpa assistants he employed between March 27 and April 4. During that time, Kancha, Angayle, Mingma, Ang Norbu, Ang Nuru, and one or two other unnamed Sherpas helped carry loads of equipment across the Khumbu and Lingtren Glaciers, plant and track glacial movement stakes, and collect specimens of glacial ice. Their assistance was essential because the oxygen deficit at 5425m made even the slightest physical activity, such as dressing oneself, into a herculean ordeal. Miller could not avoid physical activity, however, because his studies regularly took him across the Khumbu and Lingtren. These traverses were exhausting up-and-down affairs of brief, steep 10-meter climbs and descents over unstable terrain of mixed rock and ice detritus. With 15 to 20 kilos on Miller's back, loose moraine debris would slide away underfoot. This work was also mentally taxing; because there were no established paths across the glacier, Miller was forced to route-find carefully or risk walking headlong into a crevasse. With Bishop and Prather helping to establish Advance Base Camp two days travel up the Khumbu, these Sherpas were indispensable to the success of Miller's glaciological project and, by extension, Bishop's solar radiation research; Doody may not have regarded Angayle's contribution to Miller's project as worthwhile, however, the work done by Angayle and the other Sherpas was essential to the long-term success of AMEE's scientific research program.

Angayle and Kancha's assistance to Miller surpassed the aid that he had received from Bishop, or that the Western physicians had provided to Siri. These two Sherpas often pulled double-days of load-carrying and glacier-surveying neither expecting nor receiving additional compensation. Miller's enrollment of the indigenous population represented what historian of science Robert Kohler would later call a "practice of place," that is, a highly-specific behavior designed to "restrict variables" and "carry out comprehensive measuring," which is tailored to a particular space of inquiry.[397] Miller could not execute his programs in the extreme environment without the Sherpas' assistance; indeed, it is possible that their physiological adaptations to the high Himalaya made them better suited to the task than either Prather or Bishop. Miller's utilization of Kancha, Angayle, and whatever other Sherpas he could lay hands upon distinguished the glaciologist's ability to adapt his practices to his shifting perception of the environment from that of the other American scientists, for none of them employed the indigenous population in their data-collection routines even though the altitude and temperature severely hampered those routines. The Sherpas' substitution for Bishop and Prather further underscored the disparity between role assignment in grant proposals and role fulfillment in the field. It would remain to be seen whether the Sherpas would receive credit for their work on behalf of AMEE science.

THE OTHER SIDE OF THE ICEFALL

Much like AMEE's physicians, who preferred climbing to playing laboratory assistant, Bishop was not content to remain at Base Camp while the other mountaineers pushed the climbing route beyond the Icefall. As a result of his desire to climb, he "didn't have time" to set up his solar radiation instruments before departing Base Camp on April 1. Like Barry Prather, Bishop was happy to prioritize the demands of AMEE's climbing

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[397] Livingstone, *Putting Science in its Place*, 5.

objectives over his research obligations because he had a personal interest in climbing the mountain. Whereas Prather's release by Miller to aid AMEE climbers establishing Advance Base Camp was a consequence of Breitenbach's unanticipated absence, Bishop had a predetermined "list of priorities" he had cleared with his boss at *National Geographic* before leaving the United States: "climbing first, photography second, science third."[398] When the opportunity arose to ascend to Advance Base Camp in the Western Cwm, he elected to leave his project in Miller's capable, if overburdened, hands.

The Western Cwm was named by the first Westerner to see it, George Leigh Mallory.[399] Cwm is a Welsh word for a valley head that was created by glacial erosion, typified by its amphitheater-like shape. Mallory, who was born near the Welsh border in Cheshire, England, first espied the Cwm from the top of Lho La, where the surrounding mountains and the foreshortened perspective made the Cwm appear much shallower than it actually was. It was five kilometers from the head of the Khumbu Icefall to the Cwm's terminus at the foot of the western face of Lhotse, however, the Khumbu Glacier, which served as the valley floor, was split laterally by gaping crevasses whose circumvention prevented AMEE's climbers from blazing a straight path to the Lhotse Face. Mount Everest's West Shoulder and West Ridge comprised the Cwm's northern wall, rising 1,000-2,000 meters above the valley, while the southern wall climbed 1,000-1,500 meters toward the seven summits of Nuptse.

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[398] Bishop, taped McDade interview, TS, Bishop Papers.
[399] Sherpas travelling between Tibet and Nepal via Lho La had certainly seen the Western Cwm, although if it was ever named that information has not survived.

Thus, the Cwm was enclosed on three sides by extraordinarily high walls of fluted rock and corniced ice. Shielded from wind, bereft of color save the sky's brilliant blue, the Swiss had nicknamed it Valley of Silence when they first visited it in 1952. AMEE climbers called it a "desert of snow and ice," whose lack of features befuddled the climbers' sense of scale: distances that appeared to be a 30-minute hike turned out to be a three-hour slog.[400] Although its barren terrain made for straightforward climbing, this environment had its own dangers. At 6500m, climbers operating out of Advance Base Camp were subject to the same altitude-induced ailments that afflicted Emerson and Doody at Base Camp, but to a greater degree. The ice-covered, high walls of the five-kilometer amphitheater reflected a tremendous amount of solar radiation, such that during April's cloudless mornings men labored in temperatures above 32C and were under constant threat of photokeratitis, a painful condition caused by overexposure of the eye's cornea and conjunctiva to ultraviolet rays, and resulting in temporary blindness. Additionally, avalanches of snow and ice fell from those walls into the Cwm, forcing the men to keep the South Col route to the center of the valley floor.

The West Ridge climbers had a different strategy. To gain the West Ridge, they first had to surmount the northern wall of the Western Cwm, a 1000-meter buttress called the West Shoulder. On April 3, Willi Unsoeld led the way up the glaciated face accompanied by Bishop, who had ascended from Camp I to Advance Base Camp on April 2. Although Advance Base Camp was slated to be one of the sites for his solar radiology observatories, Bishop did not stop to set up his instrumentation. After

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[400] Pownall, April 3 diary, TS, JRU Papers.

establishing a dump midway up the West Shoulder with Unsoeld on the third, and resting in Advanced Base on the fourth, he returned to the Shoulder with Tom Hornbein on April 5. They came within 130 meters of the top, where they hoped to find a suitable place for Camp 3 West (3W), before returning to Advanced Base for the night. His excursions on the West Shoulder took Bishop to an elevation higher than the summit of Ama Dablam--his previous personal altitude record--however, he was climbing strong, and did not seem to have trouble acclimatizing to the new heights.

Emerson was not so fortunate. He climbed to Advance Base Camp on April 3 intending to assist Bishop, Unsoeld, and Hornbein with the West Ridge route during the day and conduct participant-observer studies in the evenings. On the fifth, while Bishop and Hornbein were high on the Shoulder, Emerson became nauseous while improving the route to the dump with Unsoeld. Although he had originally planned to stay above the Icefall until after the mountain had been climbed, Emerson's difficulty acclimatizing again forced him back down to Base Camp on April 7, just as his test-subjects were penetrating parts of Mt. Everest that had never been explored before. Unlike AMEE's South Col team, who knew the route could be climbed because it had been thoroughly explored by Swiss parties in 1952 and climbed by the British in 1953, the West Ridgers were uncertain about the possibility of their route. For that reason, the West Ridge was the place where Emerson expected his study of motivation's U variable (i.e. Uncertainty of outcome) to be most pervasive. In what seemed like a repeat from the week before, his forced absence from the West Shoulder was a blow to his participant observer routine.

As Emerson retreated from the West Shoulder on April 5, AMEE's geological program suffered a major setback that highlighted the consequences of committing

Bishop and Prather to the climbing efforts, the benefits of Miller's decision to enlist untrained Sherpas in his research program from an early stage in its pursuit, and the tensions between the men who played dual roles as mountaineers and physicians. On the evening of April 5, Miller was out on the Lingtren Glacier just northwest of Base Camp with his assistants Prather and Angayle Sherpa. As the sun set, they finished staking an observation line across the glacier to track its movement and were heading back toward Base Camp. Angayle, who was exhausted from making a carry to the Icefall dump that morning in support of AMEE's mountaineering efforts, had to pass his load off to Miller. As they threaded their way through rocky debris, Miller placed his hand atop an unstable, two-ton boulder. Under his overladen weight, the rock shifted suddenly, rolling onto Miller's foot and pinning him in place.[401]

Although both Prather and Angayle had moved out of sight, the former heard Miller shouting for help. Returning to their stricken leader, they vainly attempted to heft the boulder so that Miller might extract his foot from its bind; when Prather and Angayle tried to use an ice ax as a wedge, the ax immediately broke under the weight. Ultimately, Prather used his leg as a lever to dislodge the rock while Angayle and Miller heaved against it. Prather's knee was cut and badly bruised, but Miller was free to be crutched into Base Camp by his saviors as night fell.[402] In camp that night, he wrote that he would like to discover "that broken bones in left instep not as severe as pain tonight connotes--

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[401] Miller retrospectively blamed his accident on his having carried Angayle's load in addition to his own. See diary dated April 6, card 46, Emerson Papers.
[402] Dyhrenfurth, diary, 103.

great pain."[403] Until the severity of Miller's injury was resolved, he would remain immobile in Base Camp.

The following day, Miller recorded a "-2" feeling toward his scientific program on the -5 (apprehensive) to +5 (expectant) scale in his sociology diary. He needed "more strong help" now that he had been immobilized. Although he could rely on Prather for the time being, he knew that his program, which had already been behind schedule, would only fall farther behind as he waited for his foot to recover. Bishop was the obvious choice for assistance, since he was a trained geologist and an agent for the institution that sponsored Miller's research program. By the time of the accident, however, Bishop was entrenched at the front of the climb. During the first week of April, he operated out of Advance Base Camp, helping Hornbein and Unsoeld put up the West Ridge route, and, as the expedition consolidated its limited supply of oxygen and manpower behind a push up the South Col in the hopes of summiting Mt. Everest by May 1, Bishop chose to "switch teams" and help with the South Col effort. His priority to reach the summit of Everest, both for personal ambition and professional obligation, outweighed his attraction to the challenges posed by the West Ridge. There was climbing yet to be done on the South Col route, and so the geological research program--with its mundane responsibilities--never had a chance.

Miller's young assistant glaciologist, Barry Prather, was also eager to test his mettle against Mt. Everest, and he prevailed upon his superior's better judgment to let him go up. Miller's decision to release Prather for three nights on March 30 doomed the

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[403] Miller, diary dated April 5, card 45, Emerson Papers.

Zenith Star Camera project in the wake of the April 5 accident. Since arriving in the Solu Khumbu, neither glaciologist had taken the opportunity to deploy the Star Camera. After Miller's accident, there were no more opportunities to do so. Before leaving for Advance Base Camp on March 30, Prather was too busy constructing both the generator sheds for the benefit of Auten's radio and Siri's centrifuge, and the geological program's meteorological stations. Upon his return from Advance Base Camp, he was too busy setting up solar radiation instrumentation for Barry Bishop. Once Miller suffered a broken foot, Prather spent all his energy conducting glaciological surveys on the Khumbu and Lingtren Glaciers, and was too exhausted to attend any projects after sundown, especially one that involved assembling a complex instrument out on the exposed surface of the Lower Khumbu. Indeed, while entering his diary entry on the evening of April 8 he recorded he was too tired to even "get a drink of cold water."[404]

Miller's problems with manpower had produced one unexpected boon to his program: he had familiarized a small group of Sherpas with his projects and their protocols. Kancha, Angayle, Mingma, Ang Norbu, Ang Nuru--and possibly others--had all assisted Miller prior to his accident. They helped conduct gravimetric measurements, drill holes in the ice to take core samples, build meteorological stations, and stake lateral observation lines across the Khumbu and Lingtren glaciers, so they knew the locations of the stakes that were scattered across the glaciers' complex topographies. Miller could rely on their technical proficiency and their familiarity with the locale's unique working conditions to keep portions of his research program afloat. After the accident, Kancha

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[404] Prather, April 8 diary entry, card 48, Emerson Papers.

and Angayle took it upon themselves to transform the vicinity immediately outside Miller's tent flap into a kind of geological command information center while their *sahib* lay immobile inside his sleeping bag. On the patio they arranged his scientific equipment and meteorological boxes in "a neat arc" so that Miller could easily access his instruments and monitor weather conditions. Because his tent was on one of the moraine's higher ridges--nicknamed Nob Hill by Bishop--he was in a good position to "sit in a chair outside the door of his tent, looking out over the glacier, and direct operations."[405] Limping to and from his tent to that chair was all that Miller was willing to do immediately following his accident because, without a physician's diagnosis, he was uncertain about the severity of his injury.

Drs. Roberts and Dingman, who were both in the Western Cwm when Miller's accident occurred, were initially reluctant to descend back to Base Camp to tend to Miller's injury. The allure of climbing the globe's tallest mountain, combined with a fear of that mountain, superseded their other obligations. Roberts was helping the South Col team establish Camp III (6979m) at the foot of the Lhotse Face, and Dingman had come up to fill Emerson's absence on the West Ridge reconnaissance. They heard the news that Miller had been injured on April 6, but neither man immediately volunteered to descend to Base Camp to tend to the glaciologist. Roberts, whose carry to Camp III the day before had been cut short by acclimatization troubles, was perhaps more suited to spend a day at lower altitude than Dingman, who had already stayed behind once to assist Siri. That Roberts was uninterested in going down is puzzling, until one recalls that he was one of

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[405] Bishop, interview with McDade, TS, Bishop Papers.

the two men who watched the ice block collapse atop Breitenbach and pulled Ang Pema and Dick Pownall from the debris. Throughout early April, his diary entries lacked enthusiasm for the expedition, and he continued to struggle with fear of the Icefall.

Dingman, who had left Base Camp to help with the West Ridge on April 5, was simply too engaged with climbing to want to return already. Over the radio, he and Roberts instructed Miller to bind his foot and stay off of it. They assured him that in five days he would know if it was a "complicated fracture" or not, and one of them would descend to his aid. Unfortunately, that did not happen; five days passed, Miller could not bear any weight on his foot, but the doctors just kept climbing. It took another five days for Dyhrenfurth to intervene on Miller's behalf. Worried about the glaciologist's health, and the fate of the expedition if his foot took a turn for the worse, Dyhrenfurth asked climbing leader Unsoeld to get one of the physicians down to Base Camp to examine Miller's injury. On April 16, eleven days after the accident, Dingman finally descended to Base Camp, where he discovered that Miller had broken all five of his metatarsals.[406]

The varied consequences of Miller's injury illustrated a common problem facing AMEE researchers: at the barren periphery of knowledge-production, the extreme environment had destabilized the practices of place that they had tailored to Mt. Everest by undermining objective detachment, debilitating practitioners, and distracting and displacing assistants. As they had done in their role as assistants to Siri, the physicians once again demonstrated the tensions between their medical obligations and desire to climb Earth's tallest mountain, or, as Dyhrenfurth said: "isn't it ridiculous that we have

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[406] Dyhrenfurth diary, TS, 115.

three MDs and all of them are such ambitious climbers that nobody has offered voluntarily to come down to Basecamp to look at Maynard's foot?"[407] Those ambitions were also shared by glaciological assistants Bishop and Prather, whose early forays on the mountain cost Miller's program some of its much-needed manpower, and, in turn, forced Miller to rely more heavily on Sherpa support.

Most of the Americans had summit ambitions, including all of the research assistants and two principal researchers, Emerson and Bishop. Even Dyhrenfurth, who set out from Kathmandu without any pretenses toward Mt. Everest's summit, had his ambitions stoked when the body of his assistant cameraman refused to acclimatize; he rationalized that someone needed to try to capture motion pictures from the summit, and if Doody could not acclimatize, then he would have to go much higher than he had originally planned. The nature of climbing an 8000-meter peak like Mt. Everest meant that those would-be summiteers needed to progressively climb higher and higher on the mountain to induce enough acclimatization to be physiologically prepared for a summit attempt. Additionally, their performance at altitude during the weeks leading up to a summit push would determine whether or not they were chosen by Unsoeld and Dyhrenfurth to be on one of the summit teams.

The men pursuing these objectives were lent impetus by an ambitious timeline laid out by Dyhrenfurth on April 5. After returning to Base Camp from the Western Cwm, Dyhrenfurth "gave the straight dope" to the team about his plans to have the mountain climbed by May 1 so that the expedition could get back home: "If we have the

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[407] Ibid.

men, the strength, the logistics, and keep supplies flowing to the shock troops, let's try for it earlier; the sooner we get back to Kathmandu, the better... let's all work together, sahibs and Sherpas, work hard, carry heavy loads every day. Let's climb the damn mountain and get done with it."[408] This push for an early summit not only pressured Bishop, Emerson, and Prather, who wanted a chance at summiting, but also their colleagues who needed more time and access to complete their data-collection routines. Those who were able turned their eyes toward the summit, while those who were injured, overburdened, or inexperienced faced a new challenge: how to accelerate their programs to keep up with the climbers' successes. They could not just redesign the space from the ground up, as they might in a laboratory for simulations. Nor could they bring in additional equipment or manpower, as they might in a field site that was not so far on the periphery. They could only adapt to the site, or let their projects perish.

[408] Dyhrenfurth diary, TS, 102.

CHAPTER SIX: "CLIMB THE DAMN MOUNTAIN!" PRECISION, OBJECTIVITY, AND PERSONAL INTEREST

In the previous chapter, we explored how after just two weeks at Mt. Everest, the environment compromised the carefully-planned, disciplinary practices that guaranteed the production of reliable scientific knowledge. Chapter Six continues the previous narrative, emphasizing the scientists' pragmatic transition from those original plans toward actionable solutions. In the process, they counted on a character of toughness that complements the style of objectivity and precision characterized by science historians Lorraine J. Daston and Peter Galison as the epistemic virtue, "trained judgment," which by the 1960s was in its heyday.[409] As their machines malfunctioned and their bodies failed, AMEE scientists relied on their intuition and experience to adapt the materials and methods that they had at-hand to the environment in order to produce and observe desired phenomena. Pursuing these modifications was not always motivated by strictly scientific interests; many of their actions were unquestionably motivated by personal interest (rather than ambivalence or disinterestedness), and they felt that those actions improved the quality and quantity of data collected. Just twenty years after Robert K. Merton included disinterestedness as one of the institutional imperatives of modern science, AMEE scientists contravened that norm for the benefit of their projects.[410] As a result, they add an additional layer to Daston and Galison's "collective history" of the

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[409] Lorraine J. Daston and Peter Galison, *Objectivity,* (Brooklyn, New York: Zone Books, 2007), 314.
[410] Robert K. Merton, "Science and Technology in a Democratic Order," *Journal of Legal and Political Sociology,* Vol. 1 (1942): 115-126. This article's reprinting in 1973 indicates the persistence of its contents.

normalization of scientific objectivity, and a preceding, complementary case to Ian I. Mitroff's 1974 examples of counter-norms to the Mertonian scientific *ethos*.[411]

As seen in Chapters Two and Three, when AMEE scientists designed their projects before leaving the United States, they did so according to disciplinary norms while accounting for the extreme environment as best they could. In Chapter Five, we saw how scientific research in the high Himalaya became "personal to its core" when the environment's contingencies turned lethal.[412] AMEE scientists were aware of the "deep personal character" of their work, because they knew from Breitenbach's experience that simply standing in an otherwise-innocuous place for too long could have fatal consequences for themselves or their friends.[413] Now, we will examine how severe environmental contingencies combined with the scientists' empathy for their test-subjects and a sense of self-preservation to undermine the "impersonal character" that was requisite to scientific universalism.[414] The extreme environment is yet again the culprit; facing contingencies that were unfamiliar in type and degree, AMEE scientists had to intuit their programs up the mountain while safeguarding their well-being and the welfare of the men who accompanied them, and maintaining some semblance of professional objectivity and precise measurement. Conducting research became an *ad hoc* process that required manly virtues for its practitioners to deploy their trained judgment.[415]

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[411] Daston and Galison, "The Image of Objectivity": 82. Ian I. Mitroff, "Norms and Counter-Norms:" 579-595.
[412] Mitroff, "Norms and Counter-norms": 580.
[413] Ibid. See Chapter Eight for further discussion of the scientists' reflexivity toward the personal nature of their conduct at Mt. Everest.
[414] Robert K. Merton, *On Social Structure and Science*, Piotr Sztompka, Ed., (Chicago: Chicago University Press, 1996), 269
[415] Whereas Merton located the impersonal character of science in the norm of universality, to synthesize the counter-norm of emotional investment with Daston and Galison's notion of "trained judgment" at Mt.

SCIENCE MOVES UP

With Dyhrenfurth's new timetable to finish the climb by May 1, there was a sense of urgency among the men still at Base Camp to get into the Western Cwm if they wanted to play any part in the summit push. On April 6, Lester made his second foray into the Icefall from Base Camp. This time accompanied by Will Siri, who had finished his first round of testing and was packing his equipment to relocate to Advance Base Camp, Lester succeeded in climbing to the Icefall dump, about two-thirds of the way to its upper terminus. According to Jerstad, who heard about the climb over the radio at Advanced Base, their "dash to the dump" had almost ruined Lester. The physical and mental challenges of vigorous activity at extreme altitude, which included surmounting the sheer wall of ice that entombed Breitenbach's corpse, was still too much for the psychologist. He and Siri returned to Base Camp later that afternoon.

Siri finished packing his mobile laboratory and ascended to the Western Cwm on April 8. By April 9, he was in Advance Base Camp, setting up his equipment to continue his physiological studies. That day, Emerson decided to try his luck at high altitude again; after two days at Base Camp, he felt strong enough to try to return to the Western Cwm. He escorted Jim Lester to Camp I in what was an eight-hour climb for both men. The other ambulatory Westerners at Base Camp--Dyhrenfurth, Doody, Col. Roberts, and Auten--followed Emerson and Lester up in short order, leaving Miller in charge of activities at Base Camp. Prather took over Auten's radio duties while Noddy, the liaison

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Everest in 1963, we follow Barber, Storer, and Mitroff's lead by considering the idea of emotional neutrality as a separate norm for 20th-century scientific research. See Mitroff, "Norms and Counter-norms": 580, fn. 2.

officer from Kathmandu, organized logistics for Annalu Sherpa's Icefall team. Except for the two glaciologists, all AMEE researchers and test-subjects had ascended to above the Icefall.

Lester was "tremendously bushed" after his ascent to Camp I. He described the ordeal in a handwritten letter to Ullman that indicated the effect of the extreme space upon the psychology of a man who hoped to research that very phenomenon in his colleagues:

> Let me tell you something: I was scared stiff of the whole damn icefall, and sat around Base Camp a whole week...debating with myself whether I could bring myself to try it and realizing with some shock that I really care quite a bit about living -- When I finally did it, by the time I reached the ladder I was so exhilarated to be through it that the ladder itself seemed nothing more than a 'ride' at an amusement park -- it gave me no more than a pleasant (imagine that! I was out of my head!) thrill, and I stopped several places on it while Emerson took pictures. I almost feel a 'certified mountaineer'.[416]

Lester's letter illustrated the intimately personal character of conducting research in a setting as extreme as Mt. Everest. Having to ascend through the Khumbu Icefall in order to stay in contact with his test-subjects, Lester was subject to the same psychological forces that terrorized them: being "scared stiff," and "car[ing] quite a bit about living." Once he overcame those forces and got through the Icefall, he strongly identified with his test-subjects, which would lead to further complications concerning his professional mandate to remain emotionally detached; although he did not explicitly identify his response to those forces as the subject of his study--which it was--his behavior again raised questions about his ability to carry out his research in the dispassionate,

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[416] James Lester to James Ramsey Ullman, dated May 8, 1963. JRU Papers.

disinterested manner required by his profession. Lester, influenced by the same environmental stressors as his subjects, found himself inadvertently drawn into a disposition better suited to an ethnographer than a psychologist.

By the time Lester, Emerson, and Siri arrived at Advance Base Camp it had already been lived in for over a week. Bishop, who had spent much of that time ranging above Advance Base Camp pushing a route toward the West Ridge, called it a place of "comparative luxury." Its luxuries came in the form of group mess tents with hot meals prepared by either Danu Namche or Nima Dorje (depending on which of the two Sherpas was not load-carrying to higher camps at mealtime), spacious accommodations in four-man tents usually only occupied by two climbers at a time, and a feeling shared amongst the men that they were at last "on the mountain doing something" toward the success of the expedition. Its location at the bottom of the Valley of Silence meant that it offered stunning views of the fluted, rocky face of Everest's West Shoulder, the crevasses and pressure ridges of Lhotse's glaciated face, and the jagged peaks of Nuptse, all of which rose at sharp relief 1300 to 2000 meters above camp. Because Advance Base Camp served as the confluence of supply lines from Base Camp, the West Ridge route, and the South Col route, it was an exciting place for climbers and researchers. Bishop felt that the "infinite variety of interesting people" who passed through camp made its inhabitants "never at a loss for stimulating conversation." When they were not talking, the men were writing letters home, reading from the expedition's library of paperbacks, or tinkering with and repairing equipment.[417]

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[417] Bishop interview with McDade, TS, BCB Papers.

These luxuries were offset by the realities of sustained living above 6500m. Far from the "fantastic morale backdrop" of Base Camp, where the men could count on two regular radio broadcasts with Captain Andeel at the Hotel Royal in Kathmandu every day, Advance Base Camp's occupants felt out of touch from their lives beyond the Himalaya.[418] Cloudy weather on the researchers' first two days in camp combined with hypoxic stress to induce lethargy amongst some of the group. Appetites dwindled, coughs persisted, and sleeping for more than an hour or two at a time was impossible. For Lester, being higher on the mountain meant he did not move much or far--he was not trained for glacier travel, nor did he feel fit enough to move beyond Advance Base Camp. For Siri, living in the nexus of the climb was a welcome distraction from his research routines. For Emerson, the oxygen lack meant vomiting, nausea, and further destabilization of crucial components of his research methods.

During his time in and above Advance Base Camp, Emerson discovered a significant problem with his "recorded group discussion" routine that required him to improvise new data collection methods to save his project. His Minifon magnetic tape recorder, upon which he had planned to record test-subjects' stimulus responses during group "bull sessions," was nonfunctional in the extreme cold. Without an audio record, Emerson had to track the course of group conversations by hand--difficult to do in the cold. This practice was an even greater challenge because the authenticity of his data relied on his test-subjects being unaware that the sociologist was inserting pre-planned stimuli into their conversations to observe their reactions. To make matters worse, he

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[418] Ibid.

discovered that the amount of radio communication devoted to logistic coordination amongst the team left little room for his recorded radio communication routine. Even though his Walkie Recordall operated smoothly down in the Base Camp radio tent, capturing all of the expedition's radio traffic, Emerson was unable to devote energy or airwaves to provoking the environmental assessments of faraway subjects via the expedition's walkie talkies.[419]

These problems meant that Emerson had to keep track of what he saw and heard first hand during his time in the Western Cwm, a demanding task at 6507m even for a person not suffering from acute mountain sickness. When Emerson was presented with an opportunity to insert "stimulus-statements" into the natural course of discussion with his teammates at Advance Base Camp, and above, he designed the statement on the fly to convey either optimistic or pessimistic information. For example, during a conversation about the team's chances to summit Mt. Everest, Emerson inserted optimistic statements, such as: "We have a real good time-jump on the mountain," and, "We're about a month ahead of any previous expedition on this mountain." These statements provoked replies from Emerson's teammates ranging from positive feedback: "Uh huh--and the weather hasn't been terribly bad. I expected worse," to negative feedback: "Sure, but we have a bigger job. It's how we use the time."[420] Emerson discretely scribbled these responses into his notebook, hoping that his subjects would not notice his conversational engineering.

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[419]Richard M. Emerson, "Mount Everest: A Case Study of Communication Feedback and Sustained Group Goal-Striving," *Sociometry*, Vol. 29, No 3 (Sep., 1966): 220.
[420] Emerson, “Mount Everest: A Case Study:” 223.

Emerson's participant-observer routine also encountered significant problems. Since returning to 6500 meters, the sociologist had fallen back into the pattern of nausea, coughing, and vomiting that he had been fighting since Lobuche. After a week of struggling simply to survive at Advance Base Camp, he realized staying at altitude was making him weaker, not stronger, so he elected to descend back to the relatively thick air of Base Camp. On April 15, he went down with Bishop, Girmi Dorje, and Dr. Dingman, who descended to diagnose Miller's injury. Dyhrenfurth watched as the foursome departed Advance Base Camp, noting how Emerson was so weak that "it took him hours to get ready...just to get his few things together and put them in the pack." Dyhrenfurth and Dingman had to help Emerson put on his crampons, and when they fell off his feet a few meters from camp, Jim Whittaker had to run down to strap them back on Emerson's boots.[421] Emerson's ill health had prevented him from participating or observing his test-subjects on the frontiers of the high routes above Advance Base Camp, and now it further truncated his ability to execute his participant-observer routine during the buildup to the impending summit push.

Emerson's recorded group sessions had been disrupted by mechanical failures. The tape recorders he intended to deploy would not function in the sub-freezing temperatures, thereby compromising the precision of that data-collection routine; without an audio record of his test-subjects' responses to verbal stimuli, Emerson feared he would lack sufficient context to quantify the content of those responses. So, he abandoned attempts to use the tape-recorders above Base Camp in favor of using his expertise to

[421] Dyhrenfurth, diary, TS, 115-116.

intuit the character of his comrades' responses *in situ*. This decision exemplified the use of trained judgment in lieu of mechanical reproduction as a response to environmental contingencies. Although his original design preferred mechanical reproduction, and he continued to record bull sessions at Base Camp, Emerson had no problem relying on his previous experience working on similar problems in similar environments (i.e. Masherbrum in 1960) to devise a routine that functioned at colder elevations. In the new routine, he asserted that his mental and physical fortitude could withstand the conditions that ruined his machines. In this case, the Apollo astronauts who asserted their spaceflight competence by switching off computer-controlled autopilots were acting upon the same masculine values that motivated Emerson.[422]

Unfortunately, his inability to acclimatize thwarted even this workaround. He had to retreat from the uppermost camps, where the variables he wanted to study were most pronounced. That meant that his test-subjects' self-administered data collection routine--their sociological diaries--were Emerson's best shot at returning from Mt. Everest with enough useful data from which to draw conclusions. Unfortunately, even the sociological diaries ran up against an altitude-induced problem as their authors ascended higher on the mountain: user fatigue. Whereas his AMEE teammates had begun the expedition filling out the diaries without complaint, in the subsequent weeks the novelty had worn off, such that by the time the expedition had reached the Western Cwm some of the men were lax

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[422] Historian David A. Mindell wrote "Astronauts' accounts continually reaffirm that what it means to be a man is related to control and interpret threats to pilots' control as threats to their manhood." See David A. Mindell, *Digital Apollo: Human and Machine in Spaceflight*, (Cambridge: Massachusetts Institute of Technology, 2008), 13-15.

in their obligations to Emerson's project. This lassitude was exacerbated by the thin air of high altitude, which made even the simplest task into an enormity. As a result, some Emerson's subjects skipped days, only to fill them in later, while others developed a sardonic attitude toward the daily ritual. Tom Hornbein illustrated the latter response in a post-expeditionary account that characterizes how he and his fellows thought of the diary assignment while on the mountain:

> The diary was part of [Emerson]'s research into motivation and our response to everything from weather to each other's annoyances. Each book was indestructibly constructed and emblazoned with our names in gold; no matter which crevasse we might try to leave one in, a smiling Sherpa face would always appear: 'You lose book, Sahib?' We were asked to pour forth our most evil thoughts and fondest hopes in an impersonalized numerical scale a computer could ultimately sink its transistors into. Our emotions were all to lie within a range of minus 5 to plus 5. We had to appraise weather past and future, rate each other's irritability, evaluate the climbing difficulties and dangers today and tomorrow, gauge our physical condition (weak-strong), our enthusiasm for the various routes, and estimate the chance of success.[423]

Hornbein's prose suggests resistance to some of the parameters established by Emerson for self-reporting (e.g. carrying the diary on one's person at all times, the narrative assignments, and the +5/-5 numerical scales). It also represented a degree of good-natured ribbing from Hornbein, who was himself a professional scientific researcher, toward his friend's attempts to categorize and codify social behavior. While such resistance did not totally undermine the self-reporting routine, it could obstruct the precision of its data. Emerson's decision to trust his own ability to control for the intermittent resistance of his test-subjects represents another instance where his

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[423] Hornbein, *The West Ridge*, 108-109.

masculine reliance on trained judgment took priority over automation or mechanical reproduction.

Whereas the scientific program's test-subjects were fatigued by Emerson's daily diary entries, they loathed Siri's invasive physiological testing. His encampment at Advance Base Camp on April 9 had negative repercussions on the morale of his test-subjects, some of whom had celebrated their early arrival above the Icefall as salvation from "Will's bloodsucking."[424] After setting up his lab on April 10, and helping a tremendous caravan consisting of Whittaker, Nawang Gombu, Jerstad, Pownall, Corbet, and fifteen Sherpas carry supplies to Camp III on the South Col route on April 11, he started physiological tests upon whomever he could lay hands around camp. One of his first subjects was Lute Jerstad, whose description of Siri's tests exemplifies their impact upon the morale of AMEE's climbers: "Siri has been giving us a series of exercise tests to determine pulse rate and blood pressure. These tests have revealed that we can hold our breath for only 12 seconds at this elevation. It feels awful. It feels as if all the years of strength and endurance are being drained into a thimble. What a terrible sensation."[425] Beside the exercise tests, Siri intravenously drew blood from his subjects, a process that took multiple hours such that at least one climber noted he had been walking around Advance Base Camp all morning with a needle in his arm.[426] After four days of testing reluctant subjects, Doody brusquely characterized the physiologist's activities on April 15: "Siri still playing with Chemicraft set. Step tests to metronome. Centrifuge for blood:

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[424] Barry Corbet, diary entry dated April 2, 1963, TS, JRU Papers.
[425] Jerstad, *Everest Diary*, 92.
[426] Whittaker diary, April 16, TS, JRU Papers.

small generator... test tubes."[427] Hornbein recalled tongue-in-cheek that Siri's tests "invariably" occurred on cold, windy days, during which he would "ask us to strip down to our string underwear, then complain when he couldn't read the oscillations on the dial of his bathroom scale because we were shivering so hard. 'Just take the extremes and average them, Will,' I suggested."[428] Nobody was thrilled with the tests at Advance Base Camp--not even Siri, who recorded in his sociological diary that he was more interested in helping with supply carries to Camp III from April 19 to 23.[429]

Like Emerson, Siri's submitted himself to the extremity when his machines broke down, and his trained judgment took over when the environment caused his mechanical safeguards to fail. Watching the dial swing back and forth, he intuited the reading and recorded its value in whole pounds. His actions superseded the old ideal of "mechanical objectivity," because the best guess of an experienced physiologist was more precise than a failing instrument or his test-subjects' perceived weight-gain or -loss. Beyond his complaints to Hornbein, Siri was not perturbed by these events; just as Daston and Galison insisted that their mid-20th century atlas-makers made a capacity for individual interpretation a component in the regulatory principles for the production of a scientific image, in Mt. Everest's extreme environment trained judgment was inculcated with masculine toughness to prevail over traditional ideals of precision and objectivity. The men felt that they had to submit themselves to the elements to bear witness to their

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[427] Doody diary, April 15, TS, JRU Papers.
[428] Hornbein, *The West Ridge*, 106.
[429] Siri, Sociological Diary entries April 18-23, cards 58-63, Emerson Papers.

experiments. Had they not, Siri and his colleagues might have abandoned their projects one by one as they probed higher on the mountain.

CLIMBERS PROGRESS

The conditions faced by the researchers' test-subjects were also difficult, but that was all according to plan; Emerson, Lester, and Siri were all relying on difficult, stressful conditions in order to test their hypotheses. In his post-expeditionary account of this stage in the climb, Ullman wrote that although the specific problems that the climbing researchers and test-subjects had to overcome varied from day to day, route to route, and pitch to pitch, "the overall pattern was the same."[430] In the camps above the luxuries of Advance Base Camp, those difficulties began early each morning with "the struggle of simply getting up." In the cold mornings, thin air, and cramped quarters, unzipping sleeping bags to pile on additional clothing over the sweaters and pants worn for sleeping was a breathless affair. Making breakfast was no easier, as numb hands fumbled with can openers, matches, and pots full of ice and granulated snow to be boiled into water. Although boiling, the men could scarcely use the water to warm themselves since the boiling point at 7000 meters left the water tepid. After eating and drinking as much allowed by their stomachs, which were squeamish from the altitude, those who intended to move between camps turned to lacing their boots, pulling on their outer layers of clothing, and preparing their oxygen apparati. Once outdoors, they strapped on their crampon bindings, roped up to one another, hoisted their backpacks and oxygen bottles,

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[430] Ullman, *Americans on Everest*, 134.

adjusted their masks and regulators to the appropriate oxygen flow (between one and three liters per minute depending on the terrain), and hefted their ice axes. On a typical morning of good weather around 7000 meters, these preparations took about two hours, and left the climbers as breathless as they would be had they spent that time climbing rather than tying shoes and eating porridge.[431]

Then, as Ullman put it, "up, up, up. The kick-kick-kick of boots in steep snow. The whack-whack-whack of the ax in steep ice, where steps cannot be kicked."[432] Each step cut into the ice with the adze of the ice ax needed to be carefully scraped clean and level to afford a stable platform for the climbers coming up behind. Obstacles encountered on the route, from headwalls to bulges in the steep snow to simple switchbacks, needed to be negotiated carefully. The climbing leader--a role often played by Bishop--would move up alone, a few feet to a few inches at a time pausing for as long as a few minutes to decide his next move. Then, kicking with crampons and digging in with ice ax, he made the move, perhaps driving an anchor into the ice or rock above to clip to the rope at his hip. Once the route was established, all of its traffic--both test-subjects and the scientific data they embodied or carried--would pass along that rope. In the meantime, the lead climber halted on the opposite side of the obstacle to belay his climbing partner through the terrain.

As they continued upward, the midday sun warmed their bodies from above, and its reflection on the snow and ice, below, redoubled its effect. The climbers, numb with cold hours before, began to sweat, overheat, and dehydrate. They would stop to undress

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[431] Ibid.
[432] Ibid., 135.

their outer layers and stow them in their backpacks. But, if the sun was hidden by a passing cloud, the dry air again turned frigid. Bodies that were hot with sweat were suddenly refrigerated by it. Windy conditions exacerbated that process, freezing sweat, mucous, and whatever drinking water the climbers brought in their canteens. Dehydration became even more apparent as throats parched and arms, legs, and backs ached from chopping, kicking, and hauling.

Unless an early descent was dictated by the weather or faulty oxygen equipment, or the men were climbing up to a camp that had already been established, sometime after midday they had to decide when to turn back. "Most of the mind and body yearns for the turning, for the surcease from struggle, for the bliss of downhill," Ullman wrote, "but, strangely, there is a part of both that wants still to go on; to see what is beyond that next wall or bulge or corner; to push up another fifty feet, a hundred, two hundred until--what? Until it is dark? Until one sits down, lies down, in the snow and that is that? No. The turn is made. The way leads down."[433] Down-climbing was so much easier than ascending that climbers turned off their supplemental oxygen flow, however, it still presented dangers associated with mental and physical fatigue. Steps cut into the mountainside were obscured by falling snow, waning daylight made the path difficult to follow, and tired legs and core muscles made footing treacherous. In their exhaustion, climbers characterized the mountain as an enemy during this time, "and evil thing...waiting to kill again."[434] By the time they returned to their tent in the evening, most simply wanted to lay down and not move.

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[433] Ibid., 135-136.
[434] Ibid., 136.

Unfortunately, reaching camp did not mark the end of the day's toils. On climbing days, tents that were left behind in shambles needed to be restored to order. If weather had come in during the day, tent anchors needed to be checked and re-secured, and their doors and walls needed to be dug out of snowfall. Inside, air mattresses, sleeping bags, oxygen gear, clothing, cooking utensils, and food were upturned and spread across the small floor space. Dinner needed to be made and consumed, even though climbers rarely had any appetite, and its preparation often made the mess inside the tent even worse. Liquids needed to be thawed and drank, oftentimes by the gallon because the climbers had not had the opportunity to hydrate since morning. Beds were made, gear set aside for the next day's activity, and sociology journals were extracted from the bottom of rucksacks. By the time that the exhausted climbers undressed their outer layers and zipped themselves in sleeping bags, the teas, juices, and soups had created an urgent physiological need. According to Ullman, men in that state had three choices available: "There is a plastic urinal that can be used in the bag--and spilled. There is a hole in the flooring of the tent, specifically designed for this purpose--but it is covered over by food boxes, clothing, oxygen bottles and a sleeping companion. There is outdoors--where it is 20 below, the wind is wailing, and a false step will mean a 2000-foot plunge to extinction."[435] Simple, necessary tasks ranged from inconvenient to dangerous; even sleep did not offer respite from the hazards of high altitude, where avalanches, pulmonary edema, and cerebral edema strike fatally and without warning.

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[435] Ibid.

Above Advance Base Camp, AMEE climbers were required to breathe supplemental oxygen during resting hours. As both an important control in Siri's physiological study, and a normal practice for most post-war Western mountaineers on Mt. Everest, it necessitated that men wear their rubber oxygen masks while trying to sleep. Combined with persistent hypoxia, the mask caused a suffocating sensation that frequently woke slumbering climbers, one of whom described it as "gulping for air" inside an "aquarium."[436] Sometimes, sleeping pills could alleviate this insomnia, however, often they would not. As a result, the higher men climbed, the more restless their sleep.

After each fitful night, the climbing test-subjects began the entire process all over again, managing matters of efficiency, risk assessment and management, thermoregulation, and fatigue. The locale's steep topography and extreme elevation magnified these otherwise mundane affairs into life-or-death decisions. On the Lhotse Face and Everest's West Shoulder, the stress-inducing perils upon which AMEE researchers had counted when designing their experiments shaped the behavior and experiences of their test-subjects. The higher those subjects ascended, the more they exposed themselves to those forces as the mountain's elevation defined what was, and was not, possible.

The West Ridge climbers learned that lesson first hand while route-finding above the West Shoulder on April 12. Hornbein, Unsoeld, and Bishop pushed beyond the previous West Ridge high point of 7437m, toward the rocks at the base of Everest's bleak

[436] Dick Pownall, TS, JRU Notes, JRU Papers. Also quoted in Ullman, *Americans on Everest*, 136, 141.

summit pyramid, which appeared devoid of snow. The ridge was both too steep and too narrow maintain a sustained, direct climb at that altitude. So, the trio veered north onto the West Buttress directly below the West Ridge, and into the People's Republic of China. The glaciers and plains of Tibet stretched out below them as their route returned toward the south. Having completed the Expedition's first foray into China, they rejoined the West Ridge around 7650m, whereupon they established Camp 4W at the foot of Everest's horn on a broad level platform of snow that was large enough for several tents. From that small plateau, the ridge thrust upward toward the mountain's pinnacle in a jagged line of rotten rock; there was no clear path to the top, but the West Ridge threesome remained hopeful that a route could be created. They descended back to Camp 3W that afternoon.

The next day, Whittaker, Nawang Gombu, Girmi Dorge, and Passang Temba pushed their own route up the Lhotse Face to establish Camp IV at 7590m. On April 16, Jerstad, Pownall, Chotari and Nima Tenzing broke trail and fixed anchors all the way to the South Col, with the Sherpas independently scouting the best route into the Col. The foursome anchored what supplies they had in their packs in the Col at an elevation of 7985m, establishing Camp V 863 vertical meters below the mountain's summit. AMEE had reached this major milestone over a month earlier than the British in 1953 or the Swiss in 1956.

During the final two weeks of April, most of the expedition's manpower and materiel was directed toward establishing high camps on the South Col route. Bishop, who had initially helped establish a route up the West Shoulder after arriving at Advance Base Camp in early April, turned his attention to the South Col after he received a letter from Melvin Payne at NGS that directed Bishop to maximize his chances of reaching the summit. This left the West Ridge short four climbers--Breitenbach, Emerson, and Dingman due to aforementioned unforeseen circumstances, and Bishop due to professional obligations. Al Auten, who had unhappily haunted Advance Base Camp for a couple weeks because his responsibilities as communications officer had precluded him from consideration for one of the summit teams, ascended the West Shoulder with Barry Corbet and a gas-powered winch hoping to use technology to alleviate the shortage of labor. Hornbein and Unsoeld assisted Auten and Corbet, when needed, with the temperamental winch. Meanwhile, on the South Col route, two teams of Sherpas shuttled oxygen, food, and fuel to the highest established camps. Below them, those rated as possible assault team members, including the Sherpas Nawang Gombu, Ang Dawa, and Girmi Dorje, kept Camp III stocked with supplies carried from Advance Base Camp. Above Camp III, the rest of the team stocked the South Col's high camps in preparation for the imminent summit push, completed their daily diary entries, and urinated into plastic bottles for Siri's study. On his return from a trip to the South Col, where he had collected rocks for Miller, Jerstad recorded his feelings as Siri's test-subject: "Last iron turnover study by Siri. Good to have blood-letting and poking over with." Regarding this, and his duties as an impromptu assistant glaciologist, he wrote: "Anything for science!"[437]

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[437] Jerstad, April 21, JRU Papers.

THE SUMMIT PUSH

With trail broken to the South Col, Dyhrenfurth set the summit date for May 1, contingent upon the daily weather reports received from New Delhi. The climb was divided between two, four-man assault teams. Jim Whittaker and Nawang Gombu would spearhead the push on one rope, with Dyhrenfurth, Ang Dawa, and their cameras following on a second. One day behind them, the second assault team of two ropes--Jerstad and Pownall, and Bishop and Girmi Dorje--would follow to support the first climbers if necessary. If Whittaker et al. were in good condition on their descent, then Jerstad's group would make for the summit themselves. Behind the second assault team, Siri and Dingman would provide additional support from Camp IV, high on the Lhotse Face. From there, they could launch their own assault on Lhotse, Earth's fourth-highest peak, provided AMEE's Everest assault teams did not require additional support.

As climbers and Sherpas prepared the high camps on the South Col route, AMEE's researchers continued their work in the lower camps. Accompanied by Emerson, Bishop had returned to Base Camp on April 15 to recuperate for the summit push and to visit with his wife, Lila, and her small team who were conducting a botanical survey of the Solu Khumbu for NGS. Prather, who had been collecting samples of glacial ice around Base Camp, was dispatched to Camp I by Miller on April 21. Although Miller's foot was still bound, he felt that between his Sherpa assistants and his hobbling, he could manage Base Camp observations for the time being. Lester continued to both meet with his subjects as they passed through Advance Base Camp, and solicit their ratings of each other for his project on acquaintance. Siri, too stayed in Advance Base Camp conducting exercise tests and blood analysis, and helping to carry supplies to Camp III.

It had been over two weeks since any major injuries when, on the evening of April 21, the locale's extremity incapacitated another test-subject. Dan Doody, who until that point had spent more time inside a tent than outside due to poor acclimatization, complained of a pain in his leg whilst at Advance Base Camp. Dr. Roberts was present at the time, and he diagnosed it as thrombophlebitis. A blood clot had formed due to Doody's chronic immobility, and there was a risk that it might break off and find its way to his heart. Doody was put on anti-coagulants and instructed to move as little as possible for the next seven to ten days, at which point he would be escorted down to Base Camp's safer altitudes. For Doody, who was supposed to be Dyhrenfurth's high altitude cameraman, the expedition was effectively over. Although Siri, Emerson, and Lester were down one more test-subject, they could take heart that their remaining cadre were under an additional source of stress; even Dyhrenfurth, who had spent more time on expeditions to high altitude than any of his teammates, had the risk of blood clots on his mind following Doody's incapacitation when he happily noted in his April 23 diary that the day's carry to Camp III were vigorous enough to "prevent lazy blood and blood clots from developing."[438]

It was on that day's carry to Camp III that Dyhrenfurth noticed Siri was having difficulty hauling his load. Like the rest of the team that had spent multiple weeks at Advance Base Camp's elevation, Siri had lost a tremendous amount of weight. He had begun to realize that he was not in "as good condition for high altitude climbing" as he originally thought he would be.[439] His misgivings were exacerbated by the afternoon's

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[438] Dyhrenfurth, diary, 126.
[439] Ibid., 134.

return trip to Advance Base Camp. Weather had come in. Hard snowfall and fogged glasses hindered visibility and hid the Western Cwm's crevasses, some of whose depth exceeded 60 meters. By the time Siri made it back to his tent-laboratory, he was exhausted. For the next three days, he chose to stay inside working on physiology rather than brave the storm.

The same storm pinned two other researchers inside their tents in the Western Cwm. Emerson and Prather had moved up to Camp I earlier in the week, both intending to journey higher before the storm disrupted their plan. Emerson was on his way up to Advance Base Camp for the third time, hoping his body was better prepared for the higher altitudes of the Western Cwm and his friends' camps on the West Ridge. Prather, who had been directed by Miller to perform research on the Upper Khumbu Glacier in his stead, was preparing to repeat observations made at Camp I in the region of Advance Base Camp.

As of April 22, Miller was uncertain he would even make it up to the higher reaches of the Western Cwm before the expedition departed the Everest massif, so he entrusted Prather with several research-related activities to be conducted on the Upper Khumbu. Prather was directed to select sites for theodolite stations and transect lines for glacier profiling, set up meteorological observatories, find an accessible crevasse with an adequate number of strata for the extraction of glacial ice, and take the glacier's temperature. For the five days Prather was at Camp I, he accomplished only the last of these tasks; from April 21 to 24, he hiked to a site a few hundred meters south of camp, operated a hand auger to bore holes eight meters into the rock-hard ice, deep enough to place a thermistor. An electronic resistor designed to be particularly affected by temperature, the thermistor and recording device Prather installed in the Upper Khumbu near Camp I would allow Miller to track the glacier's core temperature. On April 26, Prather accompanied Emerson on the hike up to Advance Base Camp to repeat the process at a new site, when his plans were disrupted by a plot hatched by AMEE's climbing leader, Willi Unsoeld.

When Prather arrived at Advance Base Camp, Unsoeld approached Dyhrenfurth about "borrowing" the assistant glaciologist to partner with Dr. Dingman on the support rope in lieu of Will Siri, whose stamina had begun to flag. Prather, whose immense strength had earned him the nickname *Balu*, the Sherpa word for "bear," had proven himself as a climber and a reliable teammate, and he seemed better equipped to climb the Lhotse Face than Siri, who had a difficult time even at the base of the 1675-meter Face. When weighing Unsoeld's idea, Dyhrenfurth admitted that Dingman and Prather had a better chance of summiting Lhotse if they were given the opportunity. The decision made, Siri descended to Base Camp with the hopes that he might later go to the South Col to support a West Ridge traverse, while Prather happily prepared his kit to ascend when the weather allowed. Instead of keeping Prather in the Cwm, thereby allowing him to continue his glaciological projects, Dyhrenfurth deployed him in a climbing role. Prather would ensure the safety of the two summit assault teams, and, perhaps, enhance the expedition's profile by climbing Mount Everest's closest neighbor.[440]

On April 27, the storm that had halted movement on the mountain broke momentarily, and the men went up. Dyhrenfurth, Ang Dawa, Whittaker, and Gombu

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[440] Ibid., 134.

ascended to Camp III, accompanied by thirteen Sherpas with oxygen canisters and other supplies to stock into the high camps.[441] On the 28th, they left for Camp IV, while Bishop, Girmi Dorje, Jerstad, and Pownall, moved up to Camp III. On the 29th, the first assault team occupied Camp V on the South Col, the second team moved into Camp IV, and the rearguard of Prather, Dingman, Phu Dorje and Chotari climbed to Camp III. By the evening of April 30, Whittaker's team sited Camp VI at 8367 meters on the southern side of Mt. Everest's summit pyramid. They set down their backpacks and spent two hours carving a platform on the ice-covered ridge with the adzes of their ice axes to hold the two two-man tents. Bishop's team camped in Camp V's tents on the South Col, and Prather found himself hunkering down at 7590m on the Lhotse Face, over 3200 meters higher than the camp he had occupied during Project Crater on Mt. Rainier three years before.

When the South Col was reached for the first time in 1952 by the Swiss, they called it "the most desolate place on Earth." Dyhrenfurth had originally proposed placing a nuclear-powered weather observatory in that place back in 1961, and Bishop had planned to carry out solar radiation observations from its glaciated surface. On the night of April 30, however, the South Col's extremity was so harsh that it barely allowed human survival--what one of Bishop's climbing partners called their "brief trespass"--much less the erection of scientific instrumentation:

> My fingers are stiff as clothespins. I can hardly push the pen. The wind continues to howl. It sounds hideous. It sounds like the moaning of a

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[441] One Sherpa turned back before reaching Camp IV. Above Camp III, *sahibs* climbed on three liters-per-minute of supplemental oxygen. The Sherpas climbed without supplemental oxygen until they moved above Camp IV. Above IV, the eight Sherpas who were selected to carry all the way to Camp VI used oxygen, while the four who turned back at Camp V did not.

> dying man. Inside, the hiss of the stove and oxygen tubes is lost in the roar of the gale. The storm is really punishing us now. Several times it has all but lifted our tent off the ground. Man does not conquer such a mountain as Everest, but is permitted by God to trespass only for a brief time. Not only do physical elements defeat him, but he defeats himself as well...There's a strange almost hypnotic lure about this icy rim of the world, and now that I am up here I feel as though I know something about the mysteries of myself. It gives me an insight I've never felt before. It makes me feel very close to eternity.[442]

From the plateau outside the tent, the second assault team could see the approaches to the summits of both Mt. Everest and its subsidiary peak, Lhotse, which, if everything went smoothly for the first two summit teams, Prather would climb with Dr. Dingman in two days' time. The South Summit of Mt. Everest, which stood about 90 vertical meters below its true summit, looked "rather ominous" with a "huge plume of snow" blowing from its cap. In the opposite direction rose "the stark rocky fierceness of Lhotse...with those three gendarmes or rock towers...Lhotse looked like a mean mountain, not that Everest looks very friendly from the Col, because when you reach the Col you think, 'Gee, here I am 26,201 feet high,' and then you look up and there's another mountain on top of a mountain. That's Everest."[443] Somewhere above the South Col, about halfway to the South Summit, Dyhrenfurth's summit team bedded down early in the rising storm, hoping to strike for the summit early on May 1. Dyhrenfurth's selection to lead the final pitches, the confident and competent Jim Whittaker, wrote in his sociological diary that night: "Tomorrow I will do it."[444]

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[442] Jerstad, *Everest Diary*, 106.
[443] Dyhrenfurth, diary, TS, 147.
[444] Whittaker, card 70, Emerson Papers.

Far below, in Camp IV, Prather wrapped himself in his sleeping bag for the night. The following morning, he hoped to ascend to the South Col, from whence he could lead his rope with Dingman to Lhotse's summit. Instead, he awoke on May 1 feeling ill and lethargic. His breath was shorter and more labored than what he expected at that elevation, such that Dingman had to leave him bedridden when he departed to deliver extra oxygen canisters to Camp V through heavy weather. As Dingman climbed with Phu Dorje and Chotari, the weather turned worse. They ascended the Lhotse Face in dangerous conditions. High winds whipped snow into whiteout, a weather condition during which visibility and contrast are so restricted that there is no discernable horizon, and both orientation and orienteering are nearly impossible. Just below where the route crossed the Geneva Spur, Dingman prudently chose to withdraw back to Camp IV. He and his Sherpa companions stashed a precious supply of oxygen as high up the route as they could manage before descending. By doing so, they saved the life of the man that they left behind.

Upon returning to Camp IV, Dingman, "found [Prather] was not feeling any better and, in fact, was sitting up and seemed to be in some distress while breathing...and although he made light of his illness, some questions again as to how he really felt caused some alarm." Dingman took Prather's pulse, which was 140 beats per minute, "certainly alarming for a man who had been lying in a sleeping bag all day." It was evident to Dingman that the young glaciologist had been stricken by high altitude pulmonary edema (HAPE), an altitude-induced illness that can quickly kill if left untreated. Although not fully understood, it was believed to occur when increased capillary pressure causes an increase in the permeability of the lungs' alveolar wall. This, in turn, causes lung capillaries to leak fluid into the alveoli.[445] Dingman immediately put Prather on one liter-per-minute supplemental oxygen, and "administered intravenous and intramuscular injections."[446] Prather's symptoms subsided, but he could not remain at altitude without supplemental oxygen.

Prather was familiar with HAPE, and the danger it can pose to would-be rescuers. On Mt. Rainier in 1959, he had "sat up all night one night on the summit...with a friend who had Pulmonary Edema [sic]. He died at 3 am, that was at 14,000 feet [4267m]."[447] In an attempt to airlift emergency supplies to the Project Crater site, two men died in an airplane crash. Prather knew he needed to descend as soon as possible, forsaking his glaciological duties in the process. He spent one night at 7950m on supplemental oxygen before walking down to Advance Base Camp the following day; a journey that normally took three and a half hours took Prather seven. Prather's condition was the second major setback for Miller's glaciological program. He would have to stay below the Khumbu Icefall or else risk a relapse of HAPE. He could no longer conduct research in the Western Cwm in Miller's stead, his personal aspiration to climb Lhotse was dashed, and he could not fulfill his role as a member of the second assault team's support party.

As it turned out, the inclement weather that inadvertently saved Prather's life by driving Dr. Dingman back to Camp IV also prevented Bishop's summit assault team from leaving the South Col on the morning of May 1. By the time evening rolled around, Bishop and his comrades had climbed a short way up Everest's summit pyramid in an

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445 Charles Houston, M.D., et al. *Going Higher: Oxygen, Man, and Mountains* (Seattle: The Mountaineers Books, 2005), 135-150.
446 Dave Dingman, audio tape transcript dated May 5, 1963, Bishop Papers, NGS Library.
447 Prather, handwritten letter to JRU dated May 8, 1963, JRU Papers.

attempt to establish vocal communication with Dyhrenfurth's team, above. The walkie-talkie radios would not function in the storm, and they were concerned for the first summit assault team's health. Had they ventured into the storm? Had they made the summit? Did they have enough oxygen to withstand another night at 8367 meters?

It was about seven o'clock in the evening when Dyhrenfurth heard these shouted voices coming up from below. He and Ang Dawa had recently returned to Camp VI from an extraordinary day that saw them carry motion picture cameras to approximately 8600 meters, and their compatriots Whittaker and Gombu stand triumphant atop Mt. Everest's summit. They had ascended the summit arm-in-arm, whereupon Whittaker unfurled and planted an American flag. When the duo made it back to Camp VI, Ang Dawa had dried beef, a can of peaches, and warm tea and bouillon ready for them. Dyhrenfurth and Ang Dawa felt "terrific" with the success, however, the exhausting day and thin air sapped vigor from their festivity.[448] All four men just wanted to descend, but daylight was fading. Indefatigable Gombu left the tents to shout replies to Bishop's party: they made the summit. They likely did not have enough oxygen to last the night, but they would stay anyway.

INTERIM

The first assault team returned to the South Col on May 2, where only a handful of full oxygen containers remained. Utterly spent, they were escorted down the Lhotse Face by Bishop's team. Whittaker and Gombu blew doggedly into Advance Base Camp

[448] Dyhrenfurth, diary, 159.

late on May 2. Awaiting them were "a joyful welcome, hot drinks, all the food they could eat," along with, "a special treat, their first chance in almost a week to contribute to Will Siri's blood and urine collection," with Dr. Roberts collecting the samples.[449] On May 3, Dyhrenfurth and Ang Dawa plodded into Advance Base Camp escorted by Drs. Dingman and Roberts. Just above Camp, to Dyhrenfurth's surprise, Lester had set up the Arriflex motion picture camera on a tripod and was "filming the arrival of the 'gladiators' from the heights of Everest...[wearing] a reversed cap, sort of like an old-time Hollywood cameraman."[450] The psychologist had taken up Doody's task after Dyhrenfurth's assistant had been forced down to Base Camp by thrombophlebitis. Unfortunately, Lester was not a trained camera operator, and had forgotten to insert the appropriate conversion filter for the Kodak film, so the resulting shot was slightly blurry with a blue hue. Once in Camp, Dyhrenfurth made his own donations to Siri's repository of frozen blood and urine. His and Whittaker's samples were especially important to Siri's research, since they had both spent two nights at Camp VI, and had respectively climbed to 8848 and 8600 meters in what Siri supposed were extraordinarily stressful conditions.

When the news of the first assault team's success finally reached Base Camp, Miller celebrated the victory with Siri, Noddy, and the handful of Sherpas who were present. Nearby, the West Ridge acolytes Hornbein and Unsoeld rested in their tent. Hornbein's recollection of Miller's reaction to the successful summit attempt illustrated

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[449] Ullman, *Americans on Everest*, 205. Jerstad recorded Roberts participation in his diary dated May 2.
[450] Dyhrenfurth diary, 164. Lester continued as film crewman later in the expedition, manning the Perfectone to record sound during Dyhrenfurth and Doody's sync-sound shooting in Base Camp on May 15.

the ongoing rift between the glaciologist's need to make up for lost time and the ambitions held by the men who were galvanized to climb:

> As we lay in our bags, thinking of the future, we could hear [Miller] talking in the mess tent, fifty feet away. "Now that the mountain is climbed we've got to put our major effort into research" he said. [Siri's] softer reply was lost in the night breeze. Willi and I were suddenly alert. We turned around on our air mattresses and slid our heads out the vestibule of the tent. The lantern on the table in the mess tent cast silhouettes of the tent's three occupants on its red-orange wall. We watched and listened attentively, picking up only tantalizing snatches of conversation.[451]

Later that evening, as Miller prepared for bed, he wrote in his sociology diary that he wanted to "concentrate very heavily on [glaciological] program now that summit has been achieved." His foot was not yet well enough for him to venture from Base Camp, especially laden with requisite instrumentation. And, when Prather arrived back at Base Camp on May 4, Miller ordered him to avoid strenuous work for ten days, which precluded him from research activities at the field sites around Base Camp. For his part, Prather just hoped he that he would recover quickly.

The summit push had cost Miller more than just his longtime assistant; Kancha Sherpa had been one of eight porters who had helped Dyhrenfurth's assault team set up Camp VI at 8367 meters. He had already carried to the South Col once before, and the long days of hard labor took their toll. After returning to Base Camp following his carry to Camp VI, Kancha developed a kidney infection. He was no longer fit to assist Miller, much less carry loads up the mountain.

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[451] Hornbein, *The West Ridge*, 121.

Miller was not the only AMEE scientist frantically trying to complete his fieldwork in the aftermath of the successful summit bid. According to Dyhrenfurth, Siri's physiological research worked him "practically day and night," so much so that the physiologist had no hope of fulfilling "his great desire" of climbing to the South Col.[452] Instead, he reestablished his lab-in-a-tent at Base Camp, continued testing the blood and urine samples he had collected from the American climbers in the Western Cwm, and recorded his companions' physical adaptations to the locale. One adaptation he recorded, subject weight, had a detrimental impact on expedition morale because it served as a regular reminder of their physical deterioration. By May 6, the average individual weight-loss among Siri's 16 American test-subjects was 12.2 kilograms. The six scientific practitioners had lost a combined 73.9 kilograms, but no one was more affected by the physical and psychological consequences of rapid weight-loss than sociologist Dick Emerson. Having lost 21.7kg, nearly a quarter of his total pre-expedition bodyweight, Siri found that the sociologist had "deteriorated best."[453] By the time AMEE started gearing up for a second crack at Mount Everest's summit, many of its scientific practitioners were so dilapidated that the risks associated with prolonged exposure to extreme altitude had grown to life-threatening proportions. Emerson, Bishop, Miller, Lester, and Siri would each have to measure their continued commitment to their projects' successes against the lives of the men in the field.

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[452] Dyhrenfurth, diary, TS, 183.

[453] Figure for Emerson's weight-loss from Will Siri, *Physiological Studies*, 35. Emerson is Subject M. Hornbein characterized Emerson as the man who "deteriorated best" during the expedition on page 106 of *The West Ridge*, where he also described Emerson's battle with altitude-induced malnutrition.

CHAPTER SEVEN: SCIENCE IN EXTREMIS

The previous chapters explored some of the nuances associated with conducting scientific research in the hostile environment between Base Camp and Advance Base Camp, including the destabilization of research methods, objectivity, emotional detachment, precision, and professional identity. This chapter follows the scientists' and their test-subjects' efforts to conduct research and collect specimens on Mt. Everest's summit ridges, where reality-testing's "testing" components endangered both observers and observed, and matters of survival completely displaced scientific practices. Here we will find instances where AMEE's researchers could not adapt their programs and practices to the environment. Despite their best efforts, AMEE researchers and their proxies could not easily transport science above Advance Base Camp, which resulted in a number of programs being abandoned. In light of these obstructions to the production of scientific knowledge, we see how Mt. Everest dismantled the scientists' previous conception of it as a space in which scientific knowledge could be made and propagated. Returning to David Livingstone's conceptualization of scientific places as spaces that are "made" by the activities that "'take place'" within them and "the human practices that constitute them," the events of this chapter illustrate how the mountain was *unmade* as a place suitable for contemporary scientific research.[454]

As the team's climbers contemplated a second summit assault, its scientists knew that they were running out of time. For the scientists still operating high on the mountain, the frustration of early failures combined with the expedition's looming departure to

[454] Livingstone, *Putting Science in its Place,* 85-86.

motivate increasingly perilous acts. Three of its six scientific practitioners planned to take advantage of the continued access to the Western Cwm provided by AMEE's mountaineers. Miller, Bishop, and Emerson all had further business above the Khumbu Icefall. While Miller had a tremendous backlog of research to catch up on following his injury and Prather's illness, both Bishop and Emerson still harbored summit aspirations. For Bishop, that meant standing atop Mt. Everest for the benefit of his *National Geographic* story by whatever means possible. For Emerson, whatever time that he could spend high on the unclimbed West Ridge route observing his compatriots' encounters with uncertainty would benefit his observations of their social interactions, and he believed that the higher he climbed the route the more significant their uncertainty would become. If only he could get up on the Ridge.

EMERSON'S ORDEAL

Emerson was frustrated that his body had not accommodated his desire to help the West Ridge effort. Although he pursued his various research routines where possible, his focus on the climb in many ways superseded his interest in his research program. This attitude was present from mid-April, when he was confined to Base Camp by his altitude-induced digestive ailments while the main buildup was underway on the South Col route to support Whittaker and Gombu's summit push. Most of the expedition's Sherpas were directed to help supply the South Col effort, which meant that the West Ridge team had to rely on the expedition's two temperamental gas-powered winches, and the more reliable, but difficult to operate, hand winch. Emerson expressed annoyance that Prather, "being the most talented man with temperamental engines, nevertheless was assigned to [climb] Lhotse. I didn't understand the reasons for this." Emerson was not upset that Prather's assignment to Lhotse doomed him to a bout with HAPE, thereby curtailing AMEE's already-crippled glaciological research program; instead, he felt that Prather's assignment demonstrated that "the West Ridge effort was of very little concern to anyone" except him and his four friends who were working to establish the route.[455]

One of Emerson's compatriots characterized the West Ridge effort as "a small expedition" out of Advance Base Camp that was "divorced pretty much from the larger operation of the Col."[456] As part of this expedition-within-an-expedition, Emerson spent much of his time isolated from the majority of his test-subjects, which demonstrated his preference to contribute to the West Ridge climb and conduct research on its personnel rather than their fellows pushing the South Col route. This made sense, considering his research focused primarily on the effect of the "uncertainty" on small-group communication and sustained goal-striving, and the never-attempted West Ridge was a more uncertain quantity than the recently-climbed South Col. Nevertheless, given his poor acclimatization he could have remained in Advance Base Camp, like Lester, and directed his research from that location. That he did not was testimony to his dedication to the route and its besiegers, and it demonstrated his willingness to endanger himself to benefit his research and his friends.

For these reasons, Emerson continued to help his friends on the West Ridge. While Hornbein and Unsoeld recovered their strength in Base Camp, he operated winches from Camp 3W with Corbet, Tashi, and Pemba Tenzing to keep the West Ridge

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[455] Emerson, TS of audio recording, ND, Bishop Papers.
[456] Hornbein, TS of audio recording, Bishop Papers.

route supplied for what everybody hoped would be a push for the summit, although no line above Camp 4W had been reconnoitered, and 4W itself was nothing more than an empty snow platform. Unfortunately for Emerson, the winches proved troublesome for three reasons. First, the hand winch was so difficult to operate that it took the strength of four men to turn its pulley. Emerson, Corbet, Tashi, and Pemba Tenzing served as the hand winch crack team out of the supply dump between Advance Base Camp and Camp 3W, but, even with their combined force, hauling loads with the winch was a time-consuming process. The supply dump's position was particularly exposed, which led Emerson and Corbet to feel that the more time that they spent there, the higher the risk of accident by rockfall or avalanche. As they operated the hand winch on May 2, it started to snow "rather vigorously, and without much wind," which raised concerns about their staying put "in what might be an avalanche trap."[457] Their fears were realized the following day, when Passang Temba and Urkien's tent was swept away from the supply dump during a surface slide, Sherpas and all.

Emerson's second problem with the winches was also generated by the oxygen debt at 7000m. Because operating the hand winch was so laborious, the West Ridge crew would have preferred to use either of its motor-driven winches. Unfortunately, the extreme cold and low oxygen levels prevented the motor-driven winches from firing. Emerson and Corbet spent seven days in early May trying, and failing, to get the motor-driven winch running. On the eighth day, Al Auten arrived with a can of ether taken from

[457] Emerson, TS of audio recording [prior to June 1 1963], Bishop Papers.

Siri's physiological kit, which he poured directly into the winch motor's air intake. The motor fired, and was usable for several days before the starter cable snapped.[458]

Both hand winch and motor winches frustrated the West Ridgers for an additional reason: their loads, which were affixed to several snow skis, consistently got stuck on the West Shoulder's steep topography, or toppled into its crevasses. This meant that one or two men needed to escort each load as it was winched up the West Shoulder. On one occasion, Emerson spent 45 minutes in a crevasse below the supply dump retrieving a fouled winch cable. It was enough time to familiarize the sociologist with that crevasse's location and topography, which would prove useful when the worst storm of the entire expedition struck just a few days later.[459]

After nearly two weeks of winching, Pemba Tenzing fell ill, and could no longer assist in the operation of the hand winch. He descended to Advance Base Camp, leaving only three men left on the West Ridge effort. Without a fourth man to heave the hand winch, and with the motor-driven winch inoperable, Emerson and Corbet, who hoped to have a shot at traversing Mount Everest's summit via its West Ridge a day behind Hornbein and Unsoeld, followed Pemba Tenzing down to Advance Base to recuperate for a few days. Meanwhile, the third man, Al Auten, ascended to 3W to help Hornbein and Unsoeld stock higher camps for the imminent summit push.

Emerson and Corbet arrived at Advance Base Camp on May 12. Believing that he might partner with Corbet to traverse Mt. Everest sometime in the next ten days, Emerson concentrated on the climb ahead, rather than on his sociological study. On May 13 and

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[458] Unsoeld, TS of audio recording, ND, BCB papers.
[459] Tom Hornbein, TS of audio recording, ND, BCB papers.

14, however, Emerson had "the RUNS and TROTS" while at Advance Base Camp.[460] His gastrointestinal distress left him weakened on May 15, which was when he was supposed to advance to Camp 3W with Corbet. On the slopes below the supply dump, he told Corbet to go on ahead to meet Hornbein and Unsoeld, while he reluctantly returned to Advance Base Camp. That night, he was "exceedingly anxious because the West Ridge, if it was going to move at all, was going to move in the next few days. And if I missed out now it would be forever so far as seeing the mountain from the highest slopes were concerned." Emerson's anxiety to "break out of base camp and get up where the action was taking place" dictating his decision-making over the following 48 hours.

The night of May 15, Emerson stuffed himself with protein in the hope that he might recover enough strength to try for Camp 3W again on May 16. The following morning, he set out alone for 3W. Dyhrenfurth had expressly forbidden climbing solo for the duration of the expedition, indeed, he had radioed Miller on the morning of May 16 to instruct Emerson to descend to Base Camp, however, his instructions came too late. Emerson was already on the slope, travelling as light as possible to maximize his chances of making the Ridge. To save weight, he carried neither lamp nor sleeping bag to move as quickly as his deteriorated body would allow in the thin atmosphere, an act that increased risk of death by exposure if he was caught between camps after nightfall.

As afternoon waned, it became evident to Emerson that he could not make it to Camp 3W before sunset. Worse, wind and clouds had begun to brew on the slopes above. He was confronted with a dilemma: he could turn back to Advance Base Camp and

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[460] Emerson, TS of audio recording, ND, BCB Papers.

effectively end his role in the climbing portion of the expedition, or he could bivouac for the night, and continue upward the following morning. Knowing the location of a small cache of supplemental oxygen, and that he was not far from the crevasse below the supply dump from which he had extracted a winch cable the week before, he elected to try to bivouac. He reasoned that sleeping on supplemental oxygen would protect him from frostbite, and that the crevasse walls would reduce his exposure to the storm that had begun to blow. He did not account for the fact that the crevasse transected an area that he and Corbet decided was an "avalanche trap" the week before, and that the wind and snowfall conditions amplified the probability of a slide occurring. Instead, he tied a piece of rope to a picket anchored in the glacier, and "rappelled into the dark hole as light was failing. About thirty feet down, the crevasse closed to four feet wide, plugged with powder snow."[461] Emerson redistributed the powder by shoveling it with his hat until the gap was sufficiently clogged with snow for him to stamp down a sleeping platform. He had to work by feel in the dark, taking off his gloves to short intervals to adjust his oxygen system, prepare the two canisters of oxygen he had brought with him, inflate his air mattress, and remove his crampons.[462] When he finally lay down to try to sleep around 10 p.m., the wind direction changed to blow parallel to the crevasse. It deposited snow atop Emerson, which insulated him against the windchill and provided him with "a considerably warm and quite comfortable night."[463]

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[461] Hornbein *The West Ridge*, 135-136.
[462] Emerson, TS of audio recording, ND, BCB Papers.
[463] Emerson, TS of audio recording, ND, BCB Papers.

The site of Emerson's clever, if somewhat desperate, bivouac safeguarded him against a storm that nearly annihilated his teammates sleeping above at Camp 4W. Winds exceeding 160kph ripped two tents, filled with Corbet, Auten, and four Sherpas, from their anchors to send them sliding down the West Ridge's northern slope toward the Rongpu Glacier, 1800 meters below. They dug their fingers into the floor of the tent, hoping to claw a hold into the snow beneath as it sped by. After a few moments, the slide became a roll, as both tents and their contents tumbled down the mountain. 45 vertical meters later, the tents came to a gradual stop in a depression on the slope. Auten climbed from the wreckage back up to the tent that housed Unsoeld and Hornbein while the other five men remained behind as ballast for the "chaos of torn canvas, jutting poles, scattered gear."[464]

Auten, Hornbein, and Unsoeld descended into the storm to anchor everything that they could at the site of the broken tents, below. The men inside weathered the gale as best they could while Auten returned with Hornbein and Unsoeld to their two-man tent, squeezing into the shelter to protect themselves against the freezing wind. After daybreak, Corbet and the four Sherpas retreated to Camp 3W, while Auten, Hornbein, and Unsoeld only withdrew to 3W after making a narrow escape from their tent as it tore free from its anchors and blew away.[465]

A few hundred meters below, Emerson awoke to find the wind blowing drifts of snow so thick that they blocked out the sunlight. Once he emerged from the crevasse, he

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[464] Ullman, *Americans on Everest*, 224.
[465] Hornbein, *Everest: The West Ridge*, 140-141.

was fully exposed to the storm, and he found climbing against the wind "almost impossible." He could move "only between gusts."

> During gusts I had to drive my ax in all the way and hold myself by literally clinging to it. Once, even while I was doing this, the wind suddenly changed direction, caught me off balance, and knocked me sideways off my feet, blowing so powerfully that I sailed horizontally, instead of downward, across a 30-degree slope.[466]

He arrived at 3W around 10 a.m., where he spent the morning planning his next move. Unaware of the previous night's events at 4W, Emerson believed that he needed to get to 4W soon if he was to have any hope of roping with Corbet as a second summit assault team, much less put himself in a position to conduct his participant-observer routine during the hours most crucial to his studies on group goal-striving.

His summit hopes were dashed when the eight men from above trekked into camp on May 17. Emerson was surprised to see them, and, upon hearing their story, instantly realized that "the wind had literally blown away a second [summit] team or any hope of one when it blew away Camp 4W."[467] Hornbein, Unsoeld, Corbet, and Auten were just as surprised to see Emerson. They knew he had set off from Advance Base Camp the night before and not returned. To find him alive and well at Camp 3W heartened his comrades at a time when the success of their endeavor looked bleak. Indeed, Emerson's story of climbing light with his camp on his back--a practice that would later take hold in the Himalaya as "alpine style" mountaineering--may have inspired the plan Hornbein concocted in his tent later that night. Leaving aside his dashed summit aspirations, Emerson's long trek to 3W allowed him to observe the West Ridge team at the moment

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[466] Ullman, *Americans on Everest*, 222.
[467] Emerson, TS of audio recording, ND, BCB Papers.

during their months-long excursion when uncertainty of success was highest. Emerson's tremendous motivation to climb Mount Everest would have afforded his participant-observer routine its best data, although he did not have a functioning tape recorder to capture the occasion.

Camp 4W had been demolished by the wind. Its tents were broken and tattered, its supplies were strewn across the northern slope below its site, and the West Ridge team had neither the time, materiel, nor manpower to reoccupy 4W and place both 5W and 6W on the unreconnoitered route, above. With their limited resources, Hornbein knew that when 4W blew away, so too did the West Ridgers' ability to support a four-man push to the summit. But, with careful rationing of oxygen, and a revised itinerary comprised of two men climbing light, without siege-style support, he calculated that the men at Camp 3W could put a two-man team in position to traverse Mt. Everest's summit by the time Bishop and Jerstad set out from the South Col on the other side of the mountain. Even Hornbein thought that his plan was "a long shot," but it was also their "only chance."[468] Unsoeld and Hornbein got permission from Dyhrenfurth to try on May 18, and recruited Emerson, Corbet, Auten, Ang Dorje, Passang Tendi, Tenzing Nindra, Ila Tsering, and Tenzing Gyaltso to help replace Camp 4W and carry over 600 vertical meters up unseen terrain, without supplemental oxygen, in the hopes that they might find a suitable site for Camp 5W.

On May 20, 4W was reoccupied. The next day was Emerson's last day of climbing. In the morning, he asked Hornbein what the purpose of his presence was for

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[468] Hornbein, *The West Ridge*, 144.

the day's climb, since he was not fit to carry a load or make precise sociological observations. Hornbein replied that they had "three very inexperienced Sherpas whose performance we could not be sure of at all, and if any one of them folded he would be required to take their load, and carry on." So, Emerson accompanied the caravan up a feature called the Diagonal Ditch and over downsloping rock slabs on a traverse into Tibet that took them to the foot of a steep snow gully. The gully, which had been named Hornbein Coulier a few days before, was the end of the line for Emerson.

All of the Sherpas had climbed marvelously, impressing the *sahibs* with their strength, endurance, and good nature. With the Sherpas performing strongly, and Emerson flagging, he realized that he could not fulfill the task that Hornbein had set out for him at the beginning of the day. He halted at the base of the Hornbein Couloir, looked out over the mountains and glaciers of Tibet, and considered his role on Everest "essentially complete."[469] Hornbein and Unsoeld had torn a few blank pages from their diaries so that they could transport Emerson's study over the top of the mountain without having to carry its heavy, bulky diaries. As the summit team ascended the Hornbein Couloir, it moved beyond the purview of Emerson's participant-observer routine. Perhaps more germane to Emerson in that moment, his role as a mountaineer on Mount Everest was over. He descended to Camp 4W when Auten, Corbet, and the Sherpas returned to the bottom of the Couloir. The following day, May 23, he withdrew to Advance Base Camp.

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[469] Emerson, TS of audio recording for Ullman, ND, but before return to Kathmandu, BCB Papers.

MILLER IN THE WESTERN CWM

Unlike Emerson, who continuously pushed his limits hoping that he would break through his acclimatization troubles, Miller eased himself back into his work. It had been 33 days since an unstable boulder broke his foot when, on May 8, he decided he would attempt a glacial traverse of the Lower Khumbu with his seismic equipment. Prather, who was stir-crazy from laying around Base Camp after his HAPE encounter, defied doctor's orders to accompany Miller for the day. Miller was so far behind schedule that he did not protest Prather's reckless exertion, and their successes on the glacier that day gave Miller the confidence to range farther from camp on May 9. With Angayle and Lakpa Sherpa, he hiked to the base of the Khumbu Icefall both to test his fitness for a trip to the Upper Khumbu Glacier and to perform additional seismography. On May 10th, despite rating his enthusiasm for climbing as "obsolete" in light of his injury, Miller finally ascended the Khumbu Icefall into the Western Cwm.[470] As ever, trusty Angayle was by his side.

At Camp I, Miller ran into Lester and Dr. Roberts, who were finally returning to Base Camp after almost a month above 6500m. They were both spent, with Lester feeling particularly antsy, having "hardly moving outside a 50-yard radius" for the duration of his stay in the Cwm. Just before his trip back down to Base Camp, he had written a letter to Ullman, expressing that he felt "good and bored, and ready for the stimulation that only new people and places can bring. I am eager as hell to get back to Kathmandu and on with the trip!"[471] Although Lester may have exaggerated his sense of boredom for Ullman's benefit, since the writer was unable to make the trek to the Everest massif, the

[470] Miller, sociology diary card for May 10, 1963, Emerson Papers.
[471] Lester, handwritten letter to JRU dated May 8, 1963, JRU Papers.

psychologist had simply run out of things to do. Seven of his test-subjects had already descended to Base Camp, and they had no intention of returning to the mountain's high camps because their bodies were deteriorated from prolonged exposure to high altitude. Lester lacked the technical skill, fitness, and gumption to follow the imminent summit assaults on what would likely be their most stressful venture. He felt he had completed as much field research as possible, so down he went.

Miller's glaciological program, however, had taken on a tone of urgency by the time he awoke for his first morning's work at Camp I. With a foot that still felt weak, and without Prather or Kancha, Miller took advantage of anyone who passed through camp. On May 12, that was Bishop and Jerstad on their way to Advance Base Camp, and thence to the mountain's summit. After spending the night with Miller, they decided to postpone their ascent by a day to help the glaciologist on the 13th. Bishop described the scene at Camp One:

> One was a rather deserted spot. Maynard was trying to do some glaciology, some collection of ice samples at various depths in a crevasse wall for several types of tests and he was far behind in his glaciological program because of the bad luck he had experienced breaking a foot, so Lute and I...spent most of the day helping Maynard fix a 75-foot wire ladder down over the lip of a crevasse so he could work the face... Maynard hung precariously at various points on his ladder as he began his work collecting these specimens.[472]

Hanging over the crevasse, Miller used his ice ax to strip off the outer six inches of surface veneer from each stratum to extract fresh material from well within the crevasse wall. From each stratum, he chopped out as much as he could to ensure that each sample

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[472] Bishop, interview with McDade, TS, BCB Papers.

represented as much of a whole stratum as possible. The very uppermost and lowermost sections of each stratum were not sampled to prevent contamination from the older and younger segments below and above. He collected the ice samples in a cardboard box lowered from the lip of the crevasse by a rope. Once full, trusty Angayle hauled the box to the top of the ledge where he would transfer the ice samples into an aluminum bucket. Miller rinsed the bucket between collections to keep it as sterile as possible to avoid contaminating his specimens. The bucket was taken inside a small, two-man tent pitched near the crevasse, where the ice was transferred into an aluminum pail for melting. The pail was also rinsed between melts, and all men avoided handling the ice with either bare hands or gloves, instead transferring it from one container to another via "jiggling and pouring techniques."[473] Once melted, Miller poured the water into a sterile polyethylene bottle for subsequent transport from Mt. Everest to Dr. Libby's laboratory at UCLA via Kathmandu.

Miller described the entire process as "arduous," particularly "trying to toe-in with crampons while hanging on this vertical wall and with 5 broken bones in my left foot."[474] The procedures required a degree of precision and meticulous care that Miller could not achieve on the Upper Khumbu Glacier's higher crevasses, or its *bergschrund* up on the Lhotse Face, especially without supplemental oxygen. The glacial specimens that he collected at Camp I were the highest he could hope to acquire, however, he gave Bishop a small canvas bag and directed his erstwhile assistant to obtain samples of rock from Mt.

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[473] Miller, "Khumbu Glacier Ice Samples -- Mt. Everest 1963: Preliminary Notes by M.M. Miller", Siri Papers, 2.
[474] Ibid., 1.

Everest's summit ridge. Bishop agreed to take the bag, but neither man suggested that he take a pyrheliometer to measure solar radiation at the South Col. Both men understood that a summit assault was no time to be fussing over complex instrumentation, regardless of the promises Bishop had made to the sticklers on National Geographic's Committee for Research and Exploration.

On the afternoon of the 13th, Bishop and Jerstad left Miller to hike up to Advance Base Camp. Although they were headed up, Jerstad assured Miller that Dr. Dingman would pass through Camp I in a few days, and he could assist Miller with his ladder work in the crevasse. Miller was again alone with his Sherpa assistants and their crevasse, however, he felt no need to wait for Dr. Dingman. For the next three days, Miller hung over the crevasse with the assistance of Angayle, Will Siri's orderly Pemba Tenzing, the young mess boy Ang Norbu, and the level-headed Phu Dorje.[475] Over the course of four days, these three Sherpas helped him make 22 trips into the 25-meter crevasse to collect and melt an equal number of one-gallon samples from the layers of glacial strata.[476] Each venture over the side carried with it the risk of a fall, but there were no alternatives. The Everest Massif--especially the Upper Khumbu--was too remote to deploy a mechanized ice drill. The crevasse provided immediate access to a specimen of glacial strata Miller believed would work in lieu of the Mingbo crevasse Dr. Libby had spotted for his study, and so he was willing to take a calculated risk to acquire Dr. Libby's ice samples.

By May 17, Miller had all the ice samples that he needed, and so he prepared to ascend to Advance Base Camp to survey the Upper Khumbu's movement stakes.

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[475] Miller, sociology diary May 14-16, cards 84, 85, and 86, Emerson Papers.
[476] Miller, "Khumbu Glacier Ice Samples," 3.

Unfortunately, Miller's program suffered yet another setback that morning when Angayle began coughing up and spitting blood whilst out on the glacier at about 6250m. The tall, smartly-dressed Sherpa had never been so high before. Fearing HAPE, Miller directed him to descend to Base Camp. Up to that point, Angayle had assisted Miller more often than either Prather or Kancha, however, with the onset of illness, his short tenure as a scientific practitioner had ended.

Miller arrived at Advance Base Camp on May 17 with Pemba Tenzing and Phu Dorje. Once there, he radioed Prather in Base Camp to dispatch the young assistant to the Mingbo Valley, a full day's trek along the trail back toward Kathmandu. Miller hoped that by having Prather conduct a geological study of the area for the remainder of the expedition, they might salvage portions of the truncated research program.[477] After two months at high altitude and a close call with HAPE, however, Prather's motivation had deteriorated. Even though he felt physically fit, it took him three and a half days to pack his instruments, such that he did not depart for the Mingbo until May 21. Pownall, Gombu, and four porters accompanied him.

While Prather languished with lethargy at Base Camp, Miller was "feeling great" in the Western Cwm. Five and a half weeks of forced rest in Base Camp's relatively thick atmosphere meant Miller felt fresh, even if his foot still pestered his fitness. Working on the glacier east of Advance Base Camp with Pemba Tenzing and Phu Dorje, he

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[477] Dyhrenfurth, diary, 171-172. Dyhrenfurth believed that Miller needed to visit Mingbo to collect ice samples for Dr. Libby, whose interest in AMEE had been originally generated by a photo taken in Mingbo during the Silver Hut expedition. However, Prather's activities in Mingbo did not include collecting ice samples for Dr. Libby, perhaps since Miller had already begun collecting samples in the Western Cwm that apparently dated prior to 1954, or perhaps because the strata photographed in 1960 was no longer accessible by spring, 1963.

commented on how the surrounding mountains were "beckoning, challenging, invigorating, and exalted." No longer did he characterize Mt. Everest as an antagonist that needed to be subdued. Instead, he was the last AMEE researcher who was still engrossed by the space of inquiry and his work within it.

With the expedition's withdrawal date set for May 22, Miller needed to have his work completed in in the Western Cwm by the time Bishop and Jerstad returned from their ascent; Col. Roberts had joined Miller at Advance Base both to support the final summit push and to coordinate the extraction of materiel from the Western Cwm. With Col. Roberts running the day-to-day logistics of camp, Miller focused on obtaining gravity traverses of the Upper Khumbu Glacier south-southeast of Advance Base that would correspond with gravity profiles made on the Lower Khumbu at Lobuche and around Base Camp, and thus provide him with a more complete picture of the Khumbu Glacier's anatomy. He also obtained ice samples from the top two stratum of the Upper Khumbu Glacier in an avalanche test pit that he dug near the PVIII transect line above Advance Base Camp at 6705m. Busy as he was, however, he could not keep his thoughts from straying to the men, above. Hopefully, they had a bag full of rocks for him; more importantly, they had become his friends. On May 21 and 22, he recorded his hope "for success of both summit teams on their respective assaults" and for good weather.[478] He had spent the past two days on the Upper Khumbu completing the highest transect line that he possibly could, still a vertical kilometer below the glacier's source, and two below the summit. On May 22, the day that the teams were supposed to meet atop the

[478] Miller, sociological diary entries May 21 and 22, cards 91-92, Emerson Papers.

mountain's summit, he traded his theodolite for a pair of binoculars, stood outside his tent in Advance Base Camp, and scoured the upper slopes of Mt. Everest for any signs of life.

A GEOLOGIST ATOP EARTH'S THIRD POLE

AMEE had been in the field for over three months by the time the second summit push began--time enough for mental and physical hardship to take its toll. Bishop's description of the culmination of enduring mental and physical fatigue applied equally to all of the researchers who suffered physical ailments in addition to psychological stress:

> One thing that always goes through your mind, particularly before a big effort like this, you wonder whether you are going to hack it or not. You're so afraid that tomorrow you may just be finished and for me it was really a great worry. I was upset about it because all the desire the world was there but there was a constant worry that I might crumble. Another thing that bothered me was that my rib cage was hurting. I had to be careful breathing you see, and coughing hurt… at Base Camp I got sinusitis, which increased the coughing, so initially I was on penicillin at that time and it wasn't doing any good and I was feeling that I was beginning to weaken… anyway I was hoping that the sinusitis and the ribs wouldn't stop me… That's one side of what was going on in my mind. This fear, I mean literal fear that I physically was going to clobber.[479]

Fear generated by Bishop's sense of self-preservation and extreme physical hardship were not normally encountered in the course of his previous scientific research. Bishop, whose coughing fits had torn cartilage and muscle over the floating ribs on the left side of his torso, was motivated by the prestige and professional achievement that accompanied a successful summit bid. His colleagues who had no summit aspirations--Lester, Miller, and to a lesser extent, Siri--confronted similar fears and perils when they ascended the

[479] Bishop, TS of audio recording with McDade in Kathmandu [ND], BCB Papers.

Icefall, or were pinned beneath a boulder. They sacrificed their wellness to conduct these studies, and the higher they pursued science, the more it hurt.[480]

Even when resting in Base Camp, the scientists' health, and thus, their research, was also jeopardized by variables more mundane than the hazards of high altitude climbing. Base Camp was hardly a sanitary place, and local wood carriers, mail runners, and porters carrying various loads constantly came in from villages below. With them came "everyday germs and bugs," to which AMEE men seemed especially susceptible after pushing their bodies to the point of exhaustion at high elevations. According to Bishop, this situation generated an additional psychological phenomena that was exacerbated by their isolation from hospital. Everyone on the team became "a hypochondriac" during the expedition:

> Every slight twinge of muscle or ache of stomach or headache, toothache, anything like this is, to the individual, a major problem...and you go running to the doctor to see if his stethoscope is discovering something or not... I had period of intense aching on the left side of [my] upper chest and, of course, when something like this persists you wonder if the valves in your heart are giving out or if you haven't contracted tuberculosis, if your left lung is going."[481]

Bishop felt his burning "desire to do well on the expedition" and contribute his part to its success--as a climber, NGS photographer, and researcher--heightened his tendencies toward hypochondria. He observed that when he climbed higher, and pressured himself to succeed at any cost, "certain personality changes" took place.[482] Hypochondria was one of these, and it was ironically accompanied by a disregard for personal safety that was

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[480] Ibid.
[481] Ibid.
[482] Ibid.

embodied by Miller when he worked alone out of Advance Base Camp and Emerson when he set out alone for Camp 3W.

As Bishop and Jerstad left for Camp III from Advance Base Camp on May 18, Bishop noted his body had acclimatized to the point that he could hold an extended conversation with Jerstad while moving uphill, which was something he was unable to do the last time they had climbed from Advance Base to Camp III a few weeks before. Although he took heart from the change, it also made him feel that he had reached his "maximum acclimatization," which he understood to mean that from then on his body would undergo "the continued, incessant, ever-present deterioration" from exposure to high altitude.[483] As they climbed higher, Bishop's hyper-awareness to his physiological state and logistical concerns grew. At Camp III, he noted the "massive amount of energy" required to dig the camp out from under a slide of eighteen- to 27-kilogram blocks that had struck the night before and, in one case, sheared off the aluminum frame of a tent. They had arrived at the elevation "where everything counted: the right food, enough oxygen, continued good health...stamina and...staying power."[484]

Climbing the Lhotse Face toward Camp IV, Bishop again noted how much energy he was expending. Through the area that had been covered by an avalanche, the footprints taken by previous travel to Camp IV had been "obliviated." The skirt of snow that covered their track was so deep that Bishop was "literally up to my chin in snow." It took him 45 minutes to "carve a void in front of me" and "pack it down close to my feet

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[483] Ibid. As Emerson soon discovered, voicing negative feedback to positive information, as Bishop did in this case, was a crucial component to his sustained goal-striving.
[484] Ibid.

to make a foundation" just to enter the slide zone. Once there, he likened his work to a "mechanical ditch digger," in that he dug out the area immediately in front of him with the adze of his ice ax, packed the area down, took a step, and then repeated the process. This sort of demanding work precluded whatever scientific commitments he made prior to the expedition; even if he had carried a pyrheliometer from Advance Base Camp to Camp IV, he would have lacked both the strength and wherewithal to assemble and operate it.[485]

On May 20, Bishop, Jerstad, and the Sherpas Pemba Tenzing, Nima Tenzing, and Kalden crossed into the South Col, where they spent one night. The Sherpas were climbing without supplemental oxygen, so when Kalden became ill everyone feared HAPE. However, a long-distance diagnosis by Dr. Dingman over the walkie-talkie, and a penicillin injection administered by Bishop, assuaged the Sherpa's symptoms. The next morning, all but Kalden climbed to Camp VI, where the Sherpas dropped their 31-kilo loads before returning to the South Col. Over dinner in a small, two-man tent that was perched on the ridge below the mountain's South Summit, Bishop and Jerstad discussed their plan to push to the summit on the following day. Jerstad manned the butane stove, cooking their dinner and melting snow to drink. He left it burning even after he and Bishop hunkered down to sleep because he thought "it might be nice to keep warm."[486] Jerstad fell asleep, but Bishop could not. Hypoxia made him feel as though he had "lost control" of his inner ear. "It was the worst night that I had," he later said:

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[485] Ibid.
[486] Jerstad, audio transcript of interview with McDade, BCB Papers.

> "it wasn't just breathing that was bothering me. I was fighting a terrifying claustrophobia and had to suppress a wild desire to break out of the cluttered tent... Lying flat, I felt as if I were at an absurd and sickening angle, and nausea wrenched my stomach... I was quite frightened that this was going to affect our chances of getting to the summit the next day.[487]

Bishop's illness that night, especially his dyspnea, confusion, and restlessness, may have been induced or amplified by hypercapnia resulting from combusting butane in a double-walled, two-man tent zipped up tightly against the nighttime cold.

Early the next morning, while melting water with one butane stove, Jerstad decided to change the spent canister from his makeshift space-heater so that he could cook their breakfast on the second stove. In the process, the stove exploded and filled their tent "with a sheet of orange flame." Bishop, who was wearing his supplemental oxygen sleeping mask, recalled how its "polyethylene bag just disintegrated in the heat taking my eyebrows and beard with it." In "a matter of seconds," smoke filled the cramped tent, leaving the men choking as they first tried to smother the flames with their sleeping bags, and then desperately tried to locate a zipper to escape the fire. Bishop "turned and flopped" on his stomach before crawling to the rear of the tent in an attempt to open a vent via a zipper accessed through the vestibule liner, however, in his anoxic state, the zipper's simple operation was too complex for him to manage.[488]

Meanwhile, Jerstad grabbed hold of the tent fabric in a panicked attempt to rip the tent apart. "The whole thing was just alive with flames," he recalled, "I didn't realize how weak I was."[489] Unable to tear the tent wall, he frantically searched for the entrance

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[487] Bishop, audio transcript with McDade, BCB Papers. Portions of this appear in Ullman, *Americans on Everest*, 244.
[488] Ibid.
[489] Jerstad, TS of audio recording with McDade, BCB Papers.

zippers. Across from him, Bishop, still inside his sleeping bag, abandoned the rear vent and flopped back toward the front of the tent. At that moment, Jerstad located one of the entrance's high zippers, opened the tent, and "hurled himself out" with such vigor that he nearly "threw himself off the tent platform and down the slope toward the South Col." Bishop was "right on his heels." Having exited their smoking abode, they sagged on their hands and knees in the snow "for many minutes until we were able to breathe again."[490] The incident was an extremely close call; they considered themselves lucky that nothing in the tent had caught fire, and that they had escaped before asphyxiating. At such extreme altitude, so far removed from help--Dingman and Girmi Dorje were their closest support, a full day behind--had either man been seriously injured, he likely would have died.

Unfortunately, the ordeal left Bishop feeling both weak and "not himself," and neither man had consumed much breakfast or water to stay energized and hydrated for the climb ahead. They set out at 8:00 a.m. in clear conditions, and stopped for lunch at the base of the South Summit. Whilst there, Jerstad took the canvas rock bag from Bishop and filled it halfway with small rocks for Miller. Of the two men present, Bishop had the graduate degree in geology. That he did not select and collect the specimens, or carry the bag, may indicate a growing inability to engage in even the simplest scientific tasks. With room left in the bag, Jerstad left it behind at the base of the South Summit. He intended to retrieve it on the way down, and fill it with rocks gathered from Mt. Everest's true summit, which was still over 100 vertical meters above.

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[490] Bishop, TS of audio recording with McDade, BCB Papers.

The final 100 meters would take them nearly three hours to traverse. Just below the South Summit, Bishop tripped over a discarded oxygen bottle and careened down a slope toward the Kangshung Face before arresting himself. Up until that point, he and Jerstad had traded off leading the rope. As they climbed higher, however, Bishop was content to follow his partner. He climbed with his head down, occasionally raising it to shoot a photograph for *National Geographic* and to negotiate the route's final obstacle, the Hillary Step (8790m). They arrived at Mt. Everest's summit at 3:30 p.m., having climbed for over seven hours with little to eat and drink. Jerstad took motion picture for Dyhrenfurth and picked up rocks for Miller. Meanwhile, Bishop took a small handful of photos, and passed his camera to Jerstad to shoot a frame of Bishop which epitomizes the expedition's ironies. Dyhrenfurth and his scientists styled themselves above the "petty jingoism" and "flag-waving" of their postwar predecessors, but Bishop posed with flags of the United States and the National Geographic Society that he packed specially for the occasion. Dyhrenfurth set out to climb Mt. Everest to demonstrate the American male's rigorous strength, but Bishop is seated from exhaustion, seemingly unable to even unfurl the flags of Nepal and India that he had carried to the summit, and so swaddled with life-support technologies that both his masculinity and humanity are obscured. Despite AMEE's claims that they were climbing Mt. Everest for the benefit of scientific knowledge, science is nowhere to be seen in the photograph: Bishop managed to carry four flags and a camera to 8988m, but his canvas bag of rocks were dropped at 8740m, his sociological diary was in a tent at 8360m, and his pyrheliometers were never transported higher than 6500m. In a space where an investigator on supplemental oxygen must rest for six gasping breaths between each footstep, scientific inquiry was prioritized below survival. And, in accord with Bishop's actions throughout the expedition, the geographer photographer ranked scientific inquiry below his obligations to NGS' commercial interests.

After the summit photos were taken, Bishop and Jerstad waited until 4:15 p.m. for sign of Hornbein and Unsoeld--who were supposed to be coming up from the West Ridge--before they retraced their steps down toward the South Summit. Bishop encountered another close call just 15 meters off the summit, when the 23-meter rope tying him to Jerstad was fouled by wind whipping across the summit ridge. It wrapped around the lip of a cornice overhanging the sheer Kangshung Face. As Jerstad trekked onward, the rope inexorably pulled Bishop toward the cornice. Recognizing the danger, Bishop wriggled out onto the cornice to try to free the rope. A portion of it near his chest collapsed, giving him an unobstructed, "hair raising view" of the Kangshung Glacier, 3000 meters below. Thinking quickly, Bishop scrambled backward, untied the rope at his harness, descended parallel to the rope until it "slithered free of the cornice," and then retied the rope to his waist.[491]

Once past the South Summit, both men started to lose their vision--Jerstad had completely lost sight in one of his eyes--and were moving too slowly to make it back to Camp VI before nightfall. Dusk approached, and they found it difficult to keep their bearings. By 8:00 p.m., they had reached 8650m--still 290 vertical meters above Camp VI--when Bishop heard something in the wind: "From somewhere the sound echoes off the mountain, eerie in the enveloping darkness," he later recalled, "On Everest, the wind

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[491] Ullman, *Americans on Everest*, 265.

speaks with many voices. It rises, it falls, it thunders. Sometimes it is the remote night cry of a sick child. But it is always the wind."[492] Then, both men heard it. An unmistakably human voice, coming from behind them, back toward the summit.

The voice was that of Willi Unsoeld, who yodeled and yelled as he and Tom Hornbein crept down from the South Summit in the hopes that the South Col party might hear them. He and Hornbein had been climbing on unfamiliar, challenging terrain since they left Camp 5W that morning. Although the terrain turned downwards after they summited at 6:15 p.m., neither man was familiar with the South Col route because they had focused all of their efforts on climbing the mountain's West Ridge. They tried to follow the footprints and ice-ax holes to stay on-route, but these kept disappearing. Their flashlight was hardly useful, since its batteries had been drained the night before while they completed entries for their sociological diaries. Bishop and Jerstad's flashlights had died the night before for the same reason, so they had not packed them for their trek to the summit.[493] The lives of all four men were nearly lost on the top of the mountain because they had exhausted a crucial resource in order to transport scientific inquiry through that space.

Without a light to guide Hornbein and Unsoeld, Bishop and Jerstad waited in place, vocally steering the descending climbers until two figures emerged from the dark and embraced their comrades. It was after 9:30 p.m., and Bishop and Jerstad had been standing in one place for over two hours. Bishop, whose condition had been steadily deteriorating since the night before, declared that he was "physically unable to move on

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[492] Bishop, quoted in Ullman, *Americans on Everest*, 267.
[493] Bishop and Jerstad, TS of audio recording with McDade, BCB Papers.

at all."[494] Unsoeld and Hornbein were in much better condition than their South Col counterparts, so Unsoeld roped up behind Bishop, and Hornbein escorted the half-blind Jerstad through the dark. One by one, their supplemental oxygen ran out, and it became more and more difficult for Bishop to move. Hornbein remembered how Unsoeld "took charge of Barry [Bishop], and urged him, coerced him, and swore at him" to keep him moving.[495] "We went on and on and on," Unsoeld recalled:

> stumbling and falling and getting up again, waking Barry up when he'd fall asleep. He would sit down and he'd be gone just like that and we felt like beasts, but the old guide's instincts came to the fore and we'd flay the flesh off his bones to get him on his feet, and keep telling him, 'Anybody can walk a hundred feet! Anybody! No matter how tired--and it's only just another hundred feet.'[496]

In this state, the foursome passed the canvas bag of rock samples that Jerstad and Bishop had promised to obtain for Miller. The bag was slightly off their descent route, Jerstad recalled, "on the way down the last thing on our minds was to go and pick up a load of rocks...It was a matter of survival then."[497] For Bishop, who had departed the United States intent on playing a major role in AMEE's geological program, collecting these rock samples had been the only research-related task that he had actually undertaken. When the crucial moment came to retrieve the samples, however, he was so close to death from simply travelling across the landscape that he had neither the will, the presence of mind, nor the strength to complete that task. Unlike the Antarctic explorer Robert Falcon Scott, who had famously sledged bags of rocks from the South Pole for

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[494] Ullman, *Americans on Everest*, 269.
[495] Hornbein, TS of audio recording with McDade, BCB Papers.
[496] Unsoeld, TS of audio recording with McDade, BCB Papers.
[497] Jerstad, TS of audio recording with McDade, BCB Papers.

hundreds of miles on behalf of the Royal Geographical Society until the environment killed him and his team, Bishop and Jerstad pragmatically left their bag behind.

At 12:30 a.m., somewhere above 8500m, the foursome stopped their erratic descent. Jerstad knew that somewhere ahead the route veered off the ridge to the south, toward Camp VI. Without light, he could not find the way. Eventually, the others caught Jerstad, and they decided to wait for daybreak before proceeding farther. A small, fairly level outcropping of rock about 10 meters below the ridgeline provided space for their bivouac, which was to be the highest ever attempted. The temperature, which hovered around -28C, and the oxygen lack caused their extremities to begin freezing. Bishop was so stupefied by fatigue and hypoxia that he could not protect his feet from frostbite:

> My feet, which while I was still moving had been growing colder to the point of agony, had now lost all feeling, and the tips of my fingers were following them into numbness. We curled up in our down jackets as best we could. Then after a while I was lying dazedly on my back with my feet propped up like two antennae, wondering--almost too weary to care--how badly they were damaged. I tried to wiggle my toes, but felt nothing. Then, knowing it was hopeless, I gave up the effort and sank into a fitful sleep.[498]

Bishop stirred as the terrain below was lit by predawn. Once the sun rose above the horizon, the previous day's footprints were again visible, and the two pairs of climbers resumed their descent. At approximately 8440m, they were met by Dr. Dingman and Girmi Dorje, who had climbed up from Camp VI with spare supplemental oxygen to rescue whomever they could find. Once at Camp VI, Nima Dorje melted ice into water for mixture into warm lemonade, coffee, tea, and hot chocolate. This was repeated at

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[498] Barry Bishop, notes for *Americans on Everest*, Ullman Papers. Also, Ullman, *Americans on Everest*, 272.

Camp V with Pemba Tenzing, Camp IV on the Lhotse Face, and Camp III at the head of the Western Cwm.

It was 10:30 p.m. by the time they reached Advance Base Camp, where Emerson, Corbet, Auten, and the Sherpas who helped place Camp 5W were waiting to administer aid. At that point, Bishop, Unsoeld, and Jerstad's frozen feet had begun to thaw, and the three men hobbled in agony. Dr. Dingman examined their feet that night; Jerstad's frostbite was not nearly as bad as Unsoeld and Bishop's, whose feet "were dead white, hard as iron, and icy to the touch."[499] The next morning, Dr. Dingman radioed Dyhrenfurth with news. While Jerstad had gotten away with a more mild case of frostbite, Dr. Dingman's prognosis for Bishop and Unsoeld's feet was not a good one. Both men would need to be hospitalized immediately, although first they needed to get down through Camp I and the Khumbu Icefall.

Miller awaited the summiting climbers at Camp I on May 25. During their foray on the summit pyramid, Miller had momentarily set aside his duties as a glaciologist to become AMEE's forward observer. On May 22, through a binocular set, he had observed movement just below Everest's South Summit at 5:30 pm: two climbers, clearly descending, at about 8740m. He could not identify them before they were lost to sight, "An hour passed: another half hour--and it was growing dark--when, electrifyingly, the radio came alive with Willi Unsoeld's voice. He and [Hornbein] had just come off the summit, he said. They were a few feet below it. They were about to descend the Southeast Ridge."[500] Miller relayed the happy news to Base Camp before going to bed.

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[499] Ullman, *Americans on Everest*, 278.
[500] Ibid., 261.

He still had much to do before the expedition withdrew from the mountain--so much that for the past two weeks he had consciously removed himself from a portion of Emerson's sociological study (rating enthusiasm for the climb) because he was "concentrating on scientific program."[501] With the climbers on the way down, the scientific program was running out of time.

On May 23, Miller took Pemba Tenzing and Phu Dorje from Advance Base Camp to Camps III and I, before returning to Advance Base in order to collect the instrumentation and records of two field weather stations and two thermistors. The next day, the glaciologist and his two Sherpa assistants descended to Camp I, where they were in the process of packing instruments and preparing for the next day's descent to Base Camp when Bishop and Jerstad were escorted into camp by Dr. Dingman and Girmi Dorje. The foursome were exhausted and dehydrated, with Bishop and Jerstad confronting considerable pain and deteriorating mobility. Miller mixed some Wyley's Lemonade into his one-quart canteen for the men to share. A few minutes later, Emerson and Dr. Roberts followed Hornbein and Unsoeld into camp. They were just as tired and thirsty, but Miller's canteen was empty, and there was no butane left in Camp I to melt additional water. So, the glaciologist retreated into his tent and brought back three gallons of melted ice samples, labelled CI-1, CI-9, and CI-11, corresponding to strata that he supposed were deposited onto the Upper Khumbu Glacier in 1962-3, 1953-4, and 1951-2. Miller preserved 100ml of each of the three samples in small bottles. The remainder of the three gallons were poured into canteens, and, as Ullman would later report, "in a

[501] Miller, May 14 sociology journal, card 84, Emerson Papers.

twinkling a fair percentage of [Miller's] rare specimens was vanishing forever down parched gullets."[502] Fully rehydrated for the first time in nearly three days, the summiteers and their entourage withdrew from the Western Cwm. Miller knew that he was leaving work undone when he followed the descending teams down through the Icefall. That night, he wrote in his sociological diary that he intended to climb back up to the vicinity of Camp I to complete glaciological work in that area--perhaps even to reacquire the gallons of glacial ice samples that he had used to quench the climbers' thirst.

On the morning of May 26 the expedition withdrew from Base Camp to retrace their steps back to civilization. Miller went with them, having decided to abandon his unfinished business in the Western Cwm. To use a military metaphor in the style of AMEE's postwar predecessors: Miller's glaciological program had lost its war of attrition against Mt. Everest. Because the local conditions had injured three climbers, Dyhrenfurth needed to evacuate before frostbitten feet became gangrenous. All of the climbers, save Col. Roberts, Auten, and handful of Sherpas, had deteriorated too much from exerting themselves at high altitudes to be any use to Miller, even if they had wanted to stick around the mountain for another few days. Col. Roberts could not assist Miller because he was needed to organize transport for the expedition's massive amount of materiel. Auten and his radio were needed back at the landing site in Namche Bazaar to coordinate the evacuation of Bishop and Unsoeld. The climbing Sherpas, including Annalu's team

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[502] Ullman, *Americans on Everest*, 279. Details of this incident were taken from Bishop's audio interview with McDade, and Miller's "Khumbu Glacier Ice Samples," 3.

that kept the Icefall route open, and Miller's latest Sherpa assistants, Pemba Tenzing and Phu Dorje, were busy escorting 275 laden porters. There was no one left to help Miller.

To get back into the vicinity of Camp I without personnel or materiel support, Miller would have to subject himself to tremendous risk. Any of the more delicate maneuvers--surmounting the Icefall, rappelling over the crevasse that hosted his specimens, shuttling the voluminous and heavy gallon-sized ice samples in his backpack--could easily kill or incapacitate him. And, without a team to support his efforts, incapacitation almost certainly meant death. With the majority of the expedition in retreat, the mountain had become impregnable. The scientists had had their chance. Miller would have to make do with what he had.

AMEE made it back to Namche Bazaar as night fell on May 26. Bishop, Jerstad, and Unsoeld had been unceremoniously carried by a team of twelve Sherpa porters. The detachment that Miller had sent to Mingbo Valley joined the long procession as it passed near Pangboche. Everybody camped that night on a terraced hill overlooking the village. The next morning, a United States Agency for International Development helicopter arrived to evacuate Bishop and Unsoeld to an American-run United Mission Hospital on the outskirts of Kathmandu. Thirteen days later, on June 9, the rest of the team made it back to Kathmandu. They had been in the field for 109 days.

CHAPTER EIGHT: FROM LOCAL TO GLOBAL

In the months and years following AMEE's withdrawal from the Himalaya, popular outlets consistently cast its members as heroes. Television programs, print media, lecture circuits, and award ceremonies all fit AMEE's history into the wider Americanist narrative of the Cold War: the individual talents of each AMEE man were crucial to the success of the whole, and when combined with the expedition's democratic style of leadership, they afforded the West Ridge team the freedom to surpass all previous mountaineering endeavors in the Himalaya. The expedition's scientific projects were assimilated into these ideals of heroism. The National Geographic Society, AMEE's primary sponsor and an institution founded on the dissemination of popularized science, led the charge to frame AMEE in this manner. Doing so was good for business, good for institutional prestige, and good for the United States. It also lent certain AMEE scientists a degree of public authority in addition to the professional authority that stemmed from their close experiences with phenomena unique to the Himalaya.

Bishop would use this public and professional authority to catalyze his career. However, Siri, Emerson, Lester, and Miller found their association with Mt. Everest more difficult to exploit. After returning to their home institutions, the foursome found that their data was so contingent to the Himalayan space that they had problems using it to create generalizable scientific knowledge. To varying degrees, Siri, Emerson, Lester, and Miller all needed to purge the embodied, local features that were endemic to their data in order to normalize their scientific reports and accord them with professional standards. The noted historian Steve Shapin called the end result of this process the "voice from nowhere," when describing the "very nature of authentically scientific ideas as disembodied and their scope as universal."[503] In this final chapter, we unpack AMEE scientists' attempts to create the "voice from nowhere" using data that bore the stamp of a unique and unruly somewhere. We also explore the ways in which their conclusions undermined the heroic narrative created for AMEE's mountaineers. Finally, we examine AMEE scientists' reflections on the problems encountered in that locale, from its emergent properties that were so difficult to replicate, to its influence on their ability to conduct research in an objective manner, if at all. All of the scientists maintained that the high Himalaya was a suitable object of, and space for, scientific research. But, only Bishop would return to make use of it. The others confined their scientific explorations to lower altitudes.

NATIONAL GEOGRAPHIC SOCIETY SHAPES PUBLIC IMAGE

By Himalayan standards, the expedition was wildly successful long before AMEE's scientists made anything from their fieldwork. AMEE researchers joined in the celebrations upon their return to Kathmandu. Parties were thrown in their honor by King Mahendra of Nepal, United States Ambassador Stebbins, the local American community in Kathmandu, and the Russian owner of Hotel Royal, Boris Lissanevitch. National Geographic Society Vice President Melvin Payne and Assistant Chief Newsman Matt McDade flew out from Washington D.C. to congratulate the team and handle publicity for its imminent return to the United States. Dyhrenfurth's climbing operation had placed six men on the summit of Mt. Everest, pioneered a technically difficult route, and

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[503] Steven Shapin, "Placing the view from nowhere: historical and sociological problems in the location of science," *Transactions of the Institute of British Geographers*, Vol. 23, No. 1 (1998): 5.

completed the first traverse of an 8000-meter peak. From these feats, especially considering the dramatic style with which they were accomplished, Payne crafted the nucleus of AMEE's image, to which additional details could be added as they became relevant.

On June 7, NGS released a News Bulletin that recapitulated the expedition's achievements, while adding that "the Expedition's work was far from finished," and that its "most important task" was to "process the raw scientific information" that its scientists had gathered.[504] At this stage, however, nobody in the United States knew what sort of scientific information had been generated, or in what state that information would return to the Western Hemisphere. NGS erroneously advertised that Barry Bishop had "succeeded in measuring solar radiation at 26,000 feet," and an early outline for *National Geographic*'s article created by a team in Washington D.C. included headings for a "HIMALAYAN RANGE MAP," "METEOROLOGY," and "PHYSIOLOGY" that were to feature non-existent scientific illustrations and discoveries of the Himalaya's planimetric contours, the "air flows" and "mechanisms of the monsoon," and "data on the adrenal cortex."[505] After a June 15 telegram arrived from NGS representatives on the ground in Kathmandu, stating that "expedition produced less science than expected and leaders insist no science information available for at least [one] year," the magazine's editors decided that AMEE's "real value" as a story for its readership lay in its "dramatic" adventure narrative.[506] To the NGS editors, the prolonged process of making good

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[504] NGS Bulletin dated June 7, 1963, TS, Bishop Papers.
[505] Newman Bumstead, Memo dated Dec 10, 1962, BCB Papers.
[506] Telegram to National Geographic Society dated June 15, 1963, BCB Papers.

science did not make for good news. With the expedition's scientific products less tangible than expected, Melvin Payne and *National Geographic*'s editorial staff decided to highlight the heroism and ingenuity found in AMEE climbers' stories, and buttress these stories with optimistic projections about AMEE's as-yet-unanalyzed scientific contributions.

Although *National Geographic*'s editorial staff decided to replace scientific reports with an adventure story for their feature on AMEE, they still sought to represent the expedition as a scientific undertaking that both promoted the heroism of American science, and justified NGS' $175,000 investment in AMEE as a vehicle for scientific research. While helping Dyhrenfurth prepare his portion of the *National Geographic* article as he travelled back to the United States via Switzerland, Senior Editorial Staffer Kenneth F. Weaver telephoned Assistant Editor John Scofield to inform him that "no detailed scientific findings would be available for publication in less than a year, or even 18 months...Dr. Siri is an extremely cautious and conservative scientist, and is flatly unwilling to make anything public until the expedition's records and findings have been thoroughly studied." AMEE's scientists, it seemed, were dedicated to producing good science, regardless of whether it inconvenienced their most generous sponsor. Scofield asked Weaver to direct Dyhrenfurth to "hint as much as possible about the nature of the findings, and mention what scientific objectives the expedition had."[507] Dyhrenfurth held Siri's line, and, as a result of Scofield's editorial suggestions, simply included passages similar to those that he used in his 1962 pitch to NGS:

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[507] Memo from John Scofield dated June 24, 1963, TS, BCB Papers.

> In addition to the Geographic's earth-science studies, we undertook to measure how mind and body perform under the extreme stresses of the high mountains--fatigue, isolation, numbing cold, sleeplessness, apprehension, dehydration, sense of suffocation. In the oxygen-starved atmosphere far above the limits of human habitation, men come to the bitter edge of what is possible... [O]ur findings...may help in choosing men for space flights... The National Science Foundation also financed our study of how men react to each other under stress. Often expedition members quarrel and become lifelong enemies. Fortunately, we held our disagreements to a reasonable level and all came home good friends.[508]

Dyhrenfurth, who also mentioned how NGS supported studies in "glaciology, weather, and solar radiation," omitted Barry Bishop's limited role in those studies. During an interview with McDade, Bishop told him that he had not conducted any scientific research while in the field. Yet, NGS was eager enough to promote AMEE's scientific contributions that on May 12 it erroneously reported that Bishop had taken solar radiation measurements from the South Col. It repeated that error in a May 23 News Bulletin, and then awarded Bishop $5,000 and the Franklin L. Burr Award on June 21 for "his notable contributions to scientific knowledge through his studies in glaciology and solar radiation while participating in the expedition."[509] In light of how strict its Committee for Research and Exploration's expectations had been toward AMEE science in 1962, NGS' standards toward science seemed to have relaxed after the expedition's triumphant return.

NGS' emphasis of AMEE's scientific program, and Bishop's role in that program, conformed to an institutional ideology that harkened back to its heady days of polar exploration. *National Geographic*'s first Editor, Gilbert H. Grosvenor, prioritized American explorers over those of other nations because he believed they possessed both

[508] Dyhrenfurth, Norman G., "Six to the Summit," *National Geographic* 124, No. 4 (October, 1963): 464.
[509] Melvin Payne to Miss Allen, June 21, 1963.

physical strength and more scientific ability than their foreign counterparts.[510] During his 50-year tenure, the magazine's contents reflected this ideal. By the time his son, Melville B. Grosvenor, took over as Editor in 1957, the marriage between scientific ability and institutionalized masculinity had begun to rely more and more on the technological prowess of American explorers. The transformation completed when Project Mercury was activated in 1959, thereby making American astronauts the face of American exploration. According to Lisa Bloom, author of *Gender on Ice: American Ideologies of Polar Expeditions*, the shift in "new technologies of transport and communication" typified by the Redstone MRLV and wireless radio, "intensified contradictions already present between male heroism and male dependence on technology, resulting in a significantly greater gap between the ideal of male heroism and the material experience."[511] Bloom believed that this gap caused "nostalgia for an earlier age when men were real men" within both NGS and its subscribers.[512] Melville Grosvenor's passionate interest in, and support for, AMEE bridged that gap. For the younger Grosvenor, Dyhrenfurth's men represented a kind of "missing link" between the United States' polar explorers and its Mercury astronauts. Like Robert Peary, the American mountaineers navigated extreme climates and endured physical hardship for the sake of national prestige and furthering the boundaries of scientific knowledge. Like the Mercury Seven, their pursuit necessitated a mastery of sophisticated, innovative technology that was heavily featured in the magazine's articles.

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[510] Bloom, *Gender on Ice*, 117.
[511] Ibid., 81.
[512] Ibid., 82.

That scientific knowledge, physical endurance, and technological mastery were integral to the masculine ideal constructed by NGS was evident in the press surrounding AMEE's triumphant return from May to July, 1963. An NGS News Bulletin in late May placed special emphasis on the expedition's technological mastery, listing the "special food, clothing, and climbing equipment" used by the team to summit the mountain:

> Freeze-dried, instant-food packages that weighed less than four pounds and contained over 10,000 calories provided an all-day menu for two men... Expedition members used nylon down clothing with dead air spaces for insulation. Overlap stitching ensured tightness and durability... Modern textile technology furnished high-altitude tents of synthetic fibers designed and woven to withstand blizzards, ice storms, winds of 50 miles an hour, and 45-degree-below-zero temperatures... Special oxygen equipment was lighter and more efficient than ever before.[513]

Just two days later, a second News Bulletin proclaimed that NGS' very own Barry Bishop had successfully summited the mountain and also spent considerable time conducting scientific research. Bishop was characterized as "superbly qualified not only for climbing, but for recording his observations. He is a trained geologist and geographer, an experienced glaciologist and climatologist, and a skilled photographer and writer."[514] His scientific credentials were presented over an additional four paragraphs, and his physical prowess was implicitly guaranteed by his successful summit attempt. With its man on top, NGS could rest assured that it would have a first-hand account to thrill its readership and publically promote its ideals of American masculinity.

NGS' characterization of AMEE climbers as heroic explorers akin to astronauts extended into its private communications. In a June 6 letter to Barry Bishop, NGS

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[513] NGS Bulletin dated May 21, 1963, TS, BCB Papers.
[514] NGS Bulletin dated May 23, 1963, TS, BCB Papers.

President Grosvenor compared Bishop's achievements to those of the Mercury astronauts, and advised him:

> not to change in any way your very fine personality. With all the attention that you will receive...you will be a strange person indeed if you do not get the 'swelled head'. Be patient, calm, and keep your feet firmly on the ground. That has been one of the greatest achievements of our Mercury astronauts who have grown in stature as a result of their great successes rather than having their personalities destroyed by the notoriety.[515]

Then, the following day, Grosvenor wrote NGS Vice President Payne to plan a "big reception for the expedition," adding, "as with Glenn," to emphasize his vision of a reception that was similar to the one that honored John Glenn's return aboard *Friendship 7* in February, 1962.[516] That reception took place on July 8, 1963, during which America's Head of State personally and publicly awarded each AMEE team member the highest decoration of a private institution: the National Geographic Society's Hubbard Medal.[517] In the spirit of democracy--and at Dyhrenfurth's staunch insistence--Kennedy also awarded the Hubbard Medal to Nawang Gombu, Ang Dawa, Girmi Dorje, Ila Tsering, and Nima Tenzing from Thami, who were present as part of a grant from the State Department's Bureau of Educational and Cultural Affairs.[518] After recognizing the "generous cooperation extended to the expedition by the Indian and Nepalese Governments," Kennedy said "although as Americans we take special pride that our

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515 Melville Grosvenor, letter to Barry C. Bishop dated June 6, 1963, TS, BCB Papers.
516 Grosvenor to Payne, June 7, 1963, TS, BCB Papers.
517 The last time the President of the United States presented the Society's Hubbard Medal was in February, 1959, when President Eisenhower awarded one medal to Sir Vivian Fuchs for his transcontinental Antarctic trek, and one each to Navy Secretary Thomas S. Gates Jr., Admiral Arleigh A. Burke, and Rear Admiral George Dufek for the United States Navy Antarctic Expeditions. See *National Geographic*, Vol. 115, No. 4 (April 1959).
518 Along with Nepalese liaison officer Captain "Noddy" Rana, the five Sherpas toured the United States for six weeks with Jim Lester as their guide. See below.

countrymen have gone to the far horizon of experience...this is an international effort in which man pits himself against his friend and enemy--nature."[519] These remarks imbued AMEE with global relevance, and anticipated the rhetoric that later accompanied the Apollo 11 Moon on the lunar plaque:

HERE MEN FROM THE PLANET EARTH
FIRST SET FOOT UPON THE MOON
JULY, 1969 A.D.
WE CAME IN PEACE FOR ALL MANKIND

Like Kennedy, NGS and its magazine included AMEE's non-American agents into their plaudits, albeit on a limited basis. Although Sherpas were not given editorial time commensurate with their labor on the mountain, they were given equal credit in certain contexts, including ferrying loads to extraordinary heights, setting up high camps, and reconnoitering the Khumbu Icefall. The transition of Sherpas from subaltern bodies to equals in the minds of Western media was perhaps most clearly illustrated in a June 7 draft of the NGS Bulletin that announced the expedition's successful completion. The climax of the Bulletin was drafted to tell how Jim Whittaker, "standing higher than any American in history, with the help of his devoted Sherpa, Nawang Gombu," had climbed Mt. Everest. A judicious editor struck out the words "devoted Sherpa," replaced them with "climbing mate," and elevated Gombu from a subservient retained by Whittaker to an individual warranting equal merit.

On the other hand, the opening lines of the October issue of *National Geographic* established a master-servant power relationship between Dyhrenfurth and Ang Dawa.

"Up go, Bara Sah'b?"

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[519] Quoted in *National Geographic* (October, 1963): 514.

> I shook my head. Above the howling of the storm I shouted, "No, Ang Dawa. Down go!"

This relationship was never questioned or critiqued anywhere in the magazine, even though contemporary accounts of the expedition--including Dyhrenfurth's own diary--represented AMEE's Khumbu and Darjeeling Sherpas as separate autonomous communities that were not afraid to exercise their agency for higher pay, greater share of the expedition's limited supply of supplemental oxygen, or equal treatment.[520] Nor did the magazine recognize the tremendous amount of support given by the Sherpa cadre to AMEE's science practitioners. The magazine's portrayal of the Sherpas omitted their autonomy as a distinct culture and people; their tenacity, humility, courage, and strength were applauded, but ultimately they were portrayed as instruments for AMEE's success. AMEE scientists confronted the same dilemma that faced *National Geographic* editors. Aside from the fact that Barry Bishop authored a majority of the October issue's feature, both Miller and Siri would later contend with conflicting perceptions of Sherpa communities and performance while reconciling their preconceived notions regarding physical labor at high altitude with their field data.

BISHOP'S FORTUNES

Of AMEE's scientific practitioners, the one who contributed the least to the science program's fieldwork benefited the most from his association with the expedition. Barry Bishop may not have conducted any instrumentation in the Himalaya that year, but

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[520] See Ullman, *Americans on Everest*, 226.

his successful summit ascent and subsequent photo-essay that was published in the October issue of *National Geographic* catapulted his career within that institution. Due to the Society's close association with high-ranking individuals within federal United States agencies, Bishop's esteem with those institutions also improved, and their influence would govern his actions in the years following his return from the Himalaya.

In 1963, the Society's Board of Trustees included Coast Guard Rear Admiral Leo Otis Colbert, NASA Administrator Hugh L. Dryden, Navy Vice Admiral Emory S. Land, Assistant Secretary of the Navy James H. Wakelin Jr, Chief Justice Earl Warren, National Park Service Director Conrad L. Wirth, and retired Geological Survey Director William E. Wrather. It also included Air Force Chief Of Staff Curtis Lemay, who took special interest in both Bishop's experience on Mt. Everest and certain observations he may have had while on the mountain's summit. The vast majority of the United States' nuclear arsenal was under LeMay's command, and, as Chief of Staff advising Presidents Kennedy and Johnson, he helped shape American nuclear-weapons policy during the height of the Cold War. By 1964, American intelligence suggested that China had established a nuclear facility at Lop Nur, about 1200 kilometers north of Mt. Everest, and that weapons testing might be imminent. The Central Intelligence Agency had been unable to surveil the site from the air since 1960, when Pakistan withdrew use of Peshawar Airfield following the downing of Francis Gary Powers' U-2 spy plane over the Soviet Union.

LeMay had an idea. At a Washington D.C. cocktail party he conversed with Bishop about the photographer's experiences on Mt. Everest, and the view to the north from the summit. This conversation generated a plan--possibly derived from Dyhrenfurth's half-baked 1961 proposal to place a plutonium-powered weather observatory on Mt. Everest's South Col--which would eventually pull several of AMEE's scientific practitioners into a multi-national espionage project directed against China. With reliable spy satellites still several years in the future, a ground-level platform for surveilling Lop Nur was the United States' best option. Mt. Everest was not a site because it shared a border with Chinese-occupied Tibet, and because it would require the permission of Nepalese authorities who might not want to provoke their northern neighbor. LeMay needed another site, and he needed an American familiar enough with the locale and the logistics of such an undertaking to execute the planned installation.

On October 16, 1964, the People's Republic of China detonated its first nuclear device at Lop Nur. The war in Vietnam was expanding, and the state of China's nuclear arms development was an interest of state for the Johnson Administration. Bishop was given leave from *National Geographic* to work for the CIA. He recruited AMEE rope-mate Jerstad and a small number of other, unnamed climbers. Their original candidate for the observatory's site lay on the Indian-Sikkim border at Kanchenjunga. However, after conferring with Indian climber and Navy Captain Mohan Singh Kohli, they decided that the mountain's avalanche danger posed too great a risk to both men and to the instrument. Nanda Devi (7816m) replaced Kanchenjunga, and, in the fall of 1965, a team of American and Indian climbers, nineteen Sherpas, and five crates containing the components to build an observatory powered by decaying plutonium were helicoptered into the Nanda Devi Sanctuary. By October 16, Jerstad and others had reached Camp 4 at about 7240m, when heavy snowfall thwarted their push toward the mountain's summit. After Indian intelligence officials had signaled their permission for the climbers' withdrawal, the climbers anchored the device to the mountainside and left. Another team could ascend in spring to finish the carry and installation.

When Indians and Sherpas returned to Camp 4 in early 1966, they discovered that the loads that had been secured the previous October had vanished. Local topography indicated that the portion of the mountain that hosted Camp 4 had slid away in an avalanche of rock and ice. A team of American climbers, including AMEE physician and Will Siri's infrequent assistant, Dr. Dave Dingman, had already been trained by CIA agents and were *en route* to Nanda Devi. Their mission was to recover the lost equipment, transport it to a neighboring peak named Nanda Kot, and install it at the more manageable altitude of 6861 meters.[521] After months of searching the avalanche scree below the former site of Camp 4, a frustrated and bored Dingman abandoned the project to return to the United States for a fellowship in cancer surgery. He was drafted by Selective Training and Service before he could begin.

Dingman was not the last AMEE man to work on the CIA's project. The next year, Barry Prather and Barry Corbet were recruited to place a second observatory of similar design atop Nanda Kot. With two other American climbers, Prather and Corbet hauled the device to a "relatively level shelf not far below the summit," where they spent a day assembling and testing its function, before returning to the United States. Over the ensuing three months, the observatory recorded the CHIC-7 fizzle and CHIC-8 twenty-megaton detonation before being buried by winter snow. In the spring of 1968, a separate CIA team retrieved the observatory from Nanda Kot. It was never replaced, as satellites

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[521] Couburn, *The Vast Unknown*, 233

in earth orbit had begun to supersede other means for the United States' clandestine surveillance programs.[522]

By the time Prather and Corbet returned from Nanda Kot, Bishop had ended his affiliation with the CIA program. He served as Secretary to NGS' Committee for Research and Exploration before entering a Ph.D. program in the Department of Geography at the University of Chicago in 1966. That same year, Bishop and his collaborators at the Eppley Foundation for Research, who had designed the pyrheliometer and pyranometers Bishop had used on Ama Dablam and Miller had deployed at Mt. Everest Base Camp on Bishop's behalf, published "Solar Radiation Measurements in the High Himalayas (Everest Region)" in the *Journal of Applied Meteorology*. In the article, Bishop described the measured solar radiation intensities from the Silver Hut and AMEE sites, discussed the disadvantages of using high-altitude valleys as solar observatories (not enough direct sunlight, too much reflective light from ice and snow), and explained how the Himalaya's arid atmosphere and reflective snow-ice surfaces combined to allow "exceptionally high" radiation directed "out to space."[523] Confirmation of the final point would inform subsequent discussions on global climate change around the turn of the century.

Bishop's passions for mountain environments, their peoples, and producing scientific knowledge sustained the remainder of his career. Between 1966 and 1968, he

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[522] See Pete Takeda, *An Eye at the Top of the World: The Terrifying Legacy of the Cold War's Most Daring CIA Operation* (New York: Basic Books, 2007) and M.S. Kohli and Kenneth Conboy, *Spies in the Himalayas: Secret Missions and Perilous Climbs* (Lawrence: University Press of Kansas, 2002).
[523] Barry C. Bishop, et al., "Solar Radiation Measurements in the High Himalayas (Everest Region)," *Journal of Applied Meteorology*, Vol. 5, No. 2 (February, 1966): 103.

reconnoitered research sites in the Yukon and Alaska for projects in high-altitude physiology and ecology sponsored by the American Geographical Society and the Arctic Institute of North America, and helped install the Mt. Logan High Altitude Laboratory at 5311m in the Yukon for physiological research. From 1968 to 1972, he trekked across the Karnali Zone in western Nepal with his wife and two small children to conduct geographical research for his doctoral dissertation. He structured his field work as a cultural-ecological analysis, which "identified, described, and analyzed the hierarchy of economic systems, including the seasonal movement of people, animals and goods, along a vertical transect of the western Nepal Himalaya."[524] An overview of his research, co-authored by his wife, Lila, was featured in the November, 1971 issue of *National Geographic*. Although it took Bishop fourteen years to complete his dissertation, its eventual publication as *Karnali Under Stress: Livelihood Strategies and Seasonal Rhythms in a Changing Nepal Himalaya* was recognized as "the standard for studies of mountain peoples and environments."[525]

Bishop's experiences in the Himalaya continued to inform his professional career even after he left academia to return to the National Geographic Society. In 1983, he led an expedition of interdisciplinary investigators to the Annapurna Himal to determine human impacts on its cultural and physical landscapes. That winter, he was Chief of Field Operations for the Boston Museum/National Geographic Society Sagarmatha Khumbu photo-mapping program, which produced a 1:50,000 scale map of the Mt. Everest region

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[524] Marcus and Marcus, 195.
[525] Marcus and Marcus, 196. Bishop's choice of title may have reflected his exposure to Siri, Emerson, and Lester's corpus derived from AMEE research.

with 40-meter contours.[526] In 1984, he was made Vice Chair of the Committee for Research and Exploration, before leaving again in 1985 to organize and lead a winter reconnaissance of Bhutan's alpine regions. He produced an additional two articles for *National Geographic* before his promotion to Chair of CRE in 1989. During the years he spent serving the Society's Committee, he imprinted his "philosophical commitment to field studies" onto its deliberations, often reiterating "that research could not slide solely into the realm of keyboards, consoles, and simulations--that the reality check of field-based science was imperative."[527] Championing this coda, Bishop oversaw NGS' grant-disbursement programs for five years, before his death in a car accident in 1994.

SIRI'S UNEXPECTED RESULTS

Having experienced the extraordinary hardships of high-altitude climbing, and witnessed extraordinary demonstrations of endurance, Siri expected to find those stresses writ in his teammates' bodily fluids. Instead, ambiguous results yielded little for his patrons and threatened to undermine the public image of AMEE climbers that had been carefully cultivated by NGS, Bishop, and Ullman. Ironically, that public image catapulted Siri into the presidency of the Sierra Club during a tumultuous time in that organization's history. His scholarly contributions dwindled as a result. As with Bishop, Siri's association with AMEE benefitted his personal prestige more than his scientific career. Frustrated by physiology and stimulated by the public sphere, AMEE's Scientific Leader

[526] A map instrumental to the production of this dissertation.
[527] Marcus and Marcus, 197.

would redirect his efforts toward public service within a year of his return from the Himalaya.

While the *National Geographic* feature was on newsstands in October, 1963, Siri compiled a packet of preliminary reports from each of AMEE's researchers, except for Bishop--the NGS man was too busy writing his *National Geographic* narrative to "take time out" for the solar radiation survey. On October 22, Siri sent this "interim report" to NGS with the major caveat that "None of us are sufficiently far advanced in his work to commit himself to publication."[528] Chair of the Society's Committee for Research and Exploration, Smithsonian Institution Secretary Dr. Leonard Carmichael, remarked how the glaciological study seemed to add "a few facts of significance," and he was "glad" that NGS had supported it. Unfortunately, the sociological, psychological, and physiological studies lacked the "quantitative details" to be convincing. In their reports to NGS and other sponsors, Emerson and Lester had followed Siri's lead; it was simply too early to provide conclusive results.[529]

As time passed, and Siri further compiled his data, he was more willing to comment definitively on the results of his studies. By December, he had furnished statements to *Roche Medical IMAGE* Magazine for an article highlighting his and the physicians' work on AMEE, entitled, "The Medical Challenges of Mt. Everest." In the article, Siri recalled the logistical challenges he encountered working with human subjects at altitude, and he explained his preliminary findings. On red blood cell

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[528] Siri to Melvin Payne, October 14, 1964, TS, BCB Papers.
[529] Leonard Carmichael to Melvin Payne, November 4, 1963, TS, BCB Papers.

production, Siri said "I was forever pricking people who were dead tired and ill, but awfully patient," to discover that the speed with which iron was incorporated into the bone marrow of his subjects was three times higher at 6550m than at sea level. Siri also dispelled a myth among mountaineers that experienced high-altitude climbers could acquire a kind of acclimatization to extremely high altitudes that carried over from expedition to expedition: "I cannot conceive, as has been seriously suggested, that this is because the cells 'learn' to use oxygen better by practice. I suspect the cause is psychological, rather than physiological."[530] Siri remained silent regarding the effects of hypoxia, cold, undernourishment, exhaustion and emotional tension on cellular acclimatization, however, he remained optimistic that "establishing the mechanism" of cellular adjustment to altitude "would be a major scientific advance."[531]

Even as the Roche Medical IMAGE article went to print, Siri had begun to suspect an ambiguous result when it came to his experiments on physiological stress. In a letter to James Ramsey Ullman, who was working on a popular manuscript detailing the expedition, Siri reported that "the team as a whole was far from the end of the line and aside from the frozen feet and specific diseases, I don't have any evidence as yet that we suffered anything but malnourishment."[532] This came as a surprise to Siri, whose expectations and experiences in the field had led him to believe that his test-subjects had experienced significant physiological stress. Although he did not admit it, his expectations had been biased by a vagary of his experimental design; while subjected to

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[530] Gil Roberts, "The Medical Challenge of Mt. Everest," *Roche Medical IMAGE* Vol. 5, No. 6 (December, 1963): 15.
[531] Ibid. Fifty years later, this mechanism is still a mystery.
[532] William E. Siri letter to James Ramsey Ullman, dated Dec. 18, 1963, Box 53, "JRU Papers, 1915-1971."

the same environmental forces as his test-subjects, Siri erroneously believed that he was witnessing and succumbing to physiological stressors. The events of the expedition served as confirmation bias for the existence of this stress: his test-subjects had been frequently exhausted and had resisted study; his ostensive laboratory assistants had been recalcitrant; he had driven his body into the ground when he carried supplies to Camp III from Advance Base Camp.

But Siri's data did not bear out his bias--in this case the data he had produced using mechanical aids corrected the trained judgments derived from his intuition. "[C]limbing Everest with [supplemental] oxygen appears to be far less a physiological challenge than we had anticipated," he wrote to Ullman, "The principal ingredients would seem to be opportunity and extraordinary motivation," and not exceptional physiology.[533] Based on his data from the field, "except for Norman [Dyhrenfurth], Dan [Doody], Emerson, and possibly Gil Roberts, every other member of the team was physiologically as well or better equipped to climb Everest" than Bishop had been when he summited the mountain. These findings belied both how Siri imagined the space of inquiry prior to the expedition, and how he personally experienced it during the spring of 1963.

In his letter to Ullman, Siri also tried to make sense of the mismatch between his expectations, experiences, and results by attributing his phenomenology of Mt. Everest to factors other than physiological and psychological stress. He wrote that although "many people could [climb Everest]...remarkably few...could successfully endure the extreme discomforts and uncertainties" inherent in that venture. Siri maintained that climbing at

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[533] Ibid.

high altitude was "hideously disagreeable and difficult. Even the smallest task seems to call for superhuman effort," but that "Hornbein's and Jürg Marmet's attitude that Everest was a pleasant, enjoyable climb is the one most in accord with the physiological findings." Combined with the claims of Hornbein and Marmet--who summited Mt. Everest during the 1956 Swiss expedition--Siri's results disputed a "belief in the superman qualities of Everest climbers" to which he had subscribed "as a matter of faith" in the same way some of his compatriots believed in the Yeti and God.[534]

This alarmed Ullman. He was nearing publication for the popular history of the expedition that he was writing for J.B. Lippincott & Co. Siri's discoveries, made public in the short essay he was supposed to supply for an appendix chapter in Ullman's book, might undermine the heroic rhetoric that Ullman had used to describe the climbers throughout his narrative. When Siri heard about Ullman's concerns, he facetiously assured Ullman that he would "try to minimize the disturbing influence of fact on the dramatic impact of your story" because "It would be unthinkable to suggest that Everest is not beyond the reach of the mere mortal."[535] Yet, in his essay, Siri's tone took on a note of understated heroism: "research conducted in a tent is never so impersonal as it frequently is in the laboratory... Sharing a sleeping bag every night with three or four hard, cold, and sometimes damp bottles seemed at times an inordinate sacrifice in the name of science."[536]

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[534] Ibid.
[535] Ibid.
[536] William E. Siri, "13. Physiology," Chapter in James Ramsey Ullman, *Americans on Everest*, 381, 389.

These were the last of Siri's ruminations on the discrepancies between his intuited judgments and the physiological data. His first scientific report, the 67-page "Final Report: Physiological Studies on Mt. Everest Climbers" which was distributed to AMEE sponsors in June, 1965, reached similar conclusions to those teased in the letter to Ullman, but it lacked the letter's colorful reflections. "There can be no question about the intense subjective feelings of fatigue," he wrote, "Nevertheless, the...work level was exceedingly small compared to the sustained level of work climbers are accustomed to performing at lower elevations."[537] For this reason, Siri concluded that "climbing Mt. Everest was a relatively sedentary occupation compared to the activity of the same climbers at lower elevations."[538] His collection of urine samples from 5425m to 8848m showed no erythropoietin and normal excretion rates of the markers that he used to evaluate stress levels and energy output: 17-OHCS, 17-OS, aldosterone, catecholamines, and electrolytes. His subjects' adrenocortical responses were also normal. Although iron turnover in their blood plasma doubled at Base Camp and was two-and-a-half times normal rates above Camp III, none of the other physiological tests Siri had devised demonstrated the presumed, unique responses to Mt. Everest's exceptional locale.

This result ran contrary to the rationale Siri used to justify the study of men engaged in climbing Himalayan peaks. In the Introduction to the Final Report, Siri called these men "unique subjects for research on the body's regulatory mechanisms." He listed two premises for this assumption: 1) climbers' prolonged exposure to hypoxia would

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[537] William E. Siri, *Final Report: Physiological Studies on Mount Everest Climbers* (Berkeley: University of California, 1965), 11.
[538] Ibid., 11-12.

evoke the "fullest possible development" to physiological responses, "making their associated regulatory systems more amenable to investigation." 2) The "inevitable concomitants of high altitude climbing...would induce decisive evidence of nonspecific physiological 'stress.'"[539] He did not discuss the possibility that his result may have been an upshot of his self-selecting sample of test-subjects; the men who comprised AMEE's roll were hand-picked by Dyhrenfurth because they were the best mountaineers in the United States, each with an accomplished history of physiological endurance, and thus resistant to the stress associated with mountaineering's "concomitants."

Despite situating his test-subjects within high-altitude locales, Siri omitted any discussion of the incidental contingencies that inhibited his investigations. To borrow a concept of Science Studies scholar Bruno Latour, Siri "black-boxed" the events that might have situated his results within a particular place and time. Those events included times he had to rely on trained judgment, such as when he intuited his subjects' weights at Advance Base Camp, and times when his detachment was compromised, such as when he had difficulty reconciling his experimental results with his heroic image of mountaineers--a group with which he identified. Instead, his results were presented as settled, leaving no room to perceive how the locale shaped them. Once black-boxed, the locale and its emergent effects on the production of physiological knowledge were rendered invisible.

That is not to say that Siri considered the matter settled, or the locale impractical. He urged subsequent expeditions to continue the study of humans operating at high altitude, especially after Nawang Gombu became the first man to summit Mt. Everest

[539] Ibid., 1.

twice in 1965. He remained befuddled by his study's negative results in light of his experience and Gombu's feat, a matter that manifested itself in a letter to Ullman written a few weeks after he had delivered his Final Report: "The studies seem to indicate that climbing Everest is neither 'stressful' nor hard work," he wrote, "Wonder why it is so difficult?" Then, as if anticipating the subject of physiological research that would take place fifty years after AMEE's conclusion, Siri said, "It obviously isn't [difficult] for Gombu, he's now been up twice."[540]

Where Siri had rushed to get his popular account to Ullman, he did not rush to disseminate the results of his study beyond the technical report. Copies of it were sent to his sponsoring agencies: AEC, NSF, NASA, AFOSR, and the Army Quartermaster, and another copy was kept by Donner Laboratory at the University of California. The following year, he submitted a paper derived from observations made during his four-day stint in the low-pressure chamber in 1962, an experiment whose original purpose was to provide a touchstone for the reality-testing to follow at Mt. Everest in 1963. That paper, "Early Erythropoietin, Blood, and Physiological Responses to Severe Hypoxia in Man," was authored with five fellow Donner Laboratory staff researchers and published by the Journal of Applied Physiology on New Year's Day, 1966.[541] It did not seem to have a tremendous impact in the field's literature. By the time Siri returned to his AMEE research, nearly six years had passed since the Expedition's conclusion. The resulting

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[540] Siri to Ullman, July 13, 1965, handwritten note, Ullman Papers. In 2013, the physiological expedition eXtreme Everest 2 attempted to measure acclimatization differences between third-generation Sherpas living at high altitude and Western volunteers from low elevations.
[541] WE Siri, DC Van Dyke, HS Winchell, et al., "Early erythropoietin, blood, and physiological responses to severe hypoxia in man," *Journal of Applied Physiology*, Vol. 21, No. 1 (January, 1966): 73-80.

article, "Adrenal Gland Activity in Mt. Everest Climbers," was published by the Federation of American Societies for Experimental Biology's *Federation Proceedings* in March, 1969.[542] This, too, received limited scholarly attention even though the world was gearing up for the study's original *raison d'être*: the imminent Apollo moonshot.

Like Bishop, Siri's celebrity from his association with AMEE aided his public career. One explanation for Siri's apparent lethargy regarding his results from AMEE was his appointment as President of the Sierra Club in 1964, during the turbulent years of environmentalist David Brower's directorship. As President, Siri oversaw and resisted Executive Director Brower's reformation of the Club from a collection of local hiking institutions to the preeminent American institution for environmental activism. During his final year as President, Siri was concerned with the Club's growing deficits under Brower's leadership, and a dispute over the site of a PG&E generating facility placed Siri firmly in the anti-Brower camp. His contributions to the *Sierra Club Bulletin* and his actions in Board meetings undercut Brower's agendas, and he eventually called for a vote to accept Brower's resignation in 1969, which passed ten to five.[543]

Siri continued serving the Sierra Club on the Board of Trustees through the 1970s, although he briefly returned to conduct academic research from 1976-1978 on projects totally unrelated to his physiological *corpus*. Instead, his new inquiries seemed motivated by a desire to expand the values of service and stewardship he had assimilated via his work in the Sierra Club to his profession. He completed two projects for Department of

[542] WE Siri, AS Cleveland, P Blanche "Adrenal gland activity in Mt. Everest climbers" *Fed. Proc.* 28 (1969): 1251-1256
[543] Tom Turner, *David Brower: The making of the Environmental Movement* (Oakland: University of California Press, 2015), 133-150.

Energy on preventing nuclear proliferation before service concerning ethics and security for the benefit of the public's welfare.[544] He retired from Donner Laboratory in 1982, but continued working in the public sphere as lifetime Vice President of the Sierra Club until he was stricken by Alzheimer's disease in 1994.

EMERSON'S LACKLUSTER RESULTS

Where Bishop and Siri found public and political success from their association with AMEE, Emerson found his scientific products reflected his performance on the mountain; both defied his high expectations. Unfinished data routines produced incomplete data, and what data he had obtained was too exceptional to be generalized. While Emerson was able to salvage a publishable article from these disappointing results, the gaps in his observation routines left by his experiences in the locale pushed him away from reality-testing. Even though he had spent years prior to 1963 trying to find ways to get to the Himalaya, the events of 1963 precluded his return for nearly two decades.

Shortly after returning from the Himalaya, Emerson relocated from the University of Cincinnati to the University of Washington in Seattle. Unfortunately, due to logistical mix-up, the test-subjects' diaries that made up the bulk of his primary research material had been left behind in Nepal--even after returning to the United States, Emerson's project seemed to still be enthralled by the space of inquiry. The diaries would need to be located, and then shipped to the United States. Luckily for Emerson, both Col. Roberts

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[544] W.E. Siri, et al., *Study of nuclear material accounting. Final report, July 1976--April 1, 1977*. Technical Report. The result of the study was a new, game-theory based tool that presumed the existence of what he called "a malevolent diverter"--that is, a party intentionally diverting nuclear material from United States inventories--to enhance safeguard protocols concerning missing nuclear material.

and Unsoeld were in Nepal to sort through the boxes and see the diaries off. So, he set about gaining back the weight he had lost and transcribing tape recordings that he made during the expedition. He also helped Doody compose a funding proposal to film rural Nepalese life, and he completed a quantitative study of power-dependence relationships that predated the expedition to Mt. Everest.[545]

While Emerson waited, he drew on his personal experiences at Mt. Everest to re-conceptualize his theory of group goal-striving to include a self-maintaining component. By combining recent research on aspiration by Leon Festinger, Dwight Chapman, John Volkman, Alvin Zander, and Herman Medow with Robert White's conceptualization of goals existing at the "periphery of the person's or the group's region of known *competence*," Emerson theorized that changes in aspiration level demanded goal redefinition. Because "success reduces uncertainty, and goals are redefined upward into a region of uncertain goal outcome," and "failure likewise reduces uncertainty, and goals are redefined downward, again into a region of uncertainty," Emerson hypothesized that uncertainty about goal outcomes was the variable that maintained the goal-striving system. In a small-group setting, then, uncertainty would be a crucial component of communication as its members consistently injected uncertainty into evaluative statements.[546]

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[545] Doody to Emerson dated January 11, 1964, TS, Emerson Papers. Doody's plan was never realized; he died in a climbing accident in 1965. Emerson published the result of this project as "Power-Dependence Relations: Two Experiments," *Sociometry*, Vol. 27, No. 3 (Sept., 1964): 282-298.
[546] Emerson, "Mount Everest: A Case Study of Communication Feedback and Sustained Group Goal-Striving," *Sociometry*, Vol. 29, No. 3 (Sep., 1966): 214-215.

Many of Emerson's proposed methods and hypotheses remained intact in the early drafts of his research paper: goal-motivation within the small groups was a necessary condition to observe the predicted communication patterns; energy-mobilization was dependent upon goal-motivation; the system of task-motivation was a manifestation of environmental assessment, which allowed the environment to influence motivation and energy output. Even before seeing the diaries, he felt no need to alter any of the theory to conform to his participant-observations. But, when the diaries finally arrived in Seattle, he found that the results of their tabulations were not as compelling as he had expected them to be.

In the end, the case study that he published in 1966, "Mount Everest: A Case Study of Communication Feedback and Sustained Group Goal-Striving," supported only certain points of his theory. For example, messages in the diaries concerning the success of the South Col route, which was considered an easier goal than the West Ridge route, tended to select "pessimistic" information. Messages in the diaries concerning the success of the West Ridge route, which was considered a less probable goal, tended to select "optimistic" information. Test-subjects' assessment of chances for success corresponded to the route in which they were personally motivated, and each route's team tended to maintain uncertainty about their own goal, but not that of the rival groups. Their communication tended to counter the prevailing information that they discerned from the environment, and feedback to aspirational statements was predominantly negative, especially under conditions of high motivation. In assessments of likely goal-outcome, Emerson concluded that uncertainty "appears to be sustained *possibly* as a result of such communication." Finally, energy mobilization toward shared goals were apparently increased under conditions of uncertain outcomes.[547]

Like Siri, Emerson maintained that his line of inquiry needed further investigation, albeit for different reasons. Where Siri's test-subjects never seemed to exhibit physiological markers for stress, and therefore he could not make conclusions about the nature of stress, Emerson freely admitted that his field study was "completely uncontrolled," and so it was "hardly suited for empirical demonstration" of his theory.[548] It is intriguing that Emerson cited Mt. Everest's uncontrollable nature as the impediment to generate precise conclusions, rather than his own inability to acclimatize and prepare adequate mechanical aids to his research routines. This was a telling deviation from his pre-expeditionary preconceptions, in which he repeatedly sang the mountain's praises as an "ideal" site for the kind of research he wished to perform. Rather than black-box the situated elements of his results, as Siri had done, Emerson decided the best course of action was to change the site of his research to a non-situated space. In his article, he wrote that he intended to use the field data generated during AMEE as a baseline for further controlled studies in a university laboratory. However, if any laboratory-based studies on uncertainty's role in a self-sustaining system of goal-striving were conducted, they never made it to publication. Instead, Emerson returned his attention to social exchange theory.

The year following the publication of Emerson's AMEE results, he authored two chapters in *Sociological Theories in Progress*: "Exchange Theory, Part I: A

[547] Ibid., 227.
[548] Ibid.

Psychological Basis for Social Exchange," and "Exchange Theory, Part II: Exchange Relations and Networks."[549] From 1968 to 1976, he published an additional four papers and presented two conference presentations, each on a different facet of social exchange theory.[550] By 1976, he was so immersed in social exchange theory's literature that he wrote an authoritative, 28-page literature review for *Annual Review of Sociology* that summarized and synthesized the work of 68 contemporary researchers.[551] In its concluding remarks, Emerson wrote that social exchange theory "is not to be taken as a theory," but rather as "a frame of reference that takes the movement of valued things (resources) through social process as its focus." He employed concepts from psychology, anthropology, and economics to develop this understanding. For that article, he referenced all of his scholarly publications save one: the 1966 paper derived from his time with AMEE. This is particularly interesting because that paper was founded in social exchange theory: it treated uncertainty as a resource for energy mobilization, and tracked its movement through the social process of communication feedback amongst AMEE teammates. This omission was likely driven by Emerson's reluctance to cite a study that he believed was inconclusive due to its lack of scientific control, and it represented a continued discomfort with qualitative studies for the quantitatively-trained sociologist.

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[549] See J. Berger, J. Zelditch Jr., B Anderson, eds, *Sociological Theories in Progress* Vol. 2 (Boston: Houghton Mifflin, 1967).

[550] In addition to these, Emerson co-authored a paper with a University of Washington colleague in 1970 on one of Lester's interests: T. M. Newcomb's *The Acquaintance Process*. Timothy J. Curry and Richard M. Emerson, "Balance Theory: A Theory of Interpersonal Attraction?" *Sociometry* Vol. 33, No. 2 (Jun., 1970): 216-238.

[551] Emerson, Richard M. "Social Exchange Theory," *Annual Review of Sociology,* Vol. 2 (1976): 335-362.

In 1978, Emerson stepped down from his three-year tenure as Chair of the Sociology Department at the University of Washington. He immediately began drawing a proposal to return to the Himalaya. He had recently presented a lecture on 18th-century Mughal dynastic rule to illustrate how its imperial administration was a network of social exchange, and his desire to return to the sub-continent's high range was almost certainly influenced by his experiences at Mount Everest in 1963. He hoped to apply social exchange principles that he had developed in his laboratories to "the analysis of princely rule and the dynamics of suzerainty" in Pakistan.[552] Unfortunately, his sudden death in 1982 cut short his career, but not before he had become what a contemporary called "one of the major architects of social exchange theory" whose "articles on power and dependence...remain among the most frequently cited pieces in the social science literature."[553]

LESTER'S RESULTS

Like Emerson, Jim Lester had difficulty controlling his data after returning to the United States. His observations were too complex, too entangled with his own experiences of the locale, and too uniform to generate distinct psychological profiles that could be generalized to anyone outside of his pool of test-subjects. However, unlike Bishop, Siri, and Emerson, Lester had no permanent institutional affiliation, and so he felt that he needed to produce conclusive reports for his sponsors. As a result, he devised

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[552] Karen S. Cook, "Obituary: Richard Marc Emerson," *American Sociological Association Footnotes* Vol. 11, No. 5 (May, 1983): 10.
[553] Ibid. By 2015, "Power Dependence Relations" (1962) and "Social Exchange Theory" (1976) had been cited by over 7,650 scholarly sources.

new post-expeditionary studies that forwent the original parameters of the reality-test. This strategy was successful enough for him to elicit IPAR and ONR's patronage beyond AMEE. Although he spent nearly a decade building a career out of his experiences in the Himalaya, in the end AMEE's lasting influence on Lester may have been personal, not professional. The self-realization about which he wrote while in the field was extended by his first assignment upon return to the United States: to serve as guide to the State Department's six Nepalese visitors.

During the six weeks following the award ceremony with President Kennedy, Lester toured the United States with Nawang Gombu, Ang Dawa, Girmi Dorje, Ila Tsering, Nima Tenzing, and Noddy in a station wagon loaned to AMEE by General Motors. The group drove cross-country from New York to Los Angeles, by way of Washington D.C., St. Louis, Denver, Seattle, and San Francisco. A few weeks after his guests flew back to Nepal, Lester recounted the experience to his AMEE teammates in a style parodying the official newsletters written by Ullman that had been dispatched from Kathmandu during the expedition. Entitled, "Post-Expedition Pre-Marital Psychological Touring Newsletter #1," Lester filled his account with anecdotes that both charmed his audience and illustrated the subtle shift in his worldview that was a consequence of spending four months in the Himalaya. One of Lester's many colorful anecdotes cast the Sherpas in their typical role as willing to "stick their necks out under dangerous conditions" for "their Sahib and his welfare" while the crew negotiated speed traps along the Interstate in Colorado:

> I never had the privilege of experiencing that kind of devotion on the climb, but I--alone among men--have had the same kind of loyal protection from my six Sherpas: probing into the speed limits, keeping an

> eye on the speedometer long after I had forgotten about it, belaying one another out the back window to scan the sky for the enemy. I felt even more privileged than Whittaker with his Gombu, or Bishop with his Girme--I had both of them![554]

Lester called the six-week experience "a delight." Challenged to figure out what would "intrigue, amuse, enlighten, or otherwise make a lasting impression" upon his guests, he saw his homeland through their eyes, and discovered a joy in "sharing for a while their freshness, their directness, their delight in simple things." Soon after their departure back to Nepal, Lester felt that his life once again seemed "complex, the future doubtful, the rewards slight." These remarks paralleled subsequent meditations over the results of his field data, especially those concerning the questions: *why do men climb mountains*, and *what happens to them during that process*?[555]

Long before meeting his first Sherpa, Lester had planned to observe AMEE mountaineers' individual differences in vulnerability to stress effects, in ways of coping with stress, and in recoverability from stress effects. He hoped that these observations would produce quantifiable, clinical judgements which could serve as independent variables for correlation with the numerous assessment variables obtained during the expedition's sessions with IPAR psychoanalysts in December, 1962. Unfortunately for his project, however, he could not make clinical judgements about stress effects because his test-subjects "dealt with the obvious physical stressors (temperature extremes, fatigue,

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[554] Jim Lester, Post-Expedition Pre-Marital Psychological Touring Newsletter #1, TS, 7-8. JRU Papers.
[555] Lester's faux-newsletter was never published, although it lends the Sherpas a depth of character that is not found in any other document. Dyhrenfurth's insistence that the State Department and National Geographic Society recognize the Sherpas' contribution to AMEE's success is an example of his commitment to the values of teamwork. They were made visible performers in the climbing theatrics, however, they were rarely seen in the scientific reports.

the various effects of hypoxia) and some of the more obvious psychological stressors (separation from family, interruption of normal life routine, restricted social contacts, demands for endurance) in a very effective way." In fact, they were so effective at dealing with even the most extreme external stressors that he could not differentiate between their reactions. Although he felt that he had produced valuable observations on the mountain--including how his teammates set personal goals for their performance, adopted and acted on varying attitudes toward their physical environment, valued different aspects of their experiences in the field, and manifested a variety of personal styles "in reaction to almost everything,"--he determined that he could not synthesize his observations of the team into an understanding of each individual's relation to the locale's stressors.[556]

But, Lester was still on contract with IPAR and the Office of Naval Research. He needed to produce something to justify their support, so he prepared a paper for *Naval Research Reviews* called, "Men to Match Mount Everest," in which he discussed some of what he called the "dramatic, but difficult to operationalize, aspects of events." The article was *Naval Research Reviews'* feature for the December, 1964 issue, whose cover emphasized the unusual character of Lester's psychological research site by depicting his bearded, ruggedly-dressed profile against a background of the Nuptse Wall and Mt. Everest summit.[557] In the article, Lester connected what he believed was "a power in

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[556] James T. Lester, *Correlates of Field Behavior: Behavioral Research during the 1963 American Mount Everest Expedition* (San Francisco: Berkeley Institute of Psychological Research, 1965), 2-3.
[557] James T. Lester, Jr., "Men to Match Mount Everest," *Naval Research Reviews*, Vol. XVII, No. 12 (December, 1964): 7-14, 20.

mountains which cannot be denied" to modern psychology.[558] After outlining his research objectives, he admitted that "matters have not worked out as planned." With regard to observing stress and differentiating its influence upon AMEE test-subjects, Lester wrote, "all of the team members withstood various stresses at high levels of effectiveness, and few if any of the planned differentiations among the men could be made; all were grouped together at the high end of the performance scale."[559] As a result of these observations, and those mentioned, above, Lester shifted his research focus toward his "more general aspects" of their behavior in the field. He called his test-subjects "an introverted group, intuitive in the sense that they react more to possibilities than to established facts, and more interested in basing conclusions on thinking than on feelings. They are not highly gregarious, want to go their own way, and seek more an understanding of others than a closeness with them."[560] In his conclusion, he recognized that the group's self-selection for climbing Mt. Everest might have confounded his experiments, although he did not phrase it thus: "the characteristics that emerged from the assessment of this group of men seem to be neatly designed to equip them for such an expedition, and would seem to have had everything to do with the success, in every way, of the exercise."[561]

So, rather than produce a paper on which personality traits enable or inhibit stress mitigation in a group of climbers in the hopes that its conclusions could be applied to American submariners, Lester investigated the expedition's interpersonal relations and

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[558] Ibid., 8.
[559] Ibid., 12.
[560] Ibid., 14-20.
[561] Ibid., 20.

how those contributed to its efficacy in achieving its goals. Citing a 1963 Navy Medical report by Paul D. Nelson and E.K. Eric Gunderson, Lester defined the primary facet of individual performance in isolated groups as "the individual's handling of himself and of relations with others."[562] Nelson and Gunderson, who studied isolated researchers and Navy personnel who lived and worked in remote Antarctic research stations for 12 months at a time, had concluded that the best way to measure effective individual performance was with a questionnaire that asked an individual's peers and supervisors whether or not they would prefer to serve with that individual again for future small-station duty in the Antarctic.[563] Lester created his own questionnaire, which he sent to his surviving test-subjects in November, 1963, in which he asked them to respond to thirteen prompts by nominating other men on the team. All of the prompts sought test-subject self-assessments about matters such as morale, leadership structure, and goal-motivation. For example, prompt Q13 asked his test-subjects to choose which teammate showed "the most maturity or personal development -- in their handling of relationships with others, in their reactions to hardship and stress, in dealing with difficult emotional situations, in the kind of motivation they seemed to show, and in any other way you noted during the team's absence from the States?"[564]

By asking his test-subjects to *ex post facto* rate the feelings that they had about their comrades, Lester deflected the locale's influence over their responses. He needed

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[562] Lester, "Correlates," 3.
[563] P.D. Nelson and E.K. Eric Gunderson, Report No. 63-8: *Effective individual performance in small Antarctic stations* (U.S. Navy Med. NP Res. Unit: San Diego, California, 1963), 12. A revised version of this report was published in 1965 as "Measurement of Group Effectiveness in Natural Isolated Groups" (*The Journal of Social Psychology*, Vol. 66 (1965): 241-249.
[564] Lester, "Correlates," 55-56.

new, quantifiable data that he could control. Whereas his qualitative observations from AMEE were difficult to codify, the retrospective responses to his questionnaire were simple. But, they were also situated in a time and place much more comfortable than a Himalayan glacier. They lacked the authenticity that Lester originally sought by creating a reality-test, and that his sponsors sought by funding his study. Something to show for his time in the field and his sponsors' patronage was better than nothing, and he might be able to correlate their responses to his field observations.

After processing the team's responses, Lester found correlative relationships among their sociometric scores and IPAR's pre-expeditionary assessments that might be useful to the Navy.[565] Based on the adjectives IPAR used to describe the men whose scores best correlated with leadership choice, Lester concluded that an effective leader was "committed to the interpersonal realm," had a "facilitative style of interaction," and demonstrated an optimistic "awareness of possibilities." A good teammate, according to Lester's crunching, embodied the same three generalized personality traits as an effective leader, but with a slightly different "mixture" of adjectives, and an additional "interest in the management of people."[566] Lester and IPAR furnished these conclusions to the Office of Naval Research in 1965. Unfortunately, it is difficult to determine to what extent the Navy used these data to profile individuals for certain assignments.

With the completion of "Correlates of Field Behavior" in March, 1965, Lester had both fulfilled his obligation to the Navy and run out of funding. At that time, having been

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[565] Lester to Payne, October 20, 1964, BCB Papers.
[566] Lester, "Correlates," 31-38.

removed from clinical psychology for two and a half years, he decided to try to build his career around his experiences at Mount Everest. Through his connections with IPAR, he had recently been made Director of the Berkeley Institute of Psychological Research, so he obtained funds directly from the Institute to continue his project for a third year so that he could use his AMEE dataset to work on the problems of acquaintance and personal compatibility. Those issues had originally been introduced to Lester by Newcomb in 1962, during the run-up to the expedition's departure. Even though Lester found Newcomb's method of processing the data to be "damn tedious business," he wanted to "pay back" the past encouragement Newcomb had supplied when Lester had difficulty formulating a cohesive research proposal to cover his part in the expedition.[567]

After four months, Lester completed "Acquaintance and Compatibility: Behavioral Research during the 1963 American Mount Everest Expedition." He mailed copies of this technical report to ONR, Newcomb, and Emerson, and he hinted that a host of IPAR-affiliated psychologists (Margaret Singer, Marvin Spiegelman, Harrison Gough, Calvin Hall, and Frank Barron) were then attempting to match AMEE assessment information with their particular research interests, ranging from Rorschach protocols to the California Personality Inventory to dream analysis.[568] Lester's next plans were to reshape his three technical reports into three monographs suitable for submission to the *Journal of Personality and Social Psychology*, and rewrite his findings in a way that would be more accessible to a popular audience.[569] By July, 1965 he produced a "much

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[567] Lester to Emerson, March 29, 1965, TS, Emerson Papers.
[568] Lester, "Acquaintance and Compatibility," 30. Emerson Papers.
[569] Lester to Emerson, March 29, 1963, TS, Emerson Papers.

simpler statement" of his results and conclusions for a 15-minute presentation to the Western Psychological Association Meetings in Honolulu. Although he was unable to secure funding to present his paper in person, he did distribute it to his AMEE teammates.[570]

The concluding remarks of Lester's presentation indicated that he was satisfied with the product of his research, but uncertain whether it could be generalized to apply to similar groups in similar settings, such as "submariners, personnel at isolated Antarctic stations, astronauts and scientific space mission teams."[571] To that point, he encouraged interested researchers to conduct similar studies in these varying settings.[572] Lester wrote another summary for general audiences, "Acquaintance and Compatibility," which was mailed to AMEE teammates in July, 1965. In it, he discussed how his survey of AMEE climbers confirmed Newcomb's theory of acquaintance. "Liking influences you to perceive similarity," he wrote, "Actual similarity influences liking." Because these results were not particularly surprising, Lester used the study's setting to justify their presentation: "[Newcomb's] theory is shown to apply even in a real-life, task-oriented, stressful situation," therefore, Lester argued, "it must be an important and basic fact about human nature."[573]

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[570] Lester to Emerson, July, 1963, TS, Emerson Papers.
[571] Lester, "Paper for Presentation at the Western Psychological Association Meetings, Honolulu, June 1965," TS, Emerson Papers.
[572] As least one project would explicitly take up his challenge; in 1977, Douglas J. Herrmann et al. published "Relationship Between Personality Factors and Adaptations to Stress in a Military Institution," in which they would argue that Navy recruits who were less proficient in depending on their peer group were less likely to cope with "high levels of stress."# Their conclusion--that the personality attribute "extraversion" played a crucial role in the recruits' ability to make affiliations who would mitigate stressful circumstances--would corroborate some of Lester's Q2 data.
[573] Lester to Emerson, July 1965, TS, Emerson Papers.

Into the late 1960s, Lester continued to build his career upon his experiences and research at Mt. Everest while engaging a more general audience than professional psychologists and continuing to work within the Cold War structures that had supported his venture to the Himalaya. In 1967, he collaborated with Emerson to produce a presentation to a symposium on the psychological effects of isolation at Texas Christian University's Institute of Behavioral Research. In 1968, after working in the U.S. Virgin Islands assessing Peace Corps trainees, he wrote a manuscript for children about the 1963 American Mount Everest Expedition.[574] The following year, six years after AMEE's return from Nepal, Lester published "Personality and Everest" in the non-academic *Alpine Journal*. "Personality and Everest" was Lester's last piece directly related to the expedition, however, he spent the next ten years cultivating a fruitful relationship with his AMEE sponsors. Through the mid-1970s, during a stint with ONR's foreign office in England, Lester completed fieldwork on the Department of Defense's behalf, attended professional conferences on applied military psychology, NATO conferences on the detriments and origins of aggression, and toured Europe and Israel to assess various countries' "military psychology." He reported on all of these activities to ONR and, in turn, the United States Defense Technical Information Center. By 1979, he had returned to the United States to collect and annotate the 356 projects since 1950 concerning stress that had been funded by DOD. In 1983, he repeated the project for DoD-funded studies of organizational stress.

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[574] Lester pitched the manuscript to NGS President Melvin Payne, but the Society did not wish to publish it. Lester to Payne, December 12, 1968.

These studies, along with the whole of Lester's professional output after his quantitative reports on AMEE for ONR, reflected a preference for qualitative research. This predilection suited him; some of his most profound observations regarding AMEE were made while ruminating over his sprawling data prior to its tabulation. Some of these, particularly those that pondered the nature of scientific objectivity, are discussed later in this chapter. Another of his more poignant musings was printed in his appendix chapter for Ullman's *Americans on Everest*. Discussing why some people question those who would climb dangerous mountains, Lester wrote,

> We all recognize that in order to climb a significant mountain one has to be dedicated to and absorbed in the job; otherwise the energy simply will not be there... I sometimes feel that the amazement many of us feel in contemplating mountains and their climbers has its roots in [our] enfeebled ability to devote oneself to, to become absorbed in, an activity--in a word, to enjoy living with responsive vitality.[575]

For his part, Lester's life after AMEE stayed closer to sea level, fulfilling a promise made in 1964 to strive to achieve that responsive vitality "without going any higher than is required to get in some decent skiing--say, ten thousand feet!"[576] At least until 1997, when he returned to visit the space that had defined his career-long interest in stress. Whilst there, he noted how "something extraordinary" had happened to Mount Everest since 1963: "It has turned from an exotic locale--with overtones of Mount Olympus and Shangri-la--into a rite of passage for everyman... our American expedition, in an indirect way, had something to do with that--for better or worse."

[575] James Lester in Ullman, *Americans on Everest*, 394.
[576] James Lester in Ullman, *Americans on Everest*, 394-395.

MILLER'S RESULTS

The tremendous workload that overwhelmed Miller's glaciological program in the field made him more cognizant than his AMEE colleagues of the locale's control over their attempts to produce knowledge. After returning to the United States, Miller readily admitted the methodological obstacles present at Mt. Everest.[577] Despite his pre-expeditionary framing of the locale as an exceptional site for glaciological research, he discovered unexpected anomalies at Mt. Everest that prevented him from making generalizations about its glaciology and tele-connecting it to Earth's other alpine glacial systems. Miller's identification and attempts to explain these anomalies in his reports preceded, and likely informed, two major innovations in geology: continental drift and global climate change However, before Miller could develop these explanations, he would need to get his specimens from Mt. Everest in order.

When Miller and Prather returned to the United States with the rest of the team in June, 1963, they had little time to lose. They skipped the Hubbard Award Ceremony with President Kennedy to get up to the Juneau Icefield Research Project, whose summer season was already in full swing.[578] While at Juneau, Miller took the opportunity to bolster his Himalayan glacier samples with additional specimens from the Taku Glacier in the Juneau Icefield. By the time they returned in October 1963, the Khumbu samples had arrived in a Southern California port, however, Miller's desire to check and re-label the Khumbu samples before delivering them to Dr. Libby just in case there had been a

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[577] This was perhaps due to his familiarity with extreme sites, unlike his colleagues.
[578] "Michigan State University Geological Institute's Fourth Summer Institute of Glaciological Sciences at Juneau Icefield, Alaska," (1964), JRU Papers.

mix-up during the expedition's "hasty departure from the mountain" led to an additional delay.[579] At first, Prather planned to check and personally deliver the samples to Dr. Libby's laboratory at UCLA, however, he was unable to make the trip down to California. As a result, the samples sat for an additional three weeks until Miller arranged for their shipment to his office in Michigan. Once there, they awaited analysis through the end of 1963 as Miller arranged for NGS to send him his Kodachrome slides and black and white photographs, because these photos were his "most important notes on the stratigraphic sequence" of the sampled crevasse wall.[580] Miller was unable to send a preliminary report to Dr. Libby until December 19, six months after AMEE returned to the United States.

Miller was also behind in getting a report to Ullman for his appendix in Ullman's forthcoming book.[581] Like Siri and Emerson, Miller's duty to provide accounts for public forums, including Ullman's book, NGS editorial inquiries, and instrument manufacturers, postponed his scientific inquiries. Vannevar Bush may have presented postwar basic research as "performed without thought of practical ends" in 1945, but this did not prevent the scientists' benefactors from worrying about the fruits of their funding.[582] Having accepted public and private funding, Miller and his colleagues were saddled with the responsibilities of public and private accountability. All of these delays provoked a reaction from AMEE Scientific Leader Will Siri, who had learned of the logjam from Dr. Libby. Siri reminded Miller that he had "accepted the obligation for the Expedition to get

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[579] Miller to Will Siri, December 28, 1963, TS, Siri Papers.
[580] Ibid. AMEE's contract with NGS gave the Society first publication rights to its photographs. As a result, NGS developed all of the still photographs exposed by AMEE members.
[581] Miller to Stewart Richardson dated October 24, 1963, JRU Papers.
[582] Vannevar Bush, *Science, the Endless Frontier: A Report to the President on a Program for Postwar Scientific Research* (Washington D.C.: National Science Foundation, 1960), 18.

these samples" to Libby.[583] In his reply, Miller cited the "rugged field conditions surrounding these collections...the lack of butane, field assistants, sherpas, etc." as reasons justifying the setbacks surrounding the samples' deferred delivery.[584] Even six months on, and half the globe away, Mount Everest's locale still exerted control over the production of scientific knowledge.

Miller had additional bad news to deliver in December, 1963 in the form of two reports written about the Zenith Star Camera Equipment and Varian M-49 Magnetometer, both loaned to AMEE's geological program for testing. Regarding the Star Camera, Miller reported that "circumstances precluded completion" of its use in the geographical positioning of a set of gravity survey points. One of these circumstances was logistical: the instrument's precision chronometer was accidentally left behind in Kathmandu, and it did not catch Miller and Prather until their stay at Lobuche on March 17. Another circumstance that Miller mentioned was the extremity of the locale: in the high Himalaya, "negligible vertical control could be obtained" to calibrate the instrument for precise measurements, Miller suffered a broken foot "in a rock slide" which restricted "his activity in connection with peripheral projects," and Prather's bout with HAPE rendered him "unable thereafter to provide any more assistance." Still another circumstance was foul play: a porter from Pheriche absconded with the base plate during the return march, and by the time it was recovered the team had moved beyond Miller's gravity survey points.[585] When the base plate caught up with the withdrawing team just five days short

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[583] Miller to Will Siri, December 28, 1963, TS, Siri Papers.
[584] Ibid.
[585] The climbing Sherpa who recovered the base plate found its thief using it as a cooking pot for his family.

of Kathmandu, the arrival of the monsoon's nightly overcast precluded effective astronomical photography.

One circumstance that Miller did not mention in his report was the underestimation of the Himalayan locale that plagued his ambitious geoscientific program. Working at altitudes exceeding 5000m was much more difficult than he had anticipated; during their time in Lobuche, Miller wrote in his diary that he intended to set up the star camera.[586] Ten days later, on March 26, 1963, Prather had written in his diary that he was going "to get rolling" with star camera shots the following day.[587] Neither man kept these promises, even though both apparently had enough time to do so. In his report, Miller did not explain his neglect of the star camera program, save that he had decided "to forgo attempts to use this camera until the return march." Had Miller prioritized testing the Star Camera during those chilly nights in Lobuche, then he might have been able to report on its effectiveness to Lab Geodetics, Inc.[588]

The Varian M-49 magnetometer met a similar fate to that of the Star Camera. After testing it on the Khumbu Glacier just east of Lobuche, Miller decided that the region's uniform lithology forestalled the instrument's use. Miller was even less likely to need the instrument to study sub-glacial geomorphism in the narrower Western Cwm. So, he set aside the instrument for subsequent use in the Pumori Glacier valley, to the northwest of Gorak Shep. Those tests never materialized. Again, he cited his injury and Prather's illness as reasons why he could not conduct further tests with the magnetometer.

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[586] Miller, diary card for March 17, Emerson Papers.
[587] Prather, diary card for March 27, Emerson Papers.
[588] Miller, "Report on Zenith Star Camera Equipment loaned to The American Mt. Everest Expedition 1963," TS, Siri Papers.

By the time Miller tried to use the instrument on the return march, about 100 miles east of Kathmandu in Nepal's iron-ore district after over three months of exposure to extreme temperature swings, its battery was dead. As a consolation, Miller volunteered to take the magnetometer to the Juneau Icefield in Alaska for the 1964 season, if Varian Associates was interested in that prospect.[589]

Despite the delays and difficulties, 1964 was an extraordinarily productive year for Miller. First, he set about structuring his observations from the Himalaya into a scientific report for NGS. Called "Sketch of the Geology of the Mahalangur Himal with Preliminary Comments on the Glaciology of Mount Everest and Some Related Problems of High Altitude Research," many of the ideas that he developed for this report informed conclusions reached in four subsequent articles published later that year. A popular version of "Sketch of the Geology" was included as an appendix chapter in Ullman's *Americans on Everest* in May, 1964. It was subsequently rewritten for academic audiences and published under the title "Glacio-Meteorology on Mt. Everest in 1963: The Khumbu Glacier of Chomolongma in Northeastern Nepal," for the August, 1964 issue of *Weatherwise*. In this triad of articles, Miller began by discussing the accepted geological history of the Himalayan region, and fit the observations that he made during AMEE into that history where he could: Mount Everest's Yellow Band, which by Miller's analysis was clearly of "marine origin," was used to support the contemporary theory of an ancient, epicontinental sea that divided Asia in the same way that the Mediterranean Sea divided Europe from Africa from the Mesozoic to Cenozoic eras. The great watersheds of

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[589] Miller, "Report on the Varian M-49 Magnetometer loaned to The American Mt. Everest Expedition 1963," TS, Siri Papers.

the Himalaya began as pioneering streams that drained the epicontinental sea as the region it covered warped upwards.[590] As Miller transitioned from describing the geological landscape to the region's glaciology, however, he emphasized observations that he could not immediately reconcile with his discipline's preference for uniformitarianism.[591]

Miller's observations indicated that the Solu Khumbu region was an isolated center of glaciation in both recent and ancient history. The terminal moraines of some Ice Age glaciers merged with extant glaciers, while the moraines of others lay at most 23 kilometers from the southern limits of the extant valley glaciers surrounding the Dudh Kosi canyon.[592] These puzzling observations led Miller to pose a question about the magnitude of the towering moraines he observed: "Were they but part of a long sequence of normal retreat from the older down-valley moraines, or did it mean that a zone of former glacial concentration had shifted upward and northward in more recent time?"[593] Or, Miller supposed, was there a third solution to his problematic observations wrapped up in the "tantalizing possibility" of major, recent tectonic uplift.[594]

Miller's appraisal of glaciology and geology in the Mount Everest region led him to what he believed was a paradoxical conclusion: "that the most extensive glaciation has developed here in the Ice Age, as opposed to the early Pleistocene Maxima known to

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[590] Maynard M. Miller, "Geology and Glaciology," in James Ramsey Ullman, *Americans on Everest*, 401-402.
[591] Uniformitarianism is a belief held by geologists since Louis Agassiz and Charles Lyell that all landforms are being created by the same processes that are observed today. This is in opposition to catastrophism, which attributes landform creation to sudden, often cataclysmic phenomena.
[592] Moraines are detritus deposits left by retreating glaciers. A terminal moraine is composed of those deposits from the glacier's farthest point of advancement.
[593] Miller, "Geology and Glaciology," 407.
[594] Ibid., 412.

have occurred in formerly glaciated regions elsewhere on earth."[595] Miller believed that the simplest explanation for this phenomena was an uplift in Earth's crust, sufficiently rapid to keep the Himalayan glaciers from melting during a trend of global climate warming, and of sufficient magnitude to maintain the land's glacial condition even as the rest of Earth's glaciers were in retreat.[596] This evidence suggested to Miller that the high Himalaya along the border of southern Asia was being deformed by "a most significant event" in its diastrophic history.[597] This event, for which Miller could not provide a cause, explained the abnormal glacial conditions that characterized the Sagarmatha region and Mount Everest "in a manner not revealed anywhere else on Earth."[598] Unknown to Miller at the time, the event in question was the collision of the Indian subcontinent into southern Asia; Miller had identified an anomaly that required a new way of understanding the Earth's crust to reconcile his observations. That new understanding would emerge over the following decade in the form of the theory of plate tectonics, which became a unifying theory of the earth sciences in the early 1970s.[599]

Plate tectonics was not the only major scientific discovery anticipated by Miller because of the time that he spent with AMEE at Mount Everest. When Miller set out to the Himalaya he did so in part because he believed its glaciology might correspond with other cordillera like those found in the Andes, Alps, and Rockies.[600] If a general

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[595] Miller, "Geology and Glaciology," in Ullman's *Americans on Everest*, 412.
[596] Ibid.
[597] Diastrophism refers to the deformation of the Earth's crust, especially folding and faulting of that crust.
[598] Miller, "Geology and Glaciology," in Ullman's *Americans on Everest*, 412.
[599] Naomi Oreskes, "Continental Drift," TS, http://historyweb.ucsd.edu/oreskes/Papers/Continentaldrift2002.pdf, 2002, retrieved August 20, 2009.
[600] Cordillera are groups of parallel mountain ranges, inclusive of the plateaus between them.

correlation was discovered, then glaciers located in opposite hemispheres might be compared to favorably illuminate their respective natural histories back into the Pleistocene. This process, which Miller called "teleconnection" or "telecommunication," was a major component of his funding proposal to NGS, discussed in Chapter Three of this volume.

Miller had teleconnection on his mind when he returned from the Himalaya; it informed his work in Alaska the summer following AMEE, and the other two peer-reviewed articles that he published in 1964 reflect its influence upon his thinking. Based on observations made in affiliation with the Juneau Icefield Research Project between 1946 and 1962, Miller published an "Inventory of Terminal Position Changes in Alaskan Coastal Glaciers since the 1750s." Over the course of those sixteen years, Miller had visited seven major glacial systems, totaling 174 glaciers. Of these, he noted that 129 were shrinking, 18 appeared to be in equilibrium, and only 27 were observed to be advancing. In the article's conclusion, Miller did not attribute these observations to anthropogenic climate change because that concept did not yet exist, however, he did recommend further research to discover the cause of the glacial recession and recommended that research be conducted on "prototypical" glacier systems whose characteristics reflected the larger, regional pattern so that they might teleconnect with cordilleran glaciations.[601] Miller's desire to use local phenomena from various sites across the globe to make generalizations about global climate and its effects on glaciology

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[601] Maynard M. Miller, "Inventory of the Terminal Position Changes in Alaskan Coastal Glaciers Since the 1750's," *Proceedings of the American Philosophical Society* Vol. 108, No. 3 (Jun. 22, 1964): 272.

presaged research methods that would within twenty years provide some of the strongest visual and scientific evidence for anthropogenic global climate change.[602]

This interest in generalization via teleconnection spurred Miller to research and publish another peer-reviewed paper in 1964, "Morphogenetic Classification of Pleistocene Glaciations in the Alaska-Canada Boundary Range," which was also printed by *Proceedings of the American Philosophical Society*. From the outset, it is clear that Miller intended to use the Alaska-Canada Boundary Range as a "morphogenetic region" for teleconnection with other cordillera, including the Sagarmatha region from whence he had just returned.[603] While at Mount Everest, however, Miller observed worrying phenomena that might undermine his efforts for teleconnection. He discovered that, contrary to the previous suspicions of Swiss geologist F. Müller, who accompanied the 1956 Swiss expedition to Mount Everest, accumulation in the Western Cwm was due to direct snowfall rather than avalanche snows. Miller found that katabatic winds off the Lhotse Face depleted snow cover from the ice apron below the Lhotse Face (the Upper Khumbu above 6850m), carrying it down the Western Cwm before redepositing it on its middle and lower sections.[604] This process led to the lower third of the Western Cwm

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[602] James Balog's film *Chasing Ice* (2012) provides stunning visual evidence of global climate change's effect on Alaskan glaciers as observed by his Extreme Ice Survey. An inventory of Yukon glaciers by N. E. Barrand and M. J. Sharp, which used baseline data collected during the International Geophysical Year in 1957-1958, discovered that of the 1402 glaciers cataloged in 1958, 4 advanced, 10 remained in equilibrium, 1,065 retreated, and 323 disappeared, "Sustained Rapid Shrinkage of Yukon Glaciers since the 1957-1958 International Geophysical Year," *Geophysical Research Letters*, Vol. 37, No. 7 (Apr., 2010). Also, see Ben Marzeion, et al., "Attribution of Global Glacier Mass Loss to Anthropogenic and Natural Causes," *Science*, Vol. 345, No. 6199 (Aug. 22, 2014): 919-921.

[603] Miller, "Morphogenetic Classification of Pleistocene Glaciations in the Alaska-Canada Boundary Range," *Proceedings of the American Philosophical Society* Vol. 108, No. 3 (Jun. 22, 1964): 247. Morphogenesis refers to the formation of landforms.

[604] Katabatic winds are caused by local downward motion of cool air.

(about 6400m) receiving the greatest total accumulation of the whole Khumbu Glacier. Strata in the retained firn and ice column exposed on crevasse walls at the entrance to the Western Cwm, just below Camp I (where Miller completed transect PVI), indicated that the Khumbu's annual net accumulation in that zone averaged approximately 106cm. However, Miller's observation of depletion via katabatic airflow on the Khumbu's higher elevations created a problem of underdetermination that he could not solve by simple visual observation of the column's strata. He was concerned that what appeared to be single annual layers separated by dirty layers could actually represent alternating segments of accumulation via winter winds and summer monsoon snowfall.[605]

If that was the case--that the Khumbu Glacier was replenished bi-annually--then its local climate precluded it from correlation with other cordillera. There was only one way to find out: if Miller found interpretive clues via the nature and origin of wind-borne particulates found in melt samples from each of the Khumbu's strata that had been obtained for laboratory analysis, he might solve this problem. As it turned out, however, his work at the Juneau Icefield prevented him from conducting that analysis before Dr. W. E. Libby provided the necessary data to determine the rate of glacial accumulation in the course of his project on solar flare radiation. After finally receiving his samples in December, 1963, Libby used a technique he developed to measure relative quantities of Tritium (H^3) in melted ice to detect significant variations of that radioactive isotope of hydrogen, which he knew was produced in both periodic outbursts of flare activity on the surface of the sun and recent surface hydrogen bomb tests. He noted an anomaly in

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[605] Miller, "Sketch of the Geology," 21.

specimens taken from the Khumbu Glacier. Based on Miller's provisional dating of glacial strata, Libby found that there were twice as many years between spikes in annual Tritium levels attributed to known hydrogen bomb tests--specifically those of the American Castle and Hardtack series, and the 1961-1962 Soviet test series. When dating was compressed to reflect biannual snow accumulation, the spikes aligned with those tests, a fact that Libby co-published with Miller and UCLA geophysicist Joel S. Leventhal in their 1965 paper, "Tritium in Mt. Everest Ice--Annual Glacier Accumulation and Climatology at Great Equatorial Altitudes."[606] Based on Libby's interpretation, Miller knew that the Upper Khumbu had two distinct periods of glacial accumulation each year, an unusual attribute for a glacial system.[607] Although Miller's team had failed to obtain pre-1954 precipitation to aid Libby's study of solar flare activity, in the process of working for Libby he had learned a new method for dating ice core samples, one that would become *modus operandi* for glaciologists operating in polar regions over the next fifty years.

The result also thwarted Miller's desire to correlate the Himalaya to other regions of glaciological study, a fact that he acknowledged in a paper co-authored with Prather for the 1965 Alaska Science Conference. In their study of Alaskan, Scandinavian, Alpine, and Himalayan glaciers, they discovered correlations between the first three that they believed could be extended to the Andes and Patagonia. The Himalayan glaciers,

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[606] Maynard Miller, Joel S. Leventhal and W. F. Libby, "Tritium in Mt. Everest Ice--Annual Glacier Accumulation and Climatology at Great Equatorial Altitudes," *Journal of Geophysical Research* Vol. 70, No. 16 (Aug. 15, 1965): 3885-3888.
[607] Miller, "Sketch of the Geology:" 21-22.

however, did not fit due to their bi-annual accumulation segments.[608] Further, a lack of similarity "in major effects of the Pleistocene" in the Himalaya, compared to other cordillera, suggested that the uplift along the Nepal-Tibet border was of sufficient magnitude to negate the effects of global climate amelioration. Thus, due to this "unique causal situation," neither the anatomy of extant Himalayan glaciers nor the evidence of their forebears could be correlated with those found in other ranges.[609] Like his AMEE colleagues in the life and social sciences who had also gone to Mount Everest in search of unique phenomena, Miller's results did not match his expectations. The Khumbu Glacier and its fellows in the Sagarmatha region were too unique to be of use to Miller's teleconnection study; he could not compare the Himalaya to the rest of the world because its extreme elevation made it too exceptional.[610]

SCIENTISTS' REFLECTIONS ON SPACE

Only after returning from the mountain and digesting their data did the four principal researchers reflect on the effects of Mount Everest's extremities on their scientific research. Although they had pursued nature "in the raw" at the expense of their bodies, many of them came away with more questions than answers. The alluring

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[608] M. M. Miller and B. W. Prather, American Mount Everest Expedition, 1963, "Teleconnection Problems in the Glaciation of the Himalaya and of the North Pacific Coast Ranges," *Science in Alaska, 1965: Proceedings of the sixteenth Alaskan Science Conference* (Juneau, Alaska: 1965), 168-169.
[609] Ibid., 170.
[610] Miller never explicitly acknowledged this ironic result. 20 years after the 1965 conference, Miller teleconnected glaciers in Alaska with those in the Andes and New Zealand to demonstrate carbon dioxide's causal effect of climate, which led to glacial wastage and retreat in the observed regions. See M. M. Miller, "Recent Climatic Variations, their Causes and Neogene Perspectives," in *Late Cenozoic History of the Pacific Northwest*, Charles J. Smiley, ed., (San Francisco: American Association for the Advancement of Science, 1985), 357.

unpredictability of non-simulated testing cut both ways, simultaneously enabling circumstances that could never be replicated, and inhibiting their observation. The reports of AMEE researchers acknowledged these difficulties and reflected diverse dispositions toward the extreme space of inquiry, born from their personal experiences in the locale and the unexpected results of their studies. One common theme present in all of their reflections is the attribution of agency to Mt. Everest's environment. Even if they were not always willing to say so in their professional papers, AMEE's scientists believed that the mountain, rather than their science, limited what they could accomplish in the space.

Siri and Emerson, who were the two scientists most accustomed to working in controlled laboratory spaces, wrote the least about these matters. Siri realized that working under the "restrictive conditions" that were "imposed by the environment" had required him to limit his methods to simpler procedures than he had planned.[611] The field created "unavoidable" obstacles to his experimental controls, yet he believed that his subjects' long-term, voluntary exposure to that extreme environment led to "unprecedented" benefits to his study.[612] The comments he made about the physiological ease of climbing Mount Everest, noted above, characterize an ambivalence toward extreme field research that was not present in his project proposals.

Emerson, too, displayed a pronounced lack of enthusiasm in his post-expeditionary reflections on AMEE's space of inquiry. His reserved tone likely reflected the difficulties that he encountered while trying to work within the space. He hoped that the "adverse environment" would throw "relevant principles" into bold relief, however,

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[611] Siri, Final Report, 2.
[612] Ibid., 7, 10.

his ability to detect those principles was curtailed by the very adversity that he had hoped to study. Only one of his three data collections routines was dependable, the others were "hampered," "less reliable than usual," or "impossible" due to anoxia, personnel dispersal across vast, difficult topography, and technological difficulties resulting from extreme temperature swings.[613] As noted above, this led him to conclude that his study could not be used for "empirical demonstration." Despite this, he maintained that expeditionary mountaineering provided an "ideal setting" to study goal-oriented motivation, even though all of his future experiments were set in laboratories.[614] As a professional mountaineer, Emerson was predisposed toward mountain expeditions. Additionally, he believed that the qualitative observations that he made as a participant observer in Mount Everest's non-simulated environment provided insight into the studied sociological processes that simply could not be replicated in a lab. Had his life not been cut short, he may have made further forays into the mountains on behalf of sociological research.

Lester's prolific reflections on the space of inquiry evolved over time. In the field, he wrote about a personal need for external stimulation originating from the monotony of living at Mt. Everest for so long. Within a year, however, his tone had changed. In one of his published reports, he attributed an agency to the space of inquiry similar to those found in the writings of Enlightenment romantics who wrote about their sublimity: "Mountains, like the sea, seem always to have been powerful stimulators of the human imagination."[615] He believed that this sense of awe and power was different than those

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[613] Emerson, "Mount Everest:" 218-220.
[614] Emerson, "Mount Everest:" 217, 227.
[615] James T. Lester, Jr., "Men to Match Mount Everest:" 8.

with which humans were familiar; he speculated that the feelings inspired by high mountains "may well be the source of all religious development." After spending a year back in the United States, his opinion of the Himalaya--particularly the location of Advance Base Camp on Mount Everest's Western Cwm--had shifted from a monotonous place to an "overwhelming" one. Upon retrospection, Lester discovered a "tremendous pulling power" in the unfamiliar environment:

> Witness to the power of their beauty is the fact that I lived for a month at 21,300 feet, without going outside a radius of about 50 yards, with almost nothing to do, and yet suffered practically no boredom, which I attribute to the sheer esthetic impact of the surroundings. There was the (for me) great fantasy-provoking effect of both being removed from the necessities and external controls of a routine daily schedule and being close to the highest point of the earth's surface; being almost on the border of Tibet and exposed to Tibetan refugees, whose country has long stood as almost the number one symbol in the West for earthly mysteriousness and remoteness, contributed its share to distraction too.[616]

Lester admitted that these distractions prevented him from maintaining the "severe kind of detached objectivity" required both by his profession and by his research objectives. The physical and psychological stressors associated with the landscape's extremity contributed further to Lester's sense of awe, and sharing their trials with the rest of the team caused Lester to identify and empathize with his test-subjects. Lester had originally planned to study individual differences in vulnerability to, coping with, and recovering from stress effects, but since he was subject to the same stressors as his test-subjects, he found it impossible to objectively analyze his teammates' responses to them.

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[616] Lester, *Correlates of Field Behavior*, 47-48.

In mid-1965, Lester realized during his data analysis that the rugged topography had also confounded his research objectives; back in the Western Cwm, the distances and dangers between camps had inhibited his ability to observe his test-subjects. It also inhibited his test-subjects ability to interact with each other in ways that were important to Lester's study of acquaintance processes.[617] In spite of these variables, Lester's confidence in the results of his study grew over time. By 1969, the closing remarks in his final publication concerning AMEE reassured future scientists conducting research in extreme, uncontrolled conditions that "adequate planning, adequate attention to obtaining the whole-hearted co-operation of subjects beforehand, and no small amount of good luck" could mitigate whatever environmental vagaries they might encounter.[618]

Where Lester expressed optimism toward pursuing research opportunities in extreme localities, Miller's post-expeditionary reports underscored an appreciation for the contingencies that destabilized every component of his research program. At the beginning of his first report upon returning to North America, he made that appreciation explicit, declaring that "the nature of the physical environment at the elevations where we were obliged to work exerted strong control over what we could do in the study. Near the roof of the world, there are inexorable controls on the efforts of the field scientist as much as on the mountaineer."[619] Miller, who had built his career upon field research in harsh environments--from remote Alaskan icefields to a makeshift laboratory atop Mount

[617] Lester to Emerson, July 12, 1965, TS, Emerson Papers.
[618] Lester, "Personality and Everest," *Alpine Journal* No. 74 (1969): 106.
[619] Miller, "Sketch of the Geology," 1.

Rainier--had either been inadequately prepared for these inexorable controls, over-committed to too many of the Solu Khumbu's research opportunities, or both.

Another report written by Miller at the same time emphasized the logistical difficulties of conducting a complex program of projects in a region as remote as the Solu Khumbu. In his report on the Zenith Star Camera, he explicitly connected the locale to the obstacles to his research that he encountered. During the approach march, the travel schedule was too tight to allow for extensive local research, or to wait around for ideal conditions.[620] The train of porters were too strung out to allow for research requiring instruments that had been packed for transport.[621] Unfortunately for the geological team, it was only after encountering these local contingencies that Miller and Prather fully appreciated the "difficulties" of using elaborate technical equipment in the Himalaya.[622]

Those difficulties had been further exacerbated as the expedition climbed Mount Everest, where the geological team found even the most mundane activities to be challenging. Reflecting on this, Miller and Prather "came to appreciate the formidable problems facing geologists who undertake field research in this hostile physical environment at great altitude." Miller attributed the shortfall in his research programs to the locale. At such extreme altitude in an isolated region, he wrote that "inordinate amounts of time and energy must be spent simply to survive." Coming from a man who had spent a dozen summers researching Alaskan glaciers, these comments threw into sharp relief the demands of Mount Everest upon any field scientists who hoped to

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[620] In the case of the star camera, ideal conditions were a cloudless, nighttime sky.
[621] Miller, Star Cam, 2.
[622] Ibid., 3.

"engage effectively" in scientific inquiry.[623] Of all of AMEE's scientists, Miller seemed most aware of the degree to which the extreme locale shaped his research projects. As a career field scientist who continued research in extreme locales for nearly half a century after AMEE, he was also in the best position to develop and deploy techniques to circumvent extremity, even if the Juneau Icefield presented "more amenable field conditions" than the high Himalaya.[624]

DYHRENFURTH

The man who conceived AMEE as a scientific enterprise, rather than a purely mountaineering one, spent the months following the expedition editing the film he shot into the documentary, "Americans on Everest." Broadcast on CBS in 1965, "Americans on Everest" was accompanied by a five-page spread in the September issue of *National Geographic* announcing the Society's foray into television programming. Narrated by Orson Welles, "Americans on Everest" set the tone for the Society's subsequent programs, which endeavored to popularize research and exploration in exotic regions of the world for its American audiences. After the initial broadcast success of "Americans on Everest," Dyhrenfurth screened the film on a lecture circuit in an effort both to make up for shortfalls in AMEE's budget and to raise funds for his next expedition.

In the immediate aftermath of AMEE, Dyhrenfurth attempted to build on that expedition's successful combination of research and mountain climbing. Unfortunately,

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[623] Ibid., 2.
[624] Maynard M. Miller, "Report on the Varian M-49 Magnetometer loaned to The American Mt. Everest Expedition 1963," Box 4, "WES Papers, 1961-1966."

the 1960s were a difficult time for fundraising, in part because all of the 8000-meter peaks had been climbed. When Dyhrenfurth approached the Royal Geographical Society with a proposal to lead an Anglo-American team with Sir John Hunt to climb Himalayan peaks and search for the elusive yeti, he found less traction than he hoped. In 1964, he wanted to use funds from the American Everest Foundation--the non-profit established with surplus from AMEE coffers--to support a photogrammetry expedition "of cartographers, glaciologists, and climbers" to the Siachen Glacier, in the Karakoram Range near the border of India and China.[625] Unfortunately, the American Everest Foundation, which had been transferred to the Sierra Club's control, was not yet in the black, so no further hybrid research-mountaineering expeditions materialized during the 1960s.

By early 1970, four Apollo astronauts had walked on the surface of the moon, winning the space race for the United States. When Neil Armstrong and Buzz Aldrin returned to Earth in 1969, their success obviated the institutionalized, national mandate to direct basic scientific research toward aiding the lunar landings, exemplified in AMEE's contracts with NASA, ONR, AFOSR, AEC, and NSF. So, when Norman Dyhrenfurth turned to his contacts in the scientific research community to bolster a new team who he hoped to lead to Mount Everest in 1971, many of its goals were similar to AMEE, but Dyhrenfurth's justificatory rhetoric attempted to construct a locale around different traditions in its political and public dimensions. Like AMEE, the 1971 expedition would study "high altitude stress metabolism," this time under the direction of different

[625] Dyhrenfurth, "Post-Expedition Letter #4," TS, March 2, 1964, JRU Papers.

University of California physiologist, Dr. F. Duane Blume.[626] Like AMEE, Dyhrenfurth's new expedition would try to summit the mountain via two separate routes. Unlike AMEE, Dyhrenfurth's 1971 prospectus contained no strident nationalism, nor any mention of the expedition's potential benefits to American astronauts. The 1971 expedition was to be an international affair. Its pleas for funding tapped into the growing public interest in terrestrial worlds exemplified by the first Earth Day in 1970, rather than extraterrestrial enterprises like Apollo. A 1970 brochure advertising the imminent expedition for fundraising purposes closed with a quotation attributed to John Muir, whose Sierra Club had been making headlines throughout the late 1960s under David Brower's leadership. "Let others orbit to the inhospitable moon," it read, "I shall stay with my gigantic friends and let them direct my thoughts to eternal truths."[627]

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[626] Blume was the Assistant Director of the University of California's high-altitude White Mountain Research Station.

[627] Norman G. Dyhrenfurth, "1971 International Himalayan Expedition to the SW face of Everest," TS, Feb. 25, 1970, JRU Papers. An extensive primary account of that expedition, which failed to summit the mountain, was published by climbers Ken Wilson and Mike Pearson, "Post-Mortem of an International Expedition," *The Himalayan Journal*, Vol. 31 (1971). It ended in disarray. A promised $30,000 grant from NASA to support scientific research never materialized because the expedition was neither a non-profit corporation nor was it based in the United States. Blume still managed to accompany Dyhrenfurth's team to Mount Everest, where the diluter-demand supplemental oxygen system that he designed for the expedition was "unanimously voted superb" for its reliable performance. The physiologist's positive contribution was one of few things upon which the 1971 expedition's members could agree. Plagued by divisiveness, their excursion was abandoned after a team climber was killed on the mountain's Southwest Face. Although he would repeatedly return to document Himalayan culture, completing two award-winning film documentaries, "Tibetan Death Rights" and "Samsara -- A Tibetan Heritage" in the 1980s and 1990s, the 1971 misadventure was Dyhrenfurth's last effort to foment scientific research in the region. See F. D. Blume and N. Pace, "The diluter-demand oxygen system used during the international Himalayan expedition to Mount Everest," *American Alpine Journal* Vol. 18 (1972): 93-101.

RECAPITULATION AND CONCLUSION

The research laboratory is a space designed, constructed, and employed to fight overdetermination; within it, scientists and their assistants attempt to control nature's variables so that they might isolate, observe, and measure one causal relationship at a time. In this way, the laboratory is instrumental to the analysis and explanation of complex natural systems for practitioners who adhere to scientific reductionism. However, for AMEE's researchers the laboratory was an artificial structure whose simulation of nature constricted the systems they wished to study. They believed that experimentally restricting complex systems, such as physiological, social, and psychological responses to stress, would underdetermine the results of those experiments. They also knew that they could not ethically expose their subjects to the extreme stressors that they wished to study. Before leaving for Mt. Everest, they believed that the best way to know how willful humans responded to extreme, non-simulated stress was to observe them in an extreme, non-simulated environment.

When Siri, Emerson, and Lester were called up to participate in the first American expedition to Mt. Everest, Dyhrenfurth stipulated that they needed to pay their own way with research grants. In their grant proposals, they cast Mt. Everest as a non-simulated environment, and AMEE as an opportunity to conduct "reality-tests" in its domain on willing participants. They used their familiarity with mountainous environments to construct analogies between the Everest Massif and other places where Americans ventured whilst serving the Cold War state. More than just a "privileged theater of nature," the locale at Mt. Everest was constructed by AMEE scientists using traditions of scientific inquiry and method, publicity, and politics to serve as a stage for a heroic performance that advanced American national ideology and National Geographic's institutional identity as much as scientific knowledge.[628]

AMEE's start in Nepal made good on its promise to promote American prestige amongst the indigenous populations. The expedition employed over a thousand laborers at fair wages, rescued a critically injured woman in spectacular style, administered modern medicine to the Incarnation Lama and other locals, and helped contain a potential smallpox epidemic. Working relationships were forged between Sherpas who were hired to assist climbing the mountain and AMEE's research contingent, although it became clear as the team moved deeper into the Himalayan hinterland that an unplanned reappraisal of the expedition's climbing priorities was going to tax manpower and materiel stores. By the time AMEE reached Tengboche Monastery, its scientists recognized that Mt. Everest's isolation might inconvenience their inquiries.

The sudden death of one test-subject and friend altered the researchers' attitude toward the environment and the men that they sought to study. The environment became a "proven killer" that needed to be surmounted for their inquiries to continue. But, the farther the researchers pushed their inquiries into its domain, the more they perceived its resistance. As a result, their observations became less precise. The test-subjects, with whom the researchers shared meals, tents, and risks, became comrades. Mourning undermined objective detachment. After only two days on the mountain, some researchers felt that their professional norms had been compromised.

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[628] Findlen, *Possessing Nature*, 184.

The higher the expedition climbed, the less conducive the environment became to scientific research. Being situated within the extreme space of inquiry had unforeseen consequences. Some researchers heavily modified their carefully-formulated agendas to improvise and implement methodological substitutions. Others tried to follow their research routines as they experienced an emotional response to the environment that they had never encountered at their home institutions: existential fear. Fear of personal death and the death of their comrades altered the way that these researchers conducted their inquiries, often with propitious outcomes. Their new methods facilitated safety, survival, and continued operations within the environment, but also frustrated farther attempts to remain detached and precise.

By the time the scientific practitioners reached the summit of Mt. Everest, they lost all control over the production of scientific knowledge. In some cases, executing research routines nearly killed their practitioners. In others, inquiries were abandoned entirely, or specimens were sacrificed for the welfare of imperiled teammates. The practices that they had developed for use in the locale were simply unfit for its unprecedented heights, as were all of the six researchers.[629] These failures left substantial gaps in the researchers' observation records and led some of the researchers to conclude

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[629] Of the six, Miller and Lester were the only researchers whose fitness and acclimatization were not tested against altitudes above Advance Base Camp. Lester, of course, lacked the requisite technical skill to conduct research any higher than Camp III. Miller might have made a better candidate to conduct research above the South Col, since Bishop's deteriorating condition prevented him from performing even the simplest research routines near the summit. Alas, Miller did not have the time to devote to a summit attempt, and Dyhrenfurth's obligation to NGS meant Bishop had to at least have an attempt at the mountain's summit.

that Mt. Everest's summit was not a proper place for the production of scientific knowledge.[630]

Combined with logistical problems in transporting specimens and records back to the United States from Nepal, those gaps made it difficult for researchers to summarily process their results. Unwilling to wait for the researchers to do their jobs properly, National Geographic editors featured adventure rather than popularized scientific narratives in their magazine. This suited the researchers, whose results were either underwhelming, or too porous to support universal conclusions, or both. For some of AMEE researchers, these complications required further improvisation to fulfill contractual obligations to project sponsors. Others discovered anomalies unique to Mt. Everest's locale that presaged major disciplinary paradigm shifts. Still others left scholarly article drafts unfinished to pursue non-academic interests, riding the celebrity status resulting from their association with AMEE. In all cases, researchers ceased future attempts at reality-testing altogether. Nor would they return to such an extreme locale to promote scientific mastery. As Bishop concluded in his account of the expedition, "Everest is a harsh and hostile immensity. Whoever challenges it declares war. He must mount his assault with the skill and ruthlessness of a military operation. And when the battle ends, the mountain remains unvanquished. There are no true victors, only survivors."[631]

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[630] In 2015, Dr. John B. West, who led the American Medical Research Expedition to Everest in 1981, commented on the suitability of Mt. Everest as a site for research; although they discovered that mountain's summit serendipitously coincides with the absolute physiological limit for respiration by conscious humans without supplemental oxygen, "we are still waiting for someone else to go up there and tell us we got it right."

[631] Barry Bishop, "How We Climbed Everest," *National Geographic*, Vol. 124, No. 4 (October, 1963): 507.

Deploying the notion of the locale to analyze AMEE has opened intriguing lines for further inquiry. Recent Science Studies scholarship on the culture of Global Warming denialism, especially by historians Naomi Oreskes and Erik Conway, has introduced the political dimension of scientific inquiry into public discourse.[632] Denialists accuse climate scientists of inventing anthropogenic global climate change to dupe taxpayer dollars out of public funding agencies. Whereas *Science in extremis* focused on locally-induced impediments to scientific methods, an analysis of the locales constructed between climate scientists, their benefactors, and the public sphere could reveal how places of inquiry can generate political obstacles to scientific inquiry. Similarly, such an analysis can demonstrate how a private institution like the National Geographic Society can use exotic locations to direct inquiry via funding, and shape public and political discourse via its multimedia platforms as it did with its 2007 magazine feature, "The Big Thaw," support of James Balog's Extreme Ice Survey since 2007, and production and 2014 premiere of *Chasing Ice*.

Related to this is the application of locale to scientific projects that are not situated in exotic locations. AMEE's locale was chosen because it serves as one of the most extreme terrestrial examples. Other extreme locales in the polar region, the deep sea, and outer space, including those used today by climate scientists, might further illuminate other characteristics of science "*in extremis*." But analysis of mundane locales like the university laboratories and corporate research facilities studied by Stuart Leslie's *The Cold War and American Science: The Military-Industrial-Academic Complex at MIT*

[632] Naomi Oreskes and Erik Conway, *Merchants of Doubt: How a Handful of Scientists Obscured the Truth on Issues from Tobacco Smoke to Global Warming* (Bloomsbury: New York, 2010).

and Stanford may also help Science Studies scholars to dismantle the boundary between laboratory and field spaces. It is likely that many of the epistemological and methodological obstacles faced by AMEE researchers are regularly encountered to a lesser degree in laboratories, despite attempts to control their influence over experimental results. My exploratory research into these locales suggests that scientists' reaction to such disruptions in the modern laboratory can range from open acknowledgment--subsequently black-boxed in publications--to minimizing subtleties that the practitioners dismiss as "background noise."[633]

Because locale overlaps with cultural and environmental imaginaries, they are ideal for transdisciplinary studies that combines Science Studies scholarship with environmental history.[634] For example, following the thread from Miller's *ad hoc* assistants Kancha and Angayle Sherpa in 1963 to the Sherpas who are professionally trained at Italian universities to manage the Ev-K2-CNR "Pyramid" laboratory experiments a scant few kilometers from Mt. Everest Base Camp might provoke new questions about Western influence on indigenous environmental imaginaries favorable to the development of autonomous scientific identities, education programs, and agency.[635] Alternatively, Michael Rawson's recent investigation of "The Seventeenth Century

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[633] "Background noise" was a phrase used by practitioners during the study, "The role of uneven hypoxic pulmonary vasoconstriction in the development of high altitude pulmonary edema (HAPE)," for which the author served as an observer and test-subject in 2013 at the University of California - San Diego Radiology Imaging Laboratory. These two assessments and the range between them seem to hinge on that "trained judgment" coined by Daston and Galison. Traditions of training that are situated in particular locales, such as a particular university or laboratory, may produce distinct traditions of judgment.

[634] Dolly Jørgensen, Finn Arne Jørgensen, and Sara B. Pritchard's recent anthology, *New Natures: Joining Environmental History with Science and Technology Studies* (University of Pittsburgh Press: Pittsburgh, 2013) demonstrates the fertility of this collaboration.

[635] This line of inquiry was inspired by a serendipitous encounter with Ev-K2-CNR Staff Manager Pema Sherpa at the Pyramid in March, 2013.

Encounter with the Lunar Environment" could be used as a foil for a study of how Soviet and American environmental imaginaries of another extraterrestrial place--the surface of Venus--constructed another enigmatic locale laden with Cold War political, public, and scientific contexts.[636] Such a study would have the advantage of exploring how that locale was subsequently unmade in the United States after the Soviet *Venera* landings in 1980 and 1972, and how it continued to evolve and function in the Soviet Union until that state's dissolution in 1991.

Ultimately, there are many opportunities to apply locale as an analytical tool for Science Studies and environmental history. I hope that they are as fruitful for other scholars as they have been for my investigation of the 1963 American Mount Everest Expedition. In the words of James Ramsey Ullman, "The adventure is past. The vision remains."[637] Let us see where this vision can take us.

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[636] Michael Rawson, "Discovering the Final Frontier:" 194-216.
[637] Ullman, *Americans on Everest*, 292. These are the last lines of his narrative.

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