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A Case Study in Sensemaking:
An Ethnographic Inquiry into a Pre-conference Geological Field Trip as an Instance of Sensemaking and as an Instance of Pilgrimage

by

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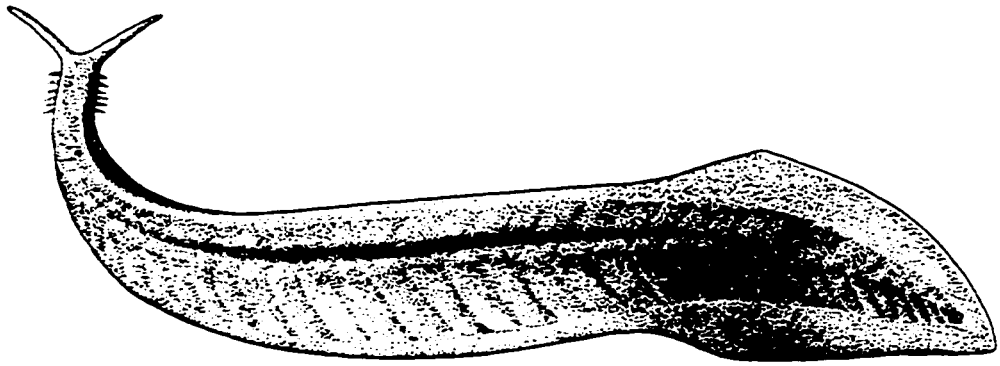

Pikaia gracilens

ABSTRACT

This case study reveals and describes a pre-conference geological field trip as an instance of sensemaking and as an instance of pilgrimage. Using the ethnographic technique of observation participation in conjunction with formal and informal interviews during and after the field trip, the researcher accompanied fifteen paleontologists on a six-day pre-conference field trip through the Canadian Rocky Mountains.

Background constructs used to interpret the data collected include Humberto Maturana's objectivity-with-parenthesis path for explaining the nature of reality in which the observer is considered the source of all discernible knowledge and Ken Wilber's three strands of all valid knowing: instrumental injunction, direct experience, and confirmation by a community of knowers. From an analysis of the data, three sensemaking themes emerged: *being there*, direct contact with geological and paleontological features; *storytelling*, shaping direct experiences into plausible accounts; and *living together*, building a community of knowers through shared experience. Based on the unique nature of this particular field trip and the number of features it holds in common with traditional religious pilgrimage, it is perceived and described as an instance of pilgrimage.

By collecting data from each of the "I," "We," and "It" domains of reality outlined by Ken Wilber, this case study attempts to integrate the cultural value spheres: Self, Culture, and Nature. In a final analysis of the field trip as an instance of sensemaking, the author proposes that scientific-field-trip-as-pilgrimage constitutes an instance of the integration of the three cultural value spheres of reality at the sensorimotor, mental, and soul levels of Being without the reduction of one sphere, or level, to another.

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If I have seen further than others, it is by standing on the shoulders of giants.

Sir Isaac Newton

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DEDICATION

To my parents, Jim and Margaret

and to my children,

Sonnet, Sky, Greg, and Megan

TABLE OF CONTENTS

LIST OF FIGURES

Life is hard, uncertain, fearful. I suffer. I am incomplete. But I have heard tales, in my childhood I heard legends, and I recall scraps of stories about another place, hundreds of difficult miles away, where all answers abide and problems dissolve as the chains of time and space are lifted from this soul. I set out - on foot, in my heart - to find that jeweled place, to tap that boundless power that will solve the dilemma of my life.

Alan Morinis, *Sacred Journeys: The Anthropology of Pilgrimage*, p. 28

CHAPTER 1: JOURNEY TO THE START

. . . behold a man clothed with Rags, standing in a certain place, with his face from his own house, a Book in his hand, and a great Burden on his back. . . .

John Bunyan, *The Pilgrim's Progress*

This thesis is an inquiry into the nature of sensemaking. It is an account of the events occurring during one specific pre-conference geological field trip through the Canadian Rocky Mountains associated with an international scientific conference held in eastern Canada. And it is about how those events, as shared experiences, influence the participants in their efforts to develop shared understandings of various natural phenomena. Hence, the purpose of this study is not to examine the knowledge claims made by the participants of the field trip but to investigate the processes occurring during the field trip which contribute to the development of knowledge claims.

It is also an account of my journey as researcher and learner, about how I came to make sense of the events that occurred on the field trip, and how I arrived at the subsequent interpretation of those events. The two accounts blend into one through the lived experience of the field trip that forms the basis and stimulus for my investigation into the construction and evolution of knowledge.

The account is divided chronologically into three main sections: first, the six day geological field trip described in chapter three; second, the development of an epistemology of participation, which serves as the theoretical foundation for the analysis and interpretation of observations made during the field trip, described in chapter two, and finally, the analysis, interpretation, and discussion of insights gained described in

chapters four and five. The account, preceded by chapter one, includes a discussion of what makes this particular case study an instance of sensemaking (chapter four) and an instance of pilgrimage (chapter five) as well as a discussion of what inspired me to pursue an exploration of what counts as knowledge.

An Instance of Sensemaking

Karl Weick[1] explains sensemaking as the act of making a situation sensible, as a process or activity rather than a product, as more invention than discovery. He sees it as the creation of that which is to be interpreted. It is that which proceeds interpretation and yet includes interpretation. It involves the progressive clarification of a situation. In other words, sensemaking is what people do to construct the reality of the world in which they live. Karl Weick defines a situation as an instance of sensemaking, as opposed to other explanatory processes (interpreting, comprehending, or understanding), in the following manner:

A process that is

1. Grounded in identity construction
2. Retrospective
3. Enactive of sensible environments
4. Social
5. Ongoing
6. Focused on and by extracted cues
7. Driven by plausibility rather than accuracy[2]

The geological field trip which is the focus of this case study exhibits each of these seven characteristics as outlined below in brief and discussed more extensively in chapter four.

"Sensemaking begins with a sensemaker."[3] Sensemakers initiate the sensemaking process by constructing their identities through interactions with others. Consequently, *identity construction* is the continual process of defining and redefining appropriate identities within a given situation or community. The geological field trip, consisting of fifteen professional, amateur, and student paleontologists from around the world, provided an opportunity for individuals to establish, adjust, and maintain their professional identities through prolonged face-to-face interactions with each other.

Sensemaking as a *retrospective* practice gives meaning to "lived experience."[4] That is to say, meaning is always assigned to an event after the fact. Any time a moment in the flow of experience is interrupted, be it through reflection or other "act of attention,"[5] that moment becomes a distinct event to which a meaning can be assigned. Consequently, the six day field trip, as an interruption in the flow of the participants' daily lives, is a distinct event. Hence, it becomes a focus of attention and an occasion to either confirm what is already known or to assign new meanings to what is now a new lived experience.

Enaction is a precondition of sensemaking.[6] It is through the actions we take that we create our reality (this notion is discussed at length in chapter two). In Weick's words, "people create their environments as those environments create them."[7] The geological field trip provided participants with the chance to create meanings based on their first hand experience with the physical environment of the areas visited as well as the social environment of the group. Thus, the field trip entails *social* sensemaking. Sensemaking is social in that people acting together influence each other's conduct and

one's conduct is dependent upon the conduct of others. Accordingly, people shape each other's meanings and sensemaking processes (interpretations and interpretings) through joint actions.[8]

"Sensemaking is *ongoing* and neither starts fresh nor stops cleanly."[9] The field trip as an instance of sensemaking is a moment extracted from a continuous flow of moments in the lives of the participants. The field trip emerges from actions taken prior to the field trip and extends on through the remainder of the conference and beyond into the daily activities of their lives. In retrospect the field trip becomes an experience from which cues are extracted and meanings created.

"*Extracted cues* are simple, familiar structures that are seeds from which people develop a larger sense of what may be occurring."[10] Extracted cues are observations that when linked with general ideas clarify particular ideas which in turn modify the general ideas.[11] The field trip brings participants into direct contact with each other and with places previously known only indirectly. These direct contacts serve as new reference points for further sensemaking.

Finally, sensemaking is about *plausibility* rather than accuracy. It is about coherence, reasonableness, and social acceptability and credibility.[12] Weick argues that while accuracy is nice it is not required in that all accounts of past events are always edited reconstructions. They are evolving stories that show "patterns that may already exist in the puzzles an actor now faces, or patterns that could be created anew in the interest of more order and sense in the future."[13] The function of the field trip is to provide first hand material for the ever evolving geological and paleontological accounts told by the participants.

Not only is the geological field trip in and of itself an instance of sensemaking but so is the case study as a research project. As a researcher, I participated in the *enactment* of a geological field trip throughout which I observed the *social* interactions of the participants. I noticed things; I extracted *cues* from an *ongoing* flow of events. In *retrospect*, I speculated on the meaning of those cues and wove them together into a *plausible* account, an account used to establish my *identity* as a researcher within a community of educational scholars. It was my desire to construct a personal identity which initially brought me to this research.

Know Thyself

As an undergraduate in the nineteen-sixties, I was inspired by the ancient command of Thales of Miletus, "Know thyself,"[14] to undertake a degree in biology. This study of biology taught me about myself as *Homo sapiens*, an animal that has evolved through the ages from a simple single-celled life form to the most complex of all life forms in the history of the planet. Consequently, I came to know myself in relation to the rest of the living world both past and present. This knowledge, while not the whole story, replaced the teachings of my Roman Catholic upbringing and served as an adequate guide for more than twenty years. Although this knowledge provided me with a better sense of my identity, something was missing; I felt that there had to be something more than just the biological self.

In the late nineteen-eighties, I commenced a Master of Arts degree in applied behavioral sciences with the hope of coming to understand that part of my self

unaddressed in my biological training. In my masters program, I learned about various psychotherapies, personality type, family-of-origin dynamics, cognitive development, and social development as well as the cultural dimensions influencing human functioning. So it was that I came to know myself psychologically and sociologically as an individual embedded within a given culture in a given period of history.

Having obtained two degrees focusing on the nature of being human, I imagined the quest for knowing myself complete. However, upon reflection I began to realize that instead of one comprehensive model of self I possessed two distinct models of self based on different epistemologies each of which to some extent denied the other. Thus, after six years of university education and fifty years of lived experience, I was left with a fragmented understanding of self rather than the integrated identity I was seeking.

Seeing that my quest for knowing myself was not yet over, I enrolled in a doctoral program in educational research. As my doctoral studies progressed, it became obvious that in order to understand myself, I must first develop a theory of knowledge, an epistemology that would allow me to explore the nature of knowledge and reality, both of which are core to self-knowing.[15] Thus the goal of my studies became to generate a viable, integrated epistemology in which the biological, psychological, sociological, and cultural models of self are grounded in a single understanding of knowing, knowledge, and reality. The epistemology I seek is one that will allow me to "know thyself," not just in terms of myself, not in an isolated fragmented sense, not in a theoretical sense separate from the lifeworld, but rather in a holistic integrated sense within the lived experience of life. In other words, I seek an epistemology that truly represents a living human being, not simply an epistemic one. It is from the perspective of this integrative epistemology that

I give meaning to my research.

The importance of my quest for self-knowledge is based on the notion that to a large extent self-knowledge is fundamental to gaining outside-knowledge,[16] that is, knowledge about the rest of the world. Or as Ken Wilber says: "All knowledge of other is simply a different degree of self-knowledge, since self and other are of the same fabric, and speak softly to each other at any moment that one listens."[17] Thus, as I come to know myself, I come to know the world; as I come to know the world, I will come to know myself. Self and world co-evolve. The identity I construct is not only of self but of the world as well.

The Story Begins

Now, with courses and field work complete, I begin to write this thesis. Having spent considerable time studying the works of various scholars in hope of finding the answers to my quest, it is now time to abandon the external path of knowing, the endless gathering of others' ideas, and pursue the internal path of reflecting and writing. It is time to write an account of my journey in coming to an understanding of the sensemaking processes which occurred during the case study.

Historically, I have pursued the internal path by retreating to the solitude of the wilderness to reflect and gain insight into the matter at hand. Since coming to Alberta, my favorite place of solitude has been along the barren slopes of the foothills overlooking the Ghost River. There, facing the mountains, I have sat in front of an open fire contemplating life, conversing with trees, mountains, and stars. There, alone by the fire

ruminating about what it means to be human, I have engaged in imaginative conversations that take my thinking beyond the horizon to places previously unexplored, conversations that have transformed my thinking.

Inspired by such nights before the fire, I have chosen to write the next chapter as a conversation about the evolution of what counts as knowledge, about the nature of knowing, knowledge, and reality. I invite you, the reader, to join me in experiencing this conversation not simply as one occurring on these pages, but as one situated far from civilization, overseen by stars and inspired by the transformative powers of fire.

NOTES

An Instance of Sensemaking

[1] Weick, 1995.
[2] Weick, 1995, p. 17.
[3] Weick, 1995, p. 18.
[4] Weick, 1995.
[5] Schutz, 1967, p. 51.
[6] Weick, 1995.
[7] Weick, 1995, p. 34.
[8] Weick, 1995.
[9] Weick, 1995, p. 49. Italics added.
[10] Weick, 1995, p. 50. Italics added.
[11] Weick, 1995.
[12] Weick, 1995.
[13] Weick, 1995, p. 61.

Know Thyself

[14] Gebser, 1985, p. 78.
[15] Belenky, et al. (1986) contend that "our basic assumptions about the nature of truth and reality and the origins of knowledge shape the way we see the world and ourselves as participants in it. They affect our definitions of ourselves, the way we interact with others, our public and private personae, our sense of control over life events, our views of teaching and learning, and our conceptions of morality" (p. 3).
[16] Bateson, 1979.
[17] Wilber, 1995, p. 110.

CHAPTER 2: THE EVOLUTION OF WHAT COUNTS AS KNOWLEDGE

O body swayed to music, O brightening glance,
How can we know the dancer from the dance?

W. B. Yeats, Among School Children

The purpose of this chapter is to delineate the key aspects comprising the epistemology which informs my research. It is written as a conversation between myself and three scholars, Ken Wilber, Max van Manen, and Humberto Maturana, each of whom has greatly influenced my thinking regarding the nature of knowing, knowledge, and reality in relation to human science research. An additional character, Q, is included in the conversation primarily as a literary device for enhancing the flow of the conversation. Except for direct quotes, the content of each speaker's comments is based on my interpretation of their work and reflects my understanding of how their ideas interrelate to form a comprehensive epistemology.

Gathering at the Fire

Jim: Beautiful evening, isn't it.

Q: Yes, it is.

Jim: The perfect place to contemplate–to stretch, to extend, to open the full mind (conscious and unconscious) to that which lies beyond what is known to that which is unknown.

Q: To know is the great temptation, is it not?

Jim: That it is. Ever since man and woman first ate from the tree of knowledge, we have struggled with knowing, with understanding ourselves and the world we inhabit. Eating the apple brought with it awareness of our existence; thus, we became *Homo sapiens*, or as Ernest Becker prefers *Homo poeta*–meaning maker.[1] We began to question. We began to know, to seek knowledge.

Q: What question tempts your mind to tonight?

Jim: Questions–my mind is filled with questions. What constitutes reality? How do we come to know things? How do we come to be knowers? What does it mean to be a knower? What is the nature of knowledge? How does knowledge evolve? The list is endless.

Q: Have these questions not been answered?

Jim: It is true that they have been answered, but the answers formulated in one culture have been rejected and replaced by those of another. Answers accepted by one generation are repeatedly abandoned by the next generation. Answers which proved satisfactory for some are deemed inadequate by others. My task is to answer them for myself in the present context of my life.

Q: Yes, but that's a life's work. What is your question, the one at the core of your research? The one that will be the focus of tonight's thinking, of tonight's conversation.

Jim: It is difficult to say as questions are never simple, nor do they travel alone. They are always embedded one within another. However, having said that, the question that is core to my research can be stated as follows: "*How does what occurs on a scientific field trip influence the evolution of knowledge within a community of scholars?*" However, before I tackle this question, I must first come to an understanding of "What counts as

knowledge?" With this in mind, the topic of tonight's conversation is to explore the evolution of what counts as knowledge.

Ken: To do so my friend, you must first consider "Schelling's burning question, 'Why is there something rather than nothing?'"[2]

Jim: Good evening. Ken, allow me to introduce my longtime friend and confidant, Q.

Ken: Glad to meet you.

Q: My pleasure.

Jim: Q, this is Ken Wilber, American writer and philosopher. Ken is considered to be one of the foremost thinkers in the field of consciousness. His work integrates Western psychology and the Eastern spiritual traditions. What I appreciate most about Ken is his ability to synthesize the diverse teachings of religion, psychology, physics, mysticism, sociology, and anthropology.[3]

Besides reading the four thousand books in his personal library and writing one book after another, Ken, like you Q, enjoys lifting weights and drinking beer.

Q: There's beer in the cooler Ken. Grab one and come join us by the fire.

Ken: Thanks.

Q: But Schelling's question has already been answered. Everything "from positivism to scientific materialism, from linguistic analysis to historical materialism, from naturalism to empiricism" informs us that the universe is "ultimately accidental or random, it just is, it just happens."[4] Nothing else need be said. Right!

Ken: Wrong! There is an alternative answer: "*something else is going on.*"[5] And that something else is Spirit, that which is unknowable, that which is the driving force behind the evolution of the universe–the deeper order or universal intelligence manifest as the

Kosmos.[6] There you have it, the two alternatives. Your "philosophy of oops,"[7] as I call it, in which the world is seen from a strictly external point of view denies the internal existence of experience (mind or consciousness) as separate from external observable experience. Consequently, all experience is reduced to objective domains of reality. This position, dominant in Western culture, seriously limits our understanding of the nature of knowledge and reality whereas the something-else-is-going-on perspective acknowledges that the internal dimensions of mind or consciousness have a validity of their own which cannot be reduced to external objective dimensions.[8] Therefore, the internal subjective and external objective components of experience are seen as important dimensions of reality.

Jim: From this perspective, with which I agree, any discussion of knowledge or reality can be seen to arise from the philosophical premise that there is an underlying order to the events of the universe, and it is this underlying order (Spirit) that drives the evolution of the Kosmos in the direction of higher consciousness (more Spirit).[9] In other words, *the evolution of consciousness is the underlying ground that gives shape to the evolution of what counts as knowledge.*

Q: So how will you go about examining this question of what counts as knowledge?

Jim: Because I ultimately must create an extensive and diverse epistemology, an integrated one that is a synthesis of ideas concerning the composition of reality, the knowing of reality, and the domains of reality, I will adopt a generalist's approach. The advantage of this approach is that it reduces the chances of becoming overly theoretical and thus detached from the context of lived experience which is the basis of knowledge and reality.[10]

Max: Did I hear "lived experience?" I must be at the right place.

Jim: Hello, Max. Gentlemen allow me to introduce Max van Manen. Max is originally from the Netherlands. Currently he is a professor of education at the University of Alberta. In the field of human science research, he brings a Dutch and German as well as a North American perspective to our discussion. He is also the founding editor of the human science journal, *Phenomenology and Pedagogy*.[11]

Q: Welcome. Would you care for a little schnapps?

Max: Please.

Jim: Max, we were just discussing taking a generalist's approach to research.

Q: A generalist approach must cause some problems. Isn't doctoral research supposed to be original and therefore don't you, by default, have to be a specialist?

Jim: Original yes, but not a specialist, at least not in the sense of having to concentrate on a single concept divorced from other related concepts. Take ecologists for example. They don't study individual species in isolation; instead they study whole systems–the relationships between species within the system. Consequently, an ecologist may develop understandings of the relationship between a particular insect and a certain plant but not have the in-depth understandings that either the entomologist or botanist might have. Thus, in taking the generalist approach, I, like the ecologists, will inevitably gloss over issues that others have considered in greater detail; however, the generalist's position allows for a synthesis of ideas from a wide spectrum of specialists' work, which is what I am after in developing an integrative epistemology.

Ken: Whenever one takes on the task of synthesizing the works of other researchers there is the problem of oversimplifying. I'm sure that could be said of my work.

Jim: Agreed. I see your work as similar to that of Jean Piaget's in that both of you focus on the epistemic person rather than the living person.

Max: We must be careful not to let our generalizing and simplifying "prevent us from developing understandings that remain focused on the uniqueness of human experience."[12]

Q: Explain what you mean by an "epistemic" person.

Jim: The epistemic person is a theoretical or idealized person. For example, Piaget's study of structural formation of knowledge focused on what was "common to all subjects at the same level of development independent of individual differences,"[13] not on the unique cognitive development of individual subjects. As such his model of cognitive stage development is epistemic rather than phenomenological. This doesn't negate his work. Rather, it situates it in a different context.

Max: Yes, a theoretical context apart from lived experience. While theoretical constructs are important in human science, we must remember that theory is generated through lived experience not the other way around. Theory in and of itself misses the meaning of life. Theory needs to be integrated with life experience. The role of phenomenological human science[14] is to discover "what a certain phenomenon means and how it is experienced."[15] "The question of knowledge always refers us back to our world, to our lives, to who we are,"[16] and, as we all know, "knowledge is like living: *things are always more complex.*"[17] Or to quote Alfred Korzybski: "A map [theory] *is not* the territory [lived experience]."[18]

Jim: My goal in creating an integrative epistemology is to make explicit the theoretical notions that will inform me in my analysis of sensemaking as the process of imposing order and attributing meaning to the randomness of lived experience. My field research

involved taking part in a paleontological field trip as an observer participant. My intent as a researcher was to pay attention to what occurred on the field trip in relation to the sensemaking processes for myself as well as for the other participants. I intentionally approached the field trip without a preconceived theoretical framework in order to maximize attending to the experience as lived rather than theoretically predetermined. In other words, my research process is one that moves "not from already proven theories to newly proven ones . . .[but rather] from an awkward fumbling for the most elementary understanding to a supported claim"[19] about sensemaking.

Q: Wait a minute. What kind of research is that? How can you do scientific research without a hypothesis?

Jim: Start with a question, but not with a preconceived answer to the question. Given that the purpose of my research is furthering the understanding of how a scientific field trip paves the way for the extension of knowledge, it is important that I select a methodology which allows me to discover the meanings of the activities to the participants as well as to observe their behavior during the activities. A case study using ethnographic techniques facilitates both of these demands. By doing a case study my focus is on what is happening and what is important to the participants rather than on my hypothesis of what is happening and what is important. A case study, being a bounded system, allows me to organize data in a way that preserves the unique character of the phenomenon studied while at the same time make naturalistic generalizations from commonly occurring patterns of meaning arising within the particular case of the field trip.[20] The beauty of a case study is that it occurs in a real-time lived experience rather than in an artificial experimental setting.[21] As such, it allows me as a researcher to

develop a more natural relationship with the people I am working with[22] and thus develop deeper insights and understandings into the meaning of their experiences of the field trip. This is particularly important when "the boundaries between phenomenon [sensemaking] and context [field trip] are not clearly evident."[23]

The underlying assumptions to this approach are that human behavior is best understood within the social framework in which it occurs and is largely based on underlying meaning structures.[24] Therefore, the purpose of the research is to "discover what these meaning structures are, how they develop, and how they influence behavior."[25] The more effectively this is achieved, the more likely my thesis will be "in harmony with the reader's experience and thus to that person a natural basis for generalization."[26]

Q: Tell me more about these ethnographic techniques and how they play out in your research?

Jim: After selecting a case study as my primary research methodology, I joined fifteen paleontologists on a pre-conference field trip in the Rocky Mountains. I choose observation participation "as a way to understand what their experiences and activities *mean to them*."[27] During this six day field trip, in my role as observer, I was able to engage participants individually and collectively in interviews and discussions regarding the processes of accumulating knowledge within their field of expertise. Throughout the trip, as an observer participant, I was privy to numerous conversations, discussions, storytellings, and other social interactions which provided information as to the meanings participants gave to the field trip. Along with my own field notes and those provided by participants, I took photographs of the places visited and collected fossil specimens where permitted. Thus interviews, discussions, written resources, non-written sources,

and artifacts were the basic ethnographic tools used to conduct my research.[28]

After the field trip, I interviewed several of the participants regarding the themes and meaning structures which arose from their actions and comments during the field trip. The purpose of these interviews was to clarify the connections between my observations, speculations, and interpretations, and the meanings the participants gave to their experiences. After completing the interviews and analysis, I began the process of writing, which in itself is an extension of the research process.

Q: And this counts as research? I don't get it. I thought research had to be objective and empirical.

Ken: Maybe I can help. Empirical science tells us what is, not what should be. Its focus is representational knowledge or truth. As such, it does not concern itself with values, worth, or meanings. What counts as validity depends upon the domain of reality with which you are concerned . . .

Q: . . . Let's not go there just yet; I'm still trying to figure out what counts as research.

Max: What counts as research depends upon the nature of the research question. Jim's question, "*How does what occurs on a scientific field trip influence the evolution of knowledge within a community of scholars?*", deals with the clarification of a specific lived experience. The understanding of lived experience is based on shared meanings of common experiences. To achieve this type of understanding, Jim must participate in the experience as well as converse with the participants regarding the meaning of their experience.

But this alone is not enough; he must also reflect upon his own experience and

then write. It is through writing and rewriting that he will come to understand the meaning of the experience. In human science, the researcher is expected to write in a manner that brings forth the meaning of experience, that shows experience as a part of the lifeworld, that reflects his desire to know the essence of being human. It is this expectation of how to write that will influence what Jim writes.[29] And what he writes will concern itself with the mutual understanding of a shared life experience. From this perspective, "research is a caring act."[30]

Humberto: A loving act, if I may say so myself. ¡Buenas noches!

Jim: Bien venidos. Come, sit down by the fire. You must be tired after the long walk from the road. A glass of wine?

Humberto: Please.

Jim: My friends, this is Humberto Maturana, professor of biology and cognition at the University of Chile in Santiago. His work on perception has led him to some very interesting and profound ideas regarding the nature of knowing and reality. Along with his colleague Francisco Varela, Humberto introduced the scientific world to the concept of autopoiesis.

Humberto: My apologies for arriving late. Please, continue.

Q: I don't get it, research a loving act?

Humberto: Allow me. Human research as Max explains it involves an intimate interaction between researcher and subject. This intimacy, as a social process in which there is a mutual understanding, "lets us *see* the other person and open up for him room for existence beside us."[31]

Jim: To use R. D. Laing's words, research is "an authentic meeting between human

beings."[32]

Humberto: Speaking from a biological point of view, love is the emotion that allows this intimacy, this authentic meeting, to occur. "Without acceptance of others, there is no social phenomenon."[33] Love, as a biological process, occurs in the domain of relational behavior when "another arises as a legitimate other in co-existence with oneself."[34] Given then, as Max would say, that the aim of phenomenological human research is to "become more fully who we are,"[35] it follows that research is a caring act, a loving act.

Max: Human science research, to use Humberto's terminology, is the legitimization of self and other. It can be argued that "because descriptions involve issues of perception and interpretation, different descriptions of 'the same' situations and events are possible."[36] Thus, from my own unique perspective I may interpret the data in one way and you from your uniqueness may interpret it differently. Accordingly, each of us "selects and emphasizes certain features and actions, ignoring and marginalizing others."[37]

Q: If people have their own opinion, their own interpretation of reality, explain to me how you come up with any valid results to your research.

Jim: Before getting into validity, it might be best to first discuss what we mean by reality, knowledge, and knowing.

Explanatory Paths

Q: Isn't reality more or less "what you see is what you've got?"

Humberto: Imagine this:

> *We are all walking back to our vehicles after our discussion by the fire. As we*

come around a bend in the trail, Ken sees a bear up ahead. Jumping back, he warns the rest of us. We all jump back. Bunched together, one by one we peer up the trail to make what we can of the bear. With little hesitation, we agree that it is too dangerous to proceed given the presence of the bear. We decide it is best to turn around and find an alternative route to our automobiles. As we begin to retrace our steps back along the trail, Jim, a seasoned outdoorsman, has second thoughts about our interpretation of the situation. He steps forward to take a closer look at the bear, and in doing so, he realizes that the bear is actually an old stump. He calls to us to stop and take a second look. Due to the dim light, it is difficult to really discern what we see. At my urging, we decide to stick with our plan of finding an alternative route. However, Jim is persistent; he informs us that more than once he has mistaken an old stump for a bear, especially at night. Finally, after much discussion we accept his argument, and cautiously follow as he leads us up the trail past an "old stump". As we pass, we breathe a sigh of relief.

The point of the story is this . . .

Jim: . . . if at any given moment we stop and ask ourselves what is the reality of the situation, we have no absolute way of determining the accuracy of our observations.

Max: We only have interpretations embedded in a cultural and historic framework. As such, lived experience "can never be grasped in its immediate manifestation but only reflectively as past presence."[38]

Humberto: Exactly my point.

Throughout Western history the ontology of explaining the nature of reality has separated into two exclusive explanatory paths. The first is the path of *objectivity-*

without-parenthesis in which "the observer assumes that existence takes place independently of what he or she does, that things exist independently of whether he or she knows them, through perception or reason."[39] As my former student Fransciso Varela and his colleagues point out, the dominant view among cognitive scientists is that cognition is simply mental representation in which a rule-based manipulation of symbols represents the world.[40]

The second path is *objectivity-with-parenthesis* in which the observer "finds him- or herself as the source of all [knowable] reality through his or her operations of distinction in the praxis of living."[41]

Q: Are you saying that each of us creates our own reality?

Ken: Only "psychotics create their own reality."[42]

Q: Isn't it obvious that things exist independently of the observer. Just look around; notice the stars, the trees, the moon on the horizon. Am I making them up or do they exist without my presence? I mean, if I wasn't here, wouldn't you still be able to see them.

Ken: What you are talking about is the representational paradigm, Humberto's objectivity-without-parenthesis, in which knowledge is seen as a representation of a pregiven world independent of the observer. From this perspective, truth, that is propositional truth, is located in the accuracy of the match between the map and the territory, between the observer's representation of the observed object and the observed object in and of itself. This paradigm is not wrong, just incomplete. It has, after all, served us well in many regards. Many ignore the fact that representationalism, as a key component of the Enlightenment paradigm, brought with it a great many human freedoms

that never existed before. First and foremost, it ended the domination of the Church and its stranglehold on knowledge thus allowing scientists to discover the nature of reality independent of religious mythology. The dignity of modernity was that it differentiated the cultural value spheres: self, culture, and nature.[43]

However, having said that, the representational paradigm is severely narrow and limited.[44] Laszlo states it quite clearly: "In short, reductionism generates a multiplicity of limited-range theories, each of which applies to a small domain of highly specific events but says nothing about the rest."[45] The disaster of modernity is that scientific modernism, with its representational way of seeing the world which led to the dissociation of the cultural value spheres, and because of its great success in dominating and controlling nature . . .

Jim: . . . as fostered by Francis Bacon[46] . . .

Ken: . . . has become the only way of knowing the world.[47]

Humberto: "In the explanatory path of objectivity-without-parenthesis the search for reality is the search for conditions that make an argument rational and, hence, undeniable."[48] The rational view of reality is valid in and of itself as it reveals truth; therefore, all else is false and thus to know is to act in relation to a pregiven world, that is to say, the rational view demands obedience.[49]

Ken: The belief in a single reality, besides leading reductionists to confuse their maps with reality, has totally negated the role of the map maker thereby collapsing the dialogical subjective and intersubjective domains of reality into the monological objective domain of reality.

Jim: And as Fritjof Capra reminds us, "All the concepts we use to describe nature are

limited, that they are not features of reality, as we tend to believe, but creations of the mind; parts of the map, not of the territory."[50]

Ken: Reality from the objectivity-without-parenthesis perspective has no depth; all of reality is reduced to objective flatland as is evident in Galileo's famous dictum: "Measure what can be measured, and make measurable what cannot be measured."[51] The upshot of all this being that empirical science covers the exteriors of reality while denying its interiors.[52]

Max: The task of phenomenological human science, of interpretive inquiry in general, is the acknowledgement of the dialogical domains of knowing.

Q: I don't get it, dialogical and monological domains of reality?

Jim: In order to understand the domains of reality we first must determine what constitutes reality. Two traditional positions concerning the constituents of reality are the atomistic view and the holistic view. The atomistic perspective as exemplified by the Cartesian-Newtonian mechanistic view of the world, in which "things are real by virtue of location–nothing exists without location in time and space,"[53] places emphasis on the properties of the individual parts that make up matter rather than on the relational properties which constitute the whole object itself. From this perspective, the key to knowledge of a whole is in reducing it to its fundamental parts. Thus, through understanding the nature of the fundamental building blocks of matter, the complexity of the universe can be understood.

Counter to this is the holistic view in which emphasis is placed on the whole object and the interdependence of its parts rather than on properties of the individual parts themselves. From this perspective, as Fritjof Capra explains, "the essential

properties of an organism, or living system, are properties of the whole, which none of the parts have. . . . [Consequently], the nature of the whole is always different from the mere sum of its parts."[54] The complexity of the universe is seen as a network of interconnected and interdependent wholes. The focus of the holistic perspective is on principles of organization rather than on fundamental building blocks.[55]

Humberto: As I claim, at the biological level "the life of a multicellular individual as a unity goes on through the operation of its components, but it is not determined by their properties."[56]

Jim: In other words, all living systems including human beings, as individual entities and as members of social systems, are defined by their organization[57] and are explained by the relationships in which they take part, not by the properties of their components.[58] Or put more simply, a watch, whether composed of mechanical or digital structures, tracks time. When it stops tracking time, it stops being a watch and becomes jewelry.

Ken: I should point out, however, both the atomists and the holists are reductionistic. The holistic crowd, with their subtle reductionism, denies the interiors of holons the same as the atomists with their gross reductionism.[59]

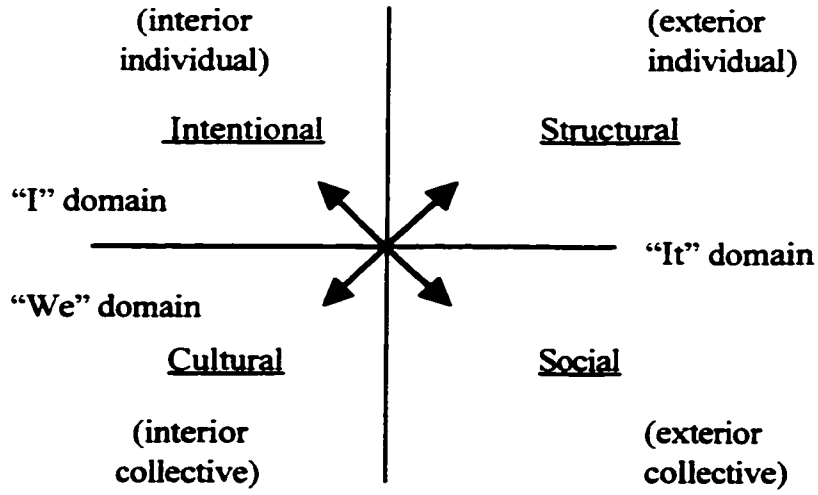
Q: Holons? What are holons?

Jim: The term holons,[60] which Ken discusses in great detail in both *Sex, Ecology, Spirituality* and *A Brief History of Everything*, was coined by Arthur Koestler in an effort to resolve the conflict as to whether emphasis should be placed on the parts of an entity or on the whole entity. As such, holons represent a third perspective concerning the constituents of reality and are key to the development of my integrative epistemology. Koestler maintained that absolute parts or absolute wholes do not exist anywhere in

nature; rather, all entities "behave partly as wholes or wholly as parts, according to the way you look at them."[61] A whole cannot be reduced to the sum of its parts nor can its characteristics be predicted from its parts. "The hierarchy concept of 'levels of organization' in itself implies a rejection of the reductionist view that all phenomena of life (consciousness included) can be reduced to and explained by physico-chemical laws."[62] Accepting that the world is composed of nothing but holons and that the interiors of holons cannot be reduced to exteriors, Ken has developed the four quadrants of holonic existence which consist of the interior aspect (what holons look like from the inside) and exterior aspect (what holons look like from the outside) of the individual and collective realms.[63] The beauty of Ken's synthesis of the four developmental dimensions of all holons is that it provides a framework for acknowledging and integrating the objective and phenomenological aspects of reality without negating either or without reducing one to the other.

Ken: Let me draw you a diagram here in the dirt beside the fire:[64]

Figure 1. The Four Quadrants



This diagram represents a hierarchical ordering of the four major aspects of each and every holon. Briefly, the Upper Right quadrant is the exterior behavioral or structural aspect of individual holons. It ranges from atoms to cells to organisms to triune-brained[65] neural organisms. The Lower Right quadrant is the exterior social aspect of holons which includes at its higher levels families, tribes, villages, empires, nations, and planetary social structures. The Upper Left quadrant is the internal or intentional aspect of individual holons. It ranges from sensation to emotion to concepts to concrete operations to formal operations and on to vision-logic. Finally, the Lower Left quadrant is the interior collective or cultural aspect of holons. It includes at its higher levels the archaic, magic, mythic, rational, centauric, and mystic worldviews of human populations.

Now, let us return to Q's earlier question regarding dialogical and monological domains of reality. The right-hand dimensions are described in "It" language. "It-language is objective, neutral, value-free surfaces. This is the standard language of the empirical, analytic, and systems sciences. . . . It is monological . . . [in that] your presence is not required."[66]

"I-language, on the other hand, *is* your presence, your consciousness, your subjective awareness. Everything in the Upper Left is basically described in I-language . . . . This 'I' or self or subjectivity becomes greater with greater depth–there is more subjectivity in an ape than in a worm–but the point is, this I-component in any case cannot be described in it-language. That would convert the subject into a mere object. . . . Subjects are understood, objects are manipulated."[67] To understand subjects you must talk with them. Thus, I-language is always dialogical.

Jim: As holons evolve, they gain depth. For example, a cell has more depth than an

atom because the cell is composed of atoms and molecules. With greater depth there is less span, that is, fewer molecules than atoms–fewer holons relative to the number of holons in the previous level[68] . . .

Ken: . . . We'll come back to that later.

"The we-language, is the Lower Left, the cultural or intersubjective dimension. . . . The Lower Left is how 'we' see it. It is the collective worldview that we of a particular time and place and culture inhabit."[69] Like the I-language it too is dialogical. In other words, "the *interior* dimensions, can only be accessed by communication and interpretation, by 'dialogue' and 'dialogical' approaches, which are not *staring* at exteriors but *sharing* of interiors. Not objective but intersubjective. Not surfaces but depths."[70]

It is important to keep in mind that the Big 3, "I," "We," and "It" domains are present in each and every holon and that the Kosmos is composed only of holons.

Humberto: In human terms this means "that art [the "I" domain] intertwines with our social existence [the "We" domain] and our technological present [the "It" domain] at all times."[71]

Ken: Absolutely!

Max: The I- and we-languages are the languages of phenomenological human science research. The research always seeks to capture the individual and collective internal meaning of lived experience, the depth of lived experience. This is the human science researcher's way of acknowledging up front that the description of any given phenomenon is only one possible interpretation out of many possible interpretations.

Humberto: Which brings us back to objectivity-with-parenthesis, or the domain of

constitutive ontologies. As living beings, we, with our organizationally closed nervous system, are structurally determined organisms structurally coupled to our environment.[72]

Q: That's a mouthful. I didn't understand a word you said.

Jim: You're not the first.[73] "These concepts [organizational closure, structural determination, and structural coupling]. . . have led to considerable misunderstanding,"[74] which is unfortunate as they are key to comprehending the notion of objectivity-with-parenthesis.

Humberto: Allow me to explain. I'll start with structural determination. Change in behavior and its accompanying change in structure,[75] is determined by, but not predetermined by, the current structure of an organism. "Since the structure is in ongoing change, its structural domains will also change, although they will be specified at every moment by their present structure."[76] Hence, the range of possible changes in structure an organism can make is limited to its present structure. An organism's current structure is a result of its genetic history as well as its ontologic history.[77] Thus, "it is never the case that an environmental action (be it physical or communicational) can determine its own effect on a structure-determined system."[78] For example, if you punch someone in the nose, it is not the punch that determines the breaking of the nose; it is the structure of the nose that determines the extent of the breakage. Or, what is food for one organism is poison for another.

Jim: In other words, the effect of the environment on an organism, while triggered by an external interaction with the environment, is determined not by the environment but by the internal structure of the organism. Furthermore, whether or not the environment can or cannot act as a trigger is determined by the structure of the organism. And this is

what is meant by structural determinism.

Humberto: Correct.

Ken: From a holonic perspective, any changes we make physically, mentally, or socially are determined not only by our biology (Upper Right quadrant), but also by our individual developmental (Upper Left quadrant) and cultural histories (Lower Left quadrant), or by both left- and right-hand quadrants, by the "I" and "We" domains as well as the "It" domain.

Humberto: Virtually all systems are structurally determined. However, there are some systems that are also organizationally closed. "A system is organizationally closed if all its possible states of activity must always lead to or generate further activity within itself,"[79] which is the case for the nervous system. "In other words, the nervous system functions as a closed network of changes in relations of activity between its components."[80] Hence, there is no transfer of information from the environment to the organism, or between organisms, as understood from the representational paradigm.[81]

Q: Are you saying that the nervous system has no inputs or outputs and as such doesn't interact with the environment?

Humberto: Not at all. While the nervous system is organizationally closed, that is no inputs or outputs, it is interactively open; it interacts with the environment through its structure.[82] That is to say, "the nervous system does not 'pick up information' from the environment. . . . On the contrary, it brings forth a world by specifying what patterns of the environment are perturbations and what changes trigger them in the organism."[83] All "the nervous system does as a component of the organism, is to generate in it sensory/effector correlations that will give rise to the behavior of the organism in the

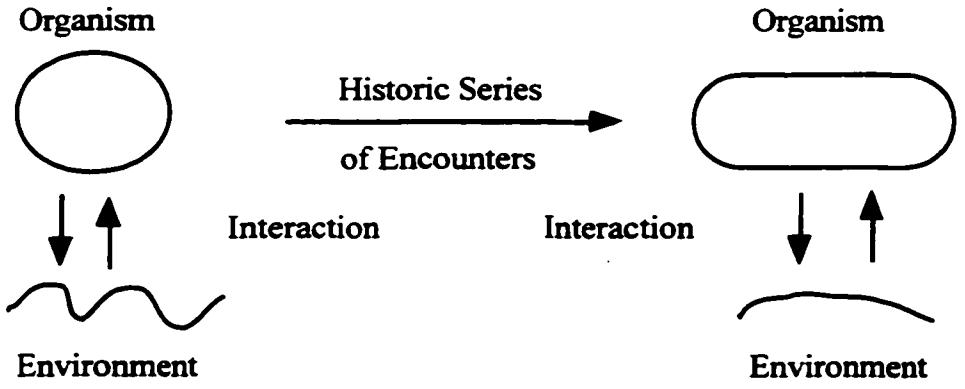
course of the latter's interactions with the medium."[84] Hence the role of the nervous system "is only to maintain constant the set states of the receptor surfaces, not to act upon an environment."[85]

Jim: The implication of this is that the nervous system, as a closed system, has no intrinsic structure in its organization for determining the possible internal or external nature of the causes of its changes of state.[86] For example, both imagined (hallucination) and perceived experience of encountering a bear trigger internal changes within the nervous system and thus within the organism.

Humberto: Most definitely. Furthermore, given the plasticity of the nervous system, every interaction results in some structural consequence. Our nervous system is thus modified by every experience. The adaptive value of the nervous system is that it allows for new dimensions of interactions between the organism and the environment, and between organisms through structural coupling[87]–structural coupling being the "history of recurrent interactions leading to the structural congruence between two (or more) systems."[88]

Let me draw you a diagram:

Figure 2. Structural Coupling



Notice that over time with a series of recurrent interactions there is a reciprocal structural coupling in which both organism and environment adapt to each other. Thus, the path of change for both systems is dependent upon the history of interactions. For example, during the first million years of cellular life on earth, various cells dispersed oxygen which led to significant changes in the atmosphere. In turn this oxygen-rich atmosphere led to the rise of new life forms capable of using oxygen.[89] Hence through recurrent structural coupling, organism and environment co-evolve. The same is true between organisms.

Ken: This "means that the 'unit' of evolution is not an isolated holon (individual molecule or plant or animal) but a holon plus its inseparable environment."[90]

Max: If this is true for systems in general, then it must also be true that social systems are made up of a network of reciprocal structural couplings between any given group of individuals.[91]

Humberto: Yes. And the consensual coordination of reciprocal structural couplings is what we call communication.[92] From what we have already said, it follows that "each person says what he says or hears what he hears according to his own structural determination. . . .[As such] the phenomenon of communication depends on not what is transmitted, but on what happens to the person who receives it. And this is a very different matter from 'transmitting information.'"[93] In short, communication is the coordination of behaviors in the realm of reciprocal structural coupling. We see this in some African birds in which a mating couple co-create a melody. Each bird sings a phrase which the other continues. This song, created during the mating season, is unique to each couple.[94]

For us as human beings, the possibilities for reciprocal structural coupling available through the richness of our nervous system gives rise to the development of language, self-consciousness and culture.[95]

Max: The implication of this is that each of us has our own experience of reality based on our particular social milieu and history of interactions with the environment, which takes us back to what I was saying earlier about multiple interpretations of reality.

Humberto: Exactly. We know reality, not by processing information from a pregiven world, but rather by bringing forth the world through the distinctions we are able to make given the current state of our unique structure.[96] In other words, "what primarily exists for us human beings are the phenomena of our experience rather than an independent reality. . . . However, these phenomena are not necessarily the same for all, but are subject-dependent, generated by the operation of a structure-determined but plastic nervous system within a consensual domain. As such, we construct the world we experience. . . . These constructions are not purely individual, but reflect the intersubjective nature of language and action. Different domains of experience give rise to different domains of reality."[97] In a family, the experiential domain of parent is different than the experiential domain of child and as such each exists in a different domain of family--each family member lives (exists) in a different family.[98]

Jim: In summary then, we can say that the explanatory path of objectivity-with-parenthesis acknowledges the possibility of many legitimate realities (multiverse) within the domain of constitutive ontologies as opposed to objectivity-without-parenthesis in which there is a single pregiven reality (universe) independent of the observer.

Humberto: Yes. "Every statement that an observer makes is valid in some domain of

reality, and none is intrinsically false."[99]

Q: This is all well and good. But if there is no pregiven reality independent of the observer, then it must follow that each of us is free to bring forth any reality we like, does it not?

Humberto: No, not at all. Remember that the reality we bring forth is based on experience in the lived world, that is, on our experience with others and the environment within which we live.

Jim: As Ernst von Glasersfeld in his interpretation of Humberto's work says, "What is observed are not things, properties, or relations of a world that exists 'as such', but rather the results of distinctions made by the observer himself or herself. Consequently, these results have no existence whatever without someone's activity of distinguishing."[100]

Max: Maybe it would be helpful to revisit our "bear-in-the-woods" story to unpackage what all this means.

Q: Here, here!

Bear in the Woods

Max: All we can ever know is the world as we experience it, to use Humberto's terminology, through our structural coupling with it, which is not the same as the world existing independently of us as observers. As such, we are limited to describing our experience of the world, not the world itself. Furthermore, our descriptions of an experience are never the experience itself; they are always and only reflections or recollections of the experience.[101] In the *Bear-in-the-Woods* story, our walk back to the

vehicles is a lived experience in the lifeworld. In it each of us brings forth a world through our senses and makes sense of that world from our own perspective, our own ontologies. Each of us creates our own reality of the experience embedded within our own unique meaning of the experience based on a common lived experience in the lifeworld. In this context, the explanation is relative, which "does not mean subjective, arbitrary or unlawful,"[102] but rather relative to the referent, the lived experience itself.

Ken: The implication of this is that "no matter how much we expand our contexts, this does not invalidate the relative truths of smaller contexts. It *negates* their exclusiveness (or their ultimateness), but *preserves* their moment of truth, their context-dependent truth."[103] Death as an integral part of life does not negate the sorrow and sense of loss of a loved one.

Humberto: In other words, each of our explanations, while not explaining an independent world, does explain the experience of the observer in the moment in relation to the distinctions he or she is able to make in that moment, and as such, each explanation is equally legitimate, though not necessarily equally desirable, as an explanation within the domain of our individual existence.[104] In the end "the ultimate reference for any description is the observer himself."[105]

Ken: In still other words, "each domain, just as it is, is allowed its own dignity, its own logic, its own architecture, its own form and structure and content–yet each is joined and united by the thread of direct experience and evidence, a deep empiricism that grounds all knowledge in experience and all claims in verifiability."[106]

Q: I think I'm catching on. If I understand all of this correctly, a territory, that is a physical world, does exist. Through interaction with it, the map maker creates a map of

his or her experience with the territory; consequently, the map is not of the territory, but rather, of the map maker's experience of interaction with the territory. Furthermore, we only know our experience with the territory reflectively, that is, through reconstructing it from the perspective of our personal and cultural history of our lived experience. As a result, we can only comment on our recollection of our experience of interaction with the territory, never on the ultimate nature of the territory.[107]

Ken: There is more to it than that. "The map is itself a performance of the territory it is trying to map,"[108] that is, in the process of mapmaking, the map maker and the territory co-evolve as a result of their ongoing interactions. This is really the crux of my writing– the evolution of consciousness, the evolution of the manifestation of Spirit. "Neither the self nor the world is pregiven, but rather they exist in contexts and backgrounds that have a history, a development."[109]

Jim: Going back to our story, as we hike along, we encounter, perceive if you prefer, a bear. Given this knowledge, we act by deciding to backtrack and find an alternative way to our cars. But moments later, after a closer look, we realize that the bear is actually an old stump . . .

Humberto: . . . which illustrates that we are unable in the moment to make a distinction between perception and illusion. Remember, "it is due to our structural determinism as living systems that we cannot distinguish in the experience between perception and illusion."[110] Thus, the distinction can only be made a posteriori by negating the first experience of *seeing* the bear in relation to the second experience of *seeing* the old stump, which "is accepted as valid without knowing if it will or will not be devaluated later in relation to another [experience]."[111]

Jim: Thus, the bear that we saw was not located in a pregiven world, but in the perceived world brought about by our structural coupling with the shadows, moonlight and objects we were able to distinguish within the environment as well as our ontological history to that moment. As we continued to interact with the environment it was possible to change our relationship with the perceived world and reinterpret our perception as an old stump.

Humberto: The significance of this is that knowing, as effective action, as the ability to make distinctions within the domain of existence, depends on the structure of the knower. Or "the changes of state of the nervous system result in changes of state in the organism, and the changes of state of the organism result in changes in its interactions, that is, in changes in its behavior."[112] Or more simply. "All doing is knowing and all knowing is doing"[113] . . .

Q: . . . which means?

Humberto: Biologically speaking, doing is the set of interactions, the structural couplings between an organism and its environment, which allows the organism to continue to exist as an entity. Knowing, based on the operational closure of the nervous system, is the ability of the organism to maintain conservation of organization while at the same time maintaining a structurally coupled relationship with its environment through constant structural change . . .

Jim: . . . which is what Minsky means when he argues that "brains use *processes that change themselves*–and this means we cannot separate such processes from the products they produce. In particular, brains make memories, which change the ways we'll subsequently think. *The principal activities of brains are making changes in*

themselves."[114]

Humberto: While there are many perspectives from which we can discuss knowledge, "cognition in its most encompassing sense consists in the enactment or bringing forth of a world by a viable history of structural coupling."[115] Hence cognitive domains, that is the domains of "possible interactions with the environment,"[116] arise as a result of the distinctions we are able to make through reciprocal structural couplings. In other words, biologically it all comes down to "cognition is effective interaction."[117] From this perspective, doing is knowing and knowing is doing. They are quite inseparable.

Jim: As I understand it Humberto, you are carving out a middle ground between representationalism and solipsism in that the nervous system does not replicate what exists independently of itself nor does it operate only from within itself separate from the environment. Rather, the nervous system, within the environment that the organism exists and through its structure and operational closure, makes distinctions which allow the organism to be in full participation with its environment, that is, to select or bring forth "a domain of significance out of the background of its random milieu."[118] In this middle ground, knowledge begins with experience and the distinctions we make within our experiences. As Francisco Varela insists, "this world of ours, no matter how we structure it, no matter how we manage to keep it stable with permanent objects and recurrent interactions, is by definition a world codependent with our experience, and not the ontological reality of which philosophers and scientists alike have dreamed."[119] He refers to this middle ground as enacted or embodied cognition, or enactivism.[120]

Max: "This enactive paradigm is based not only on Varela's work, but also that of phenomenologists such as Heidegger and Maurice Merleau-Ponty."[121] This is evident in

the phenomenological literature where the four fundamental existentials of lived space (felt space), lived body (living bodily in the world), lived time (subjective time), and lived other (lived relations with others) "have been considered as belonging to the fundamental structure of the lifeworld."[122]

Humberto: From this enactive perspective, reality "is not an experience, it is an argument in an explanation."[123] It is "a proposition that we use as an explanatory notion to explain our experiences."[124] Hence, "we explain our experiences with our experiences and with the coherences of our experiences. That is, we explain our living with our living, and in that sense we human beings are constitutively the fundament for all that exists, or may exist in our domains of cognition."[125]

Ken: Enactivism makes it clear that it is essential to explain experience not only from an objective external truth point of view but also from subjective truthfulness and intersubjective mutual understanding points of view, from "I" and "We" perspectives as well as an "It" perspective, from a perspective acknowledging values and meanings in addition to observations.

Max: In phenomenological human science, this means understanding the meaning of experience through the "*theory of the unique*, of the particular case, . . . [which] starts with and from the single case, searches for the universal qualities, and returns to the single case."[126]

Humberto: As such, "knowledge is the result of an ongoing interpretation that emerges from our capacities of understanding. These capacities are rooted in the structures of our biological embodiment but are lived and experienced within a domain of consensual action and cultural history."[127] Thus, human uniqueness arises through social

structural coupling via language. What I am saying is, "we only have the world which we create with others"[128] which is done through language "as a co-ontogeny in descriptions of descriptions."[129]

Jim: So in our story, we co-created the bear through our description of it. What we actually did through our conversation, when we all agreed that what we saw was in fact a bear, was to create a reality which we then acted upon by retreating and seeking another route to our vehicles. But immediately, through continued conversation, we were faced with a second interpretation of our sighting. Consequently, a controversy arose over what was actually seen, over what counted as knowledge . . .

Humberto: . . . which in this instance depended upon what we accepted as adequate or effective behavior or action within the context of encountering a bear while hiking through the woods in the middle of the night, which in turn was determined through languaging.[130]

Q: Sorry, but you'll have to explain what you mean by languaging.

Humberto: To understand ourselves as observers, we must first realize that "we have no way of referring to ourselves or to anything else outside of language"[131] Languaging is the process by which we explain both ourselves as observers and the phenomenon to be explained.

Max: Language "is in some sense a huge reservoir in which the incredible variety of richness of human experience is deposited."[132]

Humberto: Through a history of repeated interactions we become recursively coupled with each other; thus, we "develop behaviors that reciprocally trigger complementary behaviors."[133]

Jim: For example, I put on my hiking boots and my dog starts barking; I put his collar

on him and he runs to the front door; we go for a walk.

Humberto: These recursively coupled behaviors of Jim and his dog are context-dependent. Being consensual behaviors, they direct attention toward another interaction the two have in common. As such, these behaviors have no intrinsic meaning. The coordination of these consensual behaviors I refer to as linguistic acts.[134] And the coordination of linguistic acts is what I call languaging. Hence languaging is "consensual behaviour about consensual behaviour."[135] Without languaging, that is without the coordination of consensual behavior, *description* is impossible. Thus, there is "no way for the distinctions made by an actor to become conscious."[136] It is only through an awareness of our ability to make distinctions that we are able to bring forth a consciousness of *self.*

Jim: In other words it is through the act of distinguishing , as von Glasersfeld suggests, that "I create myself as observer."[137]

Humberto: It is this recognition of the observer as operating as a living system in language in such a manner that it is the observer who brings forth the distinctions of reality rather than replicating independent entities from a pregiven world that separates the explanatory path of objectivity-with-parenthesis from objectivity-without-parenthesis.[138]

Q: Hummm?

Jim: What Humberto is saying is that through mutual cooperation we make sense of the world through languaging, meaning, we create ourselves and the objects we distinguish through our cooperative use of language, through our conversations . . .

Humberto: . . . conversations involving the "consensual braiding of language and

emotions."[139] Emotions (love, joy, fear, anger, sorrow, etc.) determine at any given moment the consensual domains in which languaging takes place, and thus the domain in which we operate at any instant.[140] As such, languaging becomes the medium in which we interact. In conversations, we communicate with each other when "coordinated behaviors are mutually triggered among the members of a social unity."[141] Change within a social system occurs when there is a change in the conversations arising from encounters with others outside the social system or upon reflection of circumstances within the social system. Subsequently, the "configuration of conversations" and the "manner of emotioning" of any given social system specify what counts as knowledge.

Jim: Going back to our story, the evolution of our knowledge from *seeing* a bear to *seeing* an old stump could be explained by different manners of emotioning, fear-based to curiosity-based or by different configurations of conversations, different worldviews as it were. For example, from a rational worldview we might say that our initial perception was incorrect due to poor lighting, resemblance of shapes, lack of experience in this particular environment, or other such logical arguments. On the other hand, from a magical worldview this transition of bear to old stump might have been perceived as a trick played on us by a spirit being. From this perspective, the object first seen was actually a bear, and then, through the intervention of the spirit being within the object, it transformed into an old stump and at any moment might change back into a bear if it so desired . . .

Ken: . . . which leads us to the evolution of consciousness and worldviews.

Q: Is there no end to this?

Ken: Not as far as the eye can see.

Evolution of Consciousness

Jim: All our talk so far about the nature of reality–holons, objectivity-with-parenthesis, etcetera–is background for understanding the processes of how people go about deciding what counts as knowledge. You see, the evolution of what counts as knowledge is really about the evolution of worldviews people of different cultures have held throughout time, which in turn is based on the evolution of consciousness. In other words, the collective stages of human development (worldviews) and the development of intellect (consciousness) are basically similar[142] . . .

Ken: . . . in that they are both "the study of what holons can respond to."[143]

Max: The importance of worldviews is that they are the constructs we use to make sense of the experiences of our daily lives.

Jim: They are how we explain the nature of reality, our view of the structure of the universe, how things work, how things, events, and people come to be as they are, how they interrelate, and how we come to know what we know.[144] Worldviews influence "what people do, how they act toward others, and how they feel about themselves."[145]

Humberto: The culture in which we live, through the conversations we have, gives rise to and conserves our identity as to the type of human beings we become. It is through language that "mind" and "self-consciousness" arise.[146] However, because we are reflexive beings, we can, based on our emotions, stop being one kind of human being and become another according to the worldview we chose.[147]

Ken: I discuss the evolution of worldviews from the "We" or cultural domain and the evolution of consciousness from the "I" domain; however, in actual practice it is quite

impossible to separate the two. Because the individual is always situated within a cultural context, and because it is the cultural milieu that gives meaning to an individual's thoughts, the evolution of consciousness goes hand in hand with the development of worldviews.[148] Or to use Jean Piaget's words: "the evolution of individual thought is closely enmeshed in collective systems of knowledge."[149] Having said that, I will discuss them separately, starting with the evolution of consciousness . . .

Max: . . . because "the real things of the world are always meaningfully constituted by conscious human beings . . . [and because] consciousness is the only access human beings have to the world"[150] . . .

Jim: . . . which takes us back to holons, that is, entities whose behavior, partly as wholes and wholly as parts, depends upon the distinctions we as observers make in the praxis of living. Both Ken and Arthur Koestler contend that as holons evolve, the new emergent holon, in taking on new properties of its own, becomes a new whole.[151] Therefore, it is self-transcending–the old becomes the new. While the new holon negates the separateness and exclusiveness of the old holon, it also preserves the old. In short, the emergent holon transcends and includes its predecessor. Molecules, for example, transcend atoms but include them; cells transcend molecules but include them; organisms transcend cells but include them–holons nesting within holons all the way up and all the way down.[152]

Humberto: As Francisco Varela observes, "at a given level of the hierarchy, a particular system [molecules] can be seen as an *outside* to systems below it [atoms], and as an *inside* to systems above it [cells]; thus the status of a given system changes as one passes through its level in either the upward or the downward direction."[153]

Ken: This evolution of holons also includes an increase in depth and thus a corresponding increase in consciousness. I use consciousness in much the same manner as Humberto uses knowing. All holons have consciousness as they all have knowing, both of which are interior aspects of the four dimensions of holonic existence. A cell has cellular-consciousness, that is, it knows how to be a cell; it does what is needed to maintain cellness. When it no longer knows how to be a cell, that is, when it can no longer maintain conservation of cellness, it looses cellular-consciousness.

As holons increase in depth, they decrease in span, that is, the number of individuals per level. There are fewer cells than molecules and fewer molecules than atoms. The significance of this is that the evolution of holons is developmental. In the structural-developmental model of consciousness, each stage "*unfolds* and then *enfolds* its predecessor in a nested fashion."[154]

Q: Isn't this just basic evolution in which one organism is built up from another so to speak?

Ken: Not exactly. As Erich Jantsch points out, the building up you refer to "emphasizes structure and describes the emergence of hierarchical levels by the joining of systems 'from the bottom up.' Unfolding, in contrast, implies the interweaving of processes which lead simultaneously to phenomena of structuration at different hierarchical levels."[155] He concludes that "evolution is the result of self-transcendence at all levels."[156] In other words, when cells come together to form an organism, the emergent processes which constitute the organism are categorically different than those of the constituent cells.

Jim: Or as Jean Piaget says, "the initial structure is incorporated into later ones thanks

to genesis, because it is a system of transformations."[157]

Ken: The outcome of this process of transformations, of evolution, is the "Great Nest of Being," which consists of matter, life, mind, soul, and spirit.[158] An interesting side note here is that scientific materialism reduces all of the Kosmos to matter thus negating the other dimensions of the Great Nest of Being. In effect what has happened as a result is that the physiosphere (matter) is viewed as the most significant aspect of reality, and consequently the study of it, physics, has been awarded the highest status of all the sciences. As such, validity rests with physics, that is, validity exists only within the "It" domain. The mistake here is that while the physiosphere is the most fundamental, that is, the greatest span, it is the least significant in that it has the least depth.

Jim: When considering matter, life, and mind, this means that the noosphere (mind) is the least fundamental (least span) but the most significant in that it has the greatest depth.

Ken: Thus, while the noosphere depends on the biosphere (life) which depends on the physiosphere, the noosphere is part of the biosphere which is part of the physiosphere rather than the other way around as the reductionists, including the holists, would have it. We are more than just another knot in the web of life; we are not just exteriors; we have interiors that can only be known through dialogue. So greatest depth means greatest consciousness. It is consciousness that the reductionists, with their flatland thinking, deny.

Humberto: In denying consciousness, they deny responsibility. As I have said earlier, adherence to the explanatory path of objectivity-without-parenthesis demands obedience to a pregiven reality. That is to say, since there are no possibilities other than the one

pregiven reality, this explanatory path is justification for a person's actions. In accepting consciousness, as does the explanatory path of objectivity-with-parenthesis, there is the possibility of multiple realities. Hence, a person can choose the reality in which he or she wants to participate. In doing so, he or she takes responsibility for his or her actions. Similarly, it is possible to move from one level of consciousness, one worldview, or one domain of reality to another . . .

Ken: . . . which returns us to the evolution of consciousness.

Q: Good. I'm curious about how this evolution of consciousness, this self-transformation takes place.

Ken: I use a ladder metaphor to explain the transformations of consciousness.[159] In this model, there are nine stages. For our discussion, I will focus on "the stages of average consciousness up to this point in collective history,"[160] stages 1 to 6, emotion (sensoriphysical), symbols (phantasmic-emotional), concepts (representational-mind), concrete operational (rule/role mind), formal operational (formal-reflexive), and vision-logic.[161] As you can see from their names, they correspond very closely to Jean Piaget's cognitive stages.[162] I'll leave stages 7 to 9, the stages of Mysticism, for another time. It is important to realize that within each culture, past and present, there are individuals at stages 7 through 9 as well as stages 1 to 6. However, every culture has a *center of gravity* toward which each person's development is pulled. "If you are below the average level, it tends to pull you up. If you try to go above it, it tends to pull you down."[163]

Jim: Is it correct to say that the average cultural center of gravity defines a culture's worldview, while an individual's center of gravity defines his or her personal worldview?

Ken: Correct. Furthermore, "the self at any given point in its development will tend to

give around 50 percent of its responses from one level, 25 percent from a level above that, and 25 percent from a level below it. No self [or culture for that matter] is ever simply 'at' a stage."[164] As such, a person whose center of gravity is formal-reflexive will on occasion, say in a high stress situation at home, fall back into a rule/role mind set, or in some unexpected moment while working on a special project at work will experience a moment of vision-logic insight.

Jim: I assume then that these stages of consciousness, like other structural-developmental stages, while shaped by culture as you have indicated, are innate, discrete, and sequential, that is, one stage precedes the other and no stage can be skipped "because each one of them is necessary for the formation of the following one."[165]

Ken: Yes. This is why I use the ladder metaphor in which the *climber* moves up the *ladder* one rung at a time and from each position has a particular *view* of the world.[166]

Q: This sounds pretty linear to me. More "built up" than "unfolded" if I may say so.

Ken: True enough. But remember we are only speaking about one portion of the four quadrants, the "I" domain. Concentric circles would better represent the full four quadrants of nesting holons than the ladder; however, "the ladder metaphor is useful because it indicates that the basic components of consciousness do emerge in fairly discrete stages, and if you destroy a lower rung, all the higher rungs go with it. Where the ladder metaphor fails badly is that each higher stage does not actually sit on top of the lower stage. . . . [Rather] as I said, it's a nested holarchy."[167]

Q: Tell us more about this ladder metaphor.

Ken: Each rung of the ladder represents one of the nine basic structures of

consciousness as outlined earlier. The climber is quite separate from the ladder in that both have a different set of characteristics. The climber has a sense of self, a drive for growth whereas the rungs of the ladder, being inanimate, do not. "But the self appropriates these rungs, or identifies with them, and this generates various types of self-identity and various stages of growth."[168]

Jim: Being a holon, the climber's growth and development will depend upon the extent to which it cultivates the four basic drives of holons: self-preservation, self-adaptation, self-transcendence, or self-dissolution.[169]

Ken: The growth and development of the climber occurs with each step, or *fulcrum,* in the climb. Each fulcrum is a 1-2-3 process. First, the self, as it moves onto a new fulcrum or level of consciousness, *identifies* with the new level. Second, as the self begins to move beyond that level, it *differentiates* or separates from that fulcrum. Third, in the process of identifying with another new level, the self *integrates* the previous level.[170] The result is that each fulcrum is transcended and included as long as the climber continues to climb . . .

Jim: . . . which isn't always the case. Both Piaget and Kohlberg indicate that stage movement is neither automatic nor inevitable.[171]

Ken: Correct. Furthermore, at any point on the ladder instead of differentiating, the self can become fused with the rung thus either stopping or retarding its growth and development. Or, a piece of the self can be dissociated from the self, that is, as the self moves upward some of it remains on a lower rung. It is this piece that sabotages the self in its daily living.[172]

Jim: In other words, fear of authority gained in childhood during the concrete

operational stage could inhibit an adult person's ability to critically analyze situations involving authority figures.

Ken: Exactly. Furthermore, wherever the climber is, whatever rung he or she is at "there is a different view of the world–a different view of self and of others–a *different worldview*. The world looks different–is different!–at each rung in the developmental unfolding. As we have constantly seen, different worldspaces, different worlds, come into being as consciousness evolves–there is not simply a pregiven world that is monologically reflected!"[173]

Humberto: This is exactly the point of objectivity-with-parenthesis. In our everyday experience, we experience a world. "But when we examine more closely how we get to know this world, we invariably find that we cannot separate our history of actions [our developmental unfoldings]–biological and social–from how this world appears to us."[174]

Jim: This is evident in Jean Piaget's work with children. For example, the child who is able to conserve matter at one stage of development, will deny that he was unable to do so at an earlier stage.[175]

Q: What is it that actually *develops* in the evolution of consciousness?

Ken: The ladder metaphor, which "is based on the work of perhaps sixty or seventy theorists, East and West,"[176] concerns itself primarily with the differentiation of self. As infants we are totally fused with the physical world. We cannot distinguish between self and other. As we move through the stages of the evolution of consciousness, we differentiate between our self and the physical world, our self and other's emotional worlds, between the concrete world and the abstract symbolic world which leads to a sense of "oneness' with the universe and all that it entails to finally a comprehension of

"pure emptiness."[177]

Jim: Caroline Myss addresses the development of consciousness and spirituality through the study of human energy systems. She synthesizes the wisdom of the Hindu chakras, the Christian sacraments, and the sefirot of the Jewish Kabbalah into seven sacred truths of body and spirit.[178] Others who have concerned themselves with different aspects of consciousness include Lawrence Kohlberg with his levels of moral sense: preconventional, conventional, and postconventional. Jean Piaget looked at cognitive development, that is, at how we come to have rational thought. Mary Belenky and her colleagues have looked at the ways women develop self, voice, and mind through five different ways of knowing: silence, received knowledge, subjective knowledge, procedural knowledge, and constructed knowledge. Erik Erikson studied personality development which entails hope, will, purpose, competence, fidelity, love, care, and wisdom. Another is Abraham Maslow whose research on self-needs covers safety, belongingness, self-esteem, self-actualization, and self-transcendence. One whose work dovetails closely with worldviews is James Fowler who looks at stages of faith in which the generic feature of human existence is the struggle to find and maintain meaning in life experiences. This struggle for finding meaning, like other aspects of consciousness, develops via structural-developmental stages.[179]

Humberto: It is evident from this synthesis of notions about the stages of the evolution of consciousness that the individual continually expands his or her cognitive and relational domains through his or her interaction with the world and in doing so, in collaboration with others, generates a world in which he or she lives with others,[180] . . .

Ken: . . . a shared space which they can respond to. "When individual and subjective

cognitions are shared or exchanged with other individuals, the result is a collective *worldview* or community shared outlook."[181]

Jim: This notion of worldview is similar to that of Fritjof Capra's idea of a social paradigm which he defines as "a constellation of concepts, values, perceptions, and practices shared by a community, which forms a particular vision of reality that is the basis of the way the community organizes itself."[182]

Ken: While worldviews are resistant to change, they are not static. Cultural transformations from one worldview to another worldview result from the movement of individual levels of consciousness in the "I" domain to collective worldviews in the "We" domain which become incorporated into social institutions in the "It" domain which in turn reproduce the worldview and thus socialize the individual. The growth of American democracy from an ideal in the minds of a few individuals to a national institution embedded in the minds of all American citizens exemplifies how such transformations evolve.

Q: On to worldviews please.

Ken: Worldviews fall into the Lower Left quadrant, the cultural or "We" domain of holonic existence. As such, not only are they about shared space, but they are also about shared values, meanings, and beliefs as Capra suggests in his definition of social paradigms. In both *Sex, Ecology, Spirituality* and *A Brief History of Everything*, I write extensively about "the predominate 'worldviews' of the various epochs of human development . . . which may be summarized as archaic, magic, mythic, rational, and existential."[183] However, for now I will give only a brief outline of each, highlighting the significant characteristics which relate to our discussion.

Q: That would be appreciated.

Ken: The most ancient, the archaic worldview, is associated with foraging societies. Life was tribal with the family being the core unit of human functioning. These "primal tribes are literally our roots, our foundations, the basis of all that was to follow, the structure upon which all subsequent human evolution would be built, the crucial ground floor upon which so much history would have to rest."[184]

Jim: Archetypically, the tribe represented group identity, group force, group willpower and group belief patterns which instilled the moral attitudes of loyalty, honor, and justice into our very being.[185] The importance of tribal family structure is evident in Bowen Family Systems Theory which is built around the notion of "the family as an emotional unit" that governs individual behavior and development.[186]

Ken: The archaic worldview was very much a geocentric worldview in that there was little differentiation between humans, world, and universe. However, there was the emergence of role differentiation between men and women. Men hunted; women gathered.

Jim: The archaic period was the dawning of consciousness. With it, and the emergence of language and thought, came the magic worldspace.[187]

Ken: The magic epoch was characterized by horticultural village societies, the Great Mother societies, societies in which thinking was preoperational and prerational, and moral sense was preconventional. Body and mind were still undifferentiated, leading to confusion between object and image–the part could stand-in for the whole. The magic world was and still is spaceless and timeless. The collective identity, which still has a significant presence today, is kinship based. The world of magic is characterized by a

striving for power over others and nature.[188]

Jim: The individual equivalent to the collective magic worldview is the literalist whose heart rests, as James Fowler would say, with the intuitive-projective stage of faith.[189] In this stage, thinking is magical in that symbol and object are fused. There is no metaphor; there is only denotation, no connotation. Morality and rules are black and white, there is no gray.

As the epoch neared its end, tribal life gave way to transtribal life, preoperational thinking gave way to representational thought, the plow began to replace the digging stick, the ego began to emerge, and magic gave way to myth,[190] . . .

Ken: . . . which takes us to the next epoch, the mythological. During this period, clans became united through common mythology. Characterized by an agrarian technology, villages grew into cities, and cities joined together to create empires. Wars were waged. Thinking was concrete operational, morality conventional. The notion of "ruler" expanded from head of the clan to mythical "god." Ritualistic sacrifices appeased the gods. Individual consciousness was as yet unrecognized. Rules and roles focused on group membership. Identity was with the collective as well as with life roles; men's roles centered around the public world of politics while women's roles focused on the private world of home life.[191]

Jim: In this period, the literalist with a mythical worldview moved from an intuitive-projective faith to a mythic-literal faith. "The new capacity or strength of this stage is the rise of narrative and the emergence of story, drama and myth as ways of finding and giving coherence to experience."[192] The Great Myths emerged as ways to explain the mysteries of the universe, the shape of the universe, to validate social order, and to teach

people how to live "in harmony with themselves and each other and with the universe."[193] However, meaning was still literal and as such trapped within the story.

Today individuals at this stage of faith identify with the stories, beliefs, and rituals of their communities. For "received knowers,"[194] that is, for individuals who believe that truth comes from others, it is the *word* of God, emperor, father, or other authority figure that counts as knowledge. As such, mythic membership is alive and well. A two edged sword, mythic membership binds us together in community while at the same time pits community against community and thus is a great source of many of today's problems.

Ken: While we are treating these worldviews as if they are discrete entities, you should realize that they actually flow along a continuum, one into the other. An example of this is the mythic-rational worldview in which the concrete operational gives way to formal operations, mythological structures become rationalized, rationality begins to emerge, and morality shifts toward the postconventional. The average societal level of consciousness orbits somewhere between here and the mythic.[195]

Jim: This coincides with James Fowler's conformist stage which he contends represents average consciousness. In this synthetic-conventional stage of faith, emphasis is placed on creeds and doctrines. For the conformist, the meanings of symbols are inseparable from the symbol itself. Authority, while located external to the self, is found among like-minded believers. In this stage, "interpersonal relationships provide the paradigm for constructing social and political relations."[196] The conformist, while basically unreflective regarding values even though there is the ability to articulate and defend them, is able to think reflectively about his or her own thinking and experience.

This reflective thinking is the gateway to the next stage . . .

Ken: . . . the rational, where mutually recognized industrial nation-states began to eclipse agrarian empires. This era, dominated in its early stages by the collective mystic, produced during its middle stages the first named writers, who began to have an ever increasing influence on the development of culture. In the later stages, the rational period became, and still is, dominated by the thinking of science and modernity, the dignity of which is the differentiation of the cultural value spheres: art, morals, and science. Here, "each of the spheres could pursue its own truths and aspirations without domination or violence from the others."[197] Here, formal operational thinking goes beyond rules and roles. Here, reason liberates myth from its concrete literalness. Here, the individual is self-aware and introspective. Here, identity is with the ego, and the noosphere begins to differentiate from the biosphere. And here, where machine replaces muscle, the liberation of women begins.[198] Unfortunately, differentiation of the value spheres eventually led to dissociation of the subjective, intersubjective, and objective domains. "This dissociation allowed an explosive empirical science, coupled with rampant modes of industrial production–*both of which emphasized solely it-knowledge and it-technology*–to dominate and colonialize the other value spheres, effectively destroying them in their own terms."[199]

Jim: With the rational worldview came the critic with his individuative-reflective faith. This faith involved questioning and the subsequent suspension of the old mythic beliefs. Thinking evolved from the concrete to the abstract rational in which meanings are separated from symbols. Here, knowers learned to apply objective procedures for obtaining and communicating knowledge.[200] That which could be objectively and

empirically observed came to be what counted as knowledge.

Identity became located in the "executive ego"[201] which was responsible for the choices made, rather than in one's roles or meanings to others. The critic stage is characterized by inner turbulence. As such, it is often the case that the critic will return to the conformist stage where life is more settled rather than full of questions. The other path, the one least traveled, is that of conjunctive faith which coincides with the centauric or vision-logic worldview.

Max: While this is all very interesting, it lacks life; in and of itself it has little meaning. Before going on to vision-logic, we need to put these ideas into a context of lived experience.

Q: I agree. All this talk about the evolution of consciousness and worldviews is like looking at a map of the countryside while sitting at home in your living-room. It tells you where the forests, prairies, and marshes are located, but it tells you nothing about the individual trees in the forests, or the prairie grasses, or frogs that inhabit the marshes . . .

Max: . . . nor anything about the smell of the flowers, the sounds of the wind, the beauty of the sunsets . . .

Humberto: . . . once again I think we need to return to our story in order to grasp the implications of these notions to which we have listened so patiently.

Old Stump

Jim: When discussing consciousness and worldview in a specific lived experience, it is difficult to isolate and correlate levels of consciousness and worldview with specific

behaviors. This is partly because the stages are about overall general patterns rather than about specifics, partly because consciousness and worldview are entwined with one another, and partly because the structures of consciousness, both individual and collective, "*are not merely past, but are in fact still present in more or less latent and acute form in each one of us*"[202] . . .

Ken: . . . and as such "should be honored as a rich source of one's own being and one's own roots"[203] . . .

Max: . . . and partly because life is more complex than we can imagine.

Jim: Therein lies the difficulty of comprehending the terrain from reading the map.

Q: In terms of sensemaking and with reference to consciousness and worldview, I am curious about what was going on in our story when

Upon seeing the bear we all jump back and quickly decide to turn around.

Max: Considering the distinctions we were able to make in the moment, our decision to retreat was made from a rational perspective. Collectively from our previous experience with bears, either directly through lived experience with them or indirectly through others telling us about them in one way or another, we understood that they could be dangerous and that they should be avoided.

Ken: While all of us were being quite logical externally, it is possible that internally one or more of us reverted to the magic or mythic within us, for example, appealing to God for protection from the bear.

Q: Wait a minute. How can that be? You folks are all rational scientist types. Why would any of you revert to prayer? That isn't very rational, is it?

Jim: There are numerous possibilities. The sophistication of a person's worldview can

range from unarticulated and inconsistent beliefs to highly articulate and consistent metaphysical positions.[204] While our worldview about the nature of reality might be quite sophisticated, our view of bears might be considerably less so. Also, it is possible to hold beliefs that are contradictory by keeping them in nonintersecting domains.[205] Consequently, it is possible to function at a rational level on the one hand and a mythical or magical level on the other hand–a person's rational-logical understanding of bears is totally separate from the belief in a god who can protect him or her from bears.

Humberto: Or the individual could be functioning at a transrational level, that is to say, beyond the rational.

Ken: Yes, the self can function all over the place. "It can have a peak experience of a higher level, only to fall back into its actual and present self-stage. Conversely, a taste of the higher levels can so disrupt the self that it regresses to earlier fulcrums, fulcrums at which there is still some sort of fixation or repression or unfinished business."[206] As the self climbs the ladder, it can happen that while part of the self develops to the next rung, other parts are left behind–fused to the current rung.[207] This dissociation, this domination "by all that you have not transcended"[208] and the pathological, repressed, or alienated response that comes with it, can resurface in situations of stress or high anxiety. For example, seeing the bear, a dangerous wild animal, could trigger a memory of a childhood trauma of being bitten by a large dog. Such a memory could cause a person to revert back to the level of consciousness occurring at the time of the trauma. Wherever we have a deficiency, be it in level of consciousness or worldview, as individuals in the "I" domain or collectively in the "We" domain, we are vulnerable to regression and the various and sundry behaviors that go with it.

Jim: Another aspect of this vulnerability from the "It" domain relates to the fact that our thinking brain, the neocortex, is biologically linked to our emotional or limbic brain. The stresses and anxieties of everyday living, particularly fight or flight situations, can cause a person's normal level of functioning to be "emotionally hijacked."[209] In other words, the emotional brain overrides the thinking brain. For example, faced with the danger of the bear, one of us could have panicked and without any regard for the safety of the group, raced back down the path leaving the rest of us to face the danger of the bear.

Humberto: "It is emotion that specifies the kinds of relational behaviors in which one can participate at any instant."[210] Our ethics, whether we run or remain with the group, are determined not by reason but by emotion. Hence, the history of our behavior is the path of our desires.

Jim: This run-or-remain dilemma represents the tension between the self-assertive tendency and the integrative tendency common to all holons. In this situation, the person is caught between saving his own skin and transcending "the narrow boundaries of the self."[211] This need to be part of a social holon "is at the root of the 'self-transcending' emotions."[212]

Humberto: Through the explanatory path of objectivity-with-parenthesis we know that the validity of any given behavior is relative to the domain to which it is applied. The desire to save yourself, valid in the domain of individual self-preservation, is less valid in the domain of collective human relations if it negates the preservation of others.

Ken: "That everything is relative does not mean nothing is better; it means some things are, indeed, relatively better than others, all the time."[213] Since "we exist in a network of relationships, . . . our relatively greater rights absolutely demand relatively greater

responsibilities."[214]

Humberto: "This is why we frequently do not want to reflect on our desires. If we do not see our desires, we can live feeling no responsibility for most of the consequences of what we do,"[215] which is the stance of the explanatory path of objectivity-without-parenthesis.

Jim: In our story where

> *I step forward to take a better look at the bear and in doing so realize that the bear is really an old stump. And eventually convince the rest of the group that it is okay to continue.*

presents an interesting example of how this plays out. Here I am faced with two conflicting desires - the desire to be accepted as a member of this prestigious group of scholars and the desire to take charge of the situation. The first requires me to remain silent, to go along with the group's decision, to be a follower. The second requires me to step forward, to be a leader. Whichever choice I make, the other is compromised.

Humberto: Notice that each of Jim's desires is actually located in its own domain of relational behaviors, in its own system of co-ordinations of actions in language. In other words, his choices are located in two different communities. The first is located in the community of prestigious scholars. The second is located in the community of outdoorsmen. The course of Jim's actions will be determined by which desire dominates, not by his ability to reason.

Q: This sounds similar to the run-or-remain dilemma we just discussed.

Ken: Yes, but this time let's examine the dilemma from a worldview perspective. The desire to be a part of a community beyond the family group has its roots in the mythic

worldview. The desire to to be an individual, to follow the course of one's own thinking, has its roots in the rational worldview. If Jim was functioning from strictly a mythic worldview, without question he would follow his desire to be a member of the group. However, and this is what is most fascinating, the nature of mythic membership changes with the transcendence to a rational perspective. From his rational point of view, Jim can see that the most effective way to resolve this dilemma is to take an action that includes both desires. In other words, if he takes an action that is helpful to the group, that is, points out that the bear is an old stump, then he not only satisfies his desire to follow his intuition, but he also strengthens his membership in the group thus satisfying his mythic membership desire. This is what is meant by transcending and including.

Q: But if, as Humberto tells us, we can never know in the moment the accuracy of our observations, how can we determine the "better" choice?

Jim: Better is always determined in hindsight. We reconstruct the past in light of the present, that is, once we know the outcome of our action, we justify it.[216]

Humberto: Hence, what constitutes the better choice is a decision each one of us must make for him- or herself. I can not tell you which is better. However, I do claim that biologically it is love and only love that constitutes human social behavior, and, from this point of view, that which legitimizes self and other is better than that which marginalizes self or other.[217]

Max: Humberto's notion of love as legitimization of self and other goes hand in hand with the notion of tact as mindful and thoughtful action with others. By tact, I mean tactful action as "the expression of a thoughtfulness that involves the total being of the person, an active sensitivity to the subjectivity of the other, for what is unique and

special about the person."[218]

Ken: From a holonic perspective, better is the greatest depth over the widest span, which is exactly where the evolution of the noosphere, the evolution of consciousness, is headed.[219]

Max: Goethe sums up our thoughts beautifully: "One learns to know only what one loves, and the deeper and fuller the knowledge is to be, the more powerful and vivid must be the love, indeed the passion."[220]

Q: I fail to see how all this relates to science.

Ken: Before addressing that relationship, we must first turn to "deep science."[221]

Deep Science

Jim: It all goes back to what counts as knowledge. On the one hand, we have the empirical sciences seeking certainty, *objective truth*, and on the other hand, we have the subjective human sciences seeking *meaning*. With the differentiation of the cultural value spheres, empirical science, free to explore the world, became so successful in gaining objective knowledge of the physical world that it gave rise to the belief that scientific knowledge was "the only acceptable kind of knowledge."[222] All else simply did not exist– "the belief *becomes* the experience."[223]

Ken: Belief in the certainty of objective knowledge led to the collapse of the subjective and intersubjective domains. Meanings and values became objectified. Mind and consciousness were reduced to aberrations of the nervous system. There was no depth to reality, only objective reality, only flatland.

Max: Unfortunately, theory development and research in human science was reduced to the interobjective, or restricted to establishing principles and norms, to finding "the permanent in the fleeting, the commensurable in the incommensurable, the conceptual in the unique, the measurable in the poetic,"[224] which inevitably failed. Consequently, human science was left with ineffective and unacknowledged methodologies for establishing validity claims.

Now, even as the physical sciences begin to see the shortcomings of the positivistic approach to knowledge, the empirical-analytic and phenomenological-hermeneutic types of human sciences debate which methodologies, which approaches to research, produce what counts as valid knowledge. As human scientists, we get entangled in organizing life around our theories forgetting that it is people "who bring schemas and frameworks into being and not the reverse."[225] In phenomenology in particular, we must remember that its purpose "is not propositional discourse. There is no systematic argument, no sequence of propositions that we have to follow in order to arrive at a conclusion, a generalization, or a truth statement, because that would be to see theorizing itself as method."[226]

Humberto: Granted, the methods of empirical science are not applicable for examining human experience. However, if human science is to be acceptable as a science, "it must have some method for exploring and knowing what human experience is."[227]

Ken: The problem is not so much one of methodology as it is one of application of methodology. Traditionally, doing science has been characterized by sensory empiricism and as such limited to the objective domains. However, the scientific method need not be limited to sensory experience. After all, "empirical" in its broadest sense means

"experiential." Thus to be an "empiricist" "simply means to demand *evidence* for assertions, and not merely to rely on dogma, faith, or nonverifiable conjectures."[228]

Jim: In the broad sense of empiricism then, evidence can be obtained by any direct experience regardless of the domain.

Ken: As long as it incorporates the three essential aspects of scientific inquiry, the three strands of all valid knowing: injunction, illumination, and confirmation.[229] Through the application of these three strands, that is, through "deep science," it is possible to create a valid method for gaining knowledge in the subjective and intersubjective domains as well as in the interobjective and objective domains . . .

Jim: . . . thus leading to the integration of art, morals and science.

Ken: Moreover, "the three strands of deep science *separate the valid from the bogus in each quadrant* . . . helping us to separate not only true propositions from false propositions, but also authentic self-expression from lying, beauty from degradation, and moral aspirations from deceit and deception"[230] . . .

Max: . . . which is actually what is needed in the human sciences.

Ken: Science, in its broadest sense as "the primordial human quest to understand the universe and our place in it,"[231] begins with *instrumental injunction*, which is always of the form "If you want to *know* this, *do* this."[232] As we know, science is first and foremost descriptive, but, as G. Spencer Brown points out in *Laws of Form*, "description is dependent upon, and secondary to, the set of injunctions having been obeyed first."[233] This is true regardless of the domain in question, be it sensory, mental or spiritual.

Humberto: Of course, this is what I have been saying all along–knowing is doing. As a biologist, injunction is manifest as experiment. If I want to know the structure of a

pigeon's eye, I must learn to dissect it.

Max: In education, we have teacher practica. Apprentice teachers learn from exemplary teachers. Phenomenologically, injunction is lived experience. If you want to know what an experience is like, you must live it as well as dialogue with others who have lived it.

Jim: Injunction then is the same as paradigm, which Thomas Kuhn used "to refer to a collection of procedures or ideas that instruct scientists . . . [as to] how to work."[234] It is through shifts in paradigms that scientific knowledge moves forward. Each new paradigm provides a new way of looking at the world . . .

Ken: . . . a new way of experiencing the world. As such, injunction leads us to direct apprehension, experience, or *illumination*. It is through injunction that experience is brought forth, that illumination arises. Thus, injunction provides the data that serve as "the crucial anchor of genuine knowledge."[235]

Max: One of the issues that has plagued phenomenology as a legitimate study of human experience is that it "has been called a method without techniques."[236] This has been interpreted to mean an approach to studying human experience that is devoid of injunctions and as such without a reliable method of collecting valid data. However, I interpret it to mean an approach that avoids objective-analytic methodology, which separates the researcher from the experience and as such nullifies the research process and the subsequent results. In turn, I argue that writing, which is integral to phenomenological research, is the key injunction necessary for effective understanding of human experience. Of course, writing cannot occur without first having had the experience and communicating with others who have also had the experience. Paradoxically, however, "writing distances us from lived experience but by doing so it

allows us to discover the existential structures of experience."[237] It illuminates our understanding of the experience.

Q: This doesn't make sense to me. If each of us have our own unique experience of something, how can you as a researcher write anything meaningful about the experience? How do we know if the writer is telling us something valid or if his or her experience is simply an illusion or deception?

Ken: This brings us to our third strand, *confirmation.* Once we make a knowledge claim, we seek confirmation or rejection of our results from others who have, and this is the essential factor, also completed the first two strands, injunction and illumination. If these informed knowers accept our knowledge claim as valid, then it is deemed valid. If they reject it, our knowledge is discounted.

Max: Such is the case in human science where phenomenological text is confirmed or rejected by others who have had the same experience. It is the resonance between author and *informed* reader that provides the validity of the claims being made.

Humberto: In other words, we grant knowledge to another when he or she demonstrates a behavior or action we deem as adequate or effective within the domain under consideration.[238] And we deny or reject knowledge when the behavior or action is inadequate or ineffective within the domain under consideration. Thus, the key factor in granting knowledge involves the relationship between action and context. Smoking illustrates this point quite clearly. In the domain of health care, smoking is seen as ineffective behavior, while in the domain of street gangs, smoking is a criterion for membership and a sign of coolness.

Jim: What we call validity is based not on certainty, but rather on social coherences, on

the interpretation of the community of knowers, the community of individuals who share the same paradigm. The acceptability of knowledge claims therefore is dependent upon consensus criteria.[239] Consequently, when paradigms shift, the validity of knowledge claims shift, which is the whole point of Thomas Kuhn's *The Structure of Scientific Revolutions*. As Kuhn points out, politics, that is, authority and power, is as much a part of the construction of scientific knowledge as is collected data.[240]

Ken: However, this does not negate knowledge brought forth by valid injunctions. "The fact that all holons have an interpretive as well as objective component does *not* deny the objective component, it merely situates it."[241]

In other words, "paradigms disclose data, they do not merely invent it."[242]

Q: But isn't truth, regardless of context or domain, simply "truth"?

Ken: Not at all. The objective, subjective, and intersubjective domains each have their own respective validity claims that "can be *exposed to evidence* and *checked* for their actual *validity*."[243] Let me explain.

Validity claims in the objective domain are based upon objective analysis of observable behavior. In this domain we are looking at the exteriors of holons.

As such, truth is representational, propositional. All objects of this domain have simple location. The same is true for the interobjective domain where we talk about "functional fit," which refers to how holons fit into the overall objective system. In both domains knowledge claims are based on the correspondence theory of truth, . . .

Humberto: . . . the explanatory path of objectivity-without-parenthesis.

Ken: In the subjective domain, there is no simple location upon which to base validity claims. Instead, validity depends on the individual's ability to match words with

intentions and actions, upon the individual's trustworthiness, sincerity, and integrity. Thus, rather than seeking "truth," we seek "truthfulness." Of course, this is difficult because it is always possible that we misinterpret our own experience, to say nothing about intentionally misrepresenting it.

Max: Discovering the "truthfulness" of lived experience is really what hermeneutic phenomenological human science is all about. Through the validating circle of inquiry, a description of lived experience "*is collected by lived experience and recollects lived experience–is validated by lived experience and it validates lived experience.*"[244]

Humberto: Of course we must keep in mind that "everything said is said by someone."[245]

Q: What's that supposed to mean?

Humberto: That is to say, "nothing precedes its distinction."[246] It is only through the observer, through language, that we bring forth a shared world of distinctions. Through this coordination of coordinations of relational behaviors we bring forth shared descriptions of experience. We cannot separate our way of being from how the world appears to us.

Jim: In a sense then, we co-create truthfulness. If your description resonates with my description, I acknowledge the truthfulness of your description. If our descriptions resonate with the descriptions of others in a particular community, then our claims are viewed as valid at least in that community if not in others, which leads us back to what we were saying about confirmation and rejection by a community of knowers.

Ken: To be a member of a community of knowers "means you and I inhabit each other's interior to some degree. You and I can *share* our *depth*. When we point to *truth*,

and we are situated in *truthfulness*, we can reach *mutual understanding*,"[247] which is the basis of validity in the intersubjective domain.

Max: Human science researchers, through interpretive conversations with others, orient themselves to the collective context, the cultural ground, that brings forth the significance of mutual experience.[248]

Ken: As "the participant observer, the hermeneutic interpreter . . . you understand by immersing yourself in this cultural background which will give you the common worldspace or common context against which you can now make adequate interpretations."[249]

Humberto: What the two of you are saying is that an explanation is acceptable to a given community of knowers who share a common set of conditions for validation. "Magic, for instance, is as explanatory for those who accept it as science is for those who accept it."[250] The difference between magic and science is that each in their own domain must meet the specific conditions of validation set forth within their respective domains. In the explanatory domain of science, we can distinguish four such conditions.[251] These conditions are not necessarily sequential and may overlap in various ways. Interestingly enough, they dovetail closely with the three strands of deep science.

The first condition involves an explanatory hypothesis, that is, a way of generating the phenomenon or proposed "injunction." The second condition is invoking the injunction, which leads to the third condition, experiencing the phenomenon in the praxis of living, that is, "illumination." The fourth condition requires that the description of the phenomenon be explained in an acceptable way to a community of knowers, "confirmation."

The implication of this discussion is that "since it is not measurement, quantification or prediction that constitutes science as a domain of explanations and statements but the application of the criterion of validation of scientific explanations by a standard observer in his or her praxis of living, a standard observer can do science in any domain of the praxis of living in which he or she applies this criterion."[252]

Ken: The importance of these notions is that they provide us with the power and the tools to transform beyond the rational. Through the understanding and application of *deep science* in conjunction with *enactivism*, and the tenets of holons, we have, for the first time in history, the possibility of actually integrating on a cultural level, the "I," "We," and "It" domains rather than *re-fusing* them as many new age imperialists advocate. It is this integration of the cultural value spheres which constitutes the next stage in the evolution of consciousness, vision-logic, or the centauric worldview.

Vision-Logic

Jim: Modernism, the dominant feature of today's rational worldview, stems from Rene Descartes' famous proclamation: ". . . the mind by which I am what I am, is entirely distinct from the body,"[253] whereas vision-logic is based on the integration of body and mind . . .

Ken: . . . "which is why I call the self of this stage the *centaur*, representing an integration of the mind and the body, the noosphere and the biosphere, in a relatively autonomous self."[254] This integration was made possible through the development of abstract critical thinking which is an integral part of the rational worldview. Abstract

thinking led to metathinking–thinking about thinking–which has subsequently led to postmodern thought, the principle source of the centauric worldview.

Humberto: From within the context of postmodern thought, constructivism and the notion of constitutive ontologies emerged. Through constructivism, we began to understand that we cannot assume a pregiven reality independent of the observer.[255] Through constitutive ontologies we came to realize the possibility of multiple realities.

Max: Of course, postmodern thought also includes the whole notion of contextualism in which meanings are context-dependent, contexts are boundless, and language creates the world, or better, *worlds* we live in.[256] In part, it is through constructivism and contextualism that we have come to apprehend the uniqueness of human experience and appreciate the value and validity of phenomenological human science.

Jim: Moreover, postmodern thought has led us to realize that there is no one privileged perspective–a concept the dualistic rational perspective can scarcely grasp. As such, it is postmodern thought that forms the link between the rational worldview and what Jean Gebser calls the integral-aperspectival worldview or simply the integral.[257]

Ken: Not only does the integral-aperspectival mind privilege no perspective as final but it maintains an awareness that synthesizes all perspectives. The clear boundaries of self and other which the rational mind worked so hard to establish, the integral mind now strives to make porous and permeable. The centauric stage acknowledges the depth of our relationship with the natural world and the Jungian archetypes that have their origins in archaic images and magico-mythic motifs.[258] It realizes the transformative powers of myths and that "all of the world's great mythologies exist today in each one of us, in me and in you. They are produced, and can at any time be produced, by the archaic, the

magic, and the mythic structures of our own compound individuality."[259]

While the integral mind respects the differentiation of the arts, morals, and science as achieved by the rational mind, it strives to integrate them. It transcends simple rationality in its ability to "unify opposites and see identity-in-difference."[260] In moving toward a worldcentric or planetary perspective, the integral-aperspectival mind transcends egocentric and ethnocentric perspectives.

Jim: This means that conjunctive faith, the individual's planetary perspective "is ready for significant encounters," as James Fowler suggests, "with other traditions than its own, expecting that truth has disclosed and will disclose itself in those traditions in ways that may complement or correct its own."[261] To enact this readiness the integral mind makes itself vulnerable to another's truth without negating its own truth. There is the knowledge that truth is a matter of context and that in order to construct knowledge there must be a joining "together [with others] to arrive at some new understanding."[262] By engaging with another in *dialogical* knowing, that is, through mutual listening and speaking in an I-Thou relationship, it becomes possible to grasp the depths of reality of the other's experience and thus move closer to truthfulness.[263] Fritjof Capra's exploration of the parallels between modern physics and Eastern mysticism is an excellent example of this kind of awareness.[264]

Ken: The significance of this awareness is the recognition that "any single perspective is likely to be partial, limited, perhaps even distorted, and only by taking multiple perspectives and multiple contexts can the knowledge quest be fruitfully advanced."[265] This capacity to recognize one's own perspective as a distortion of transcendent reality is James Fowler's *ironic imagination*.[266]

Humberto: This is exactly the point that rational-minded critics don't really understand. They argue that because the explanatory path of objectivity-with-parenthesis maintains the notion of multiple realities and that no theory can claim objective truth, then it must follow that the notion of constitutive ontologies is either not worth considering or is self-contradictory.[267] What they don't comprehend is that constructionistic or relativistic notions like constitutive ontologies don't claim to have an objective truth that covers all domains, but rather they claim a truth relative to a specific domain in a given period of time. These critics fail to recognize that truths are context dependent as well as dependent upon the acceptance of a community of knowers which always makes them subject to revision.

Ken: In other words, they fail to understand "no matter how much we expand our contexts, this does not invalidate the relative truths of smaller contexts. It *negates* their exclusiveness (or their ultimateness), but *preserves* their moment of truth, their context-dependent truth."[268]

Jim: Unlike the rational mind, caught in the world of dualities, in the world of oppositionality, the integral mind is able to accept paradox, to hold contradictions. Whereas the rational mind separates object from background, self from other, the centauric mind, in apprehending the inclusiveness of being, goes beyond either-or thinking by attending to the organic and interconnectedness of the nature of all things.[269] It is the acknowledgement of this interconnectedness that forms the basis of web-of-life systems thinking. While some holists may be reductionists in that they collapse internal domains to external domains, there are others like Fritjof Capra who go beyond flatland notions. This is evident in his belief that "ecological awareness, at the deepest level, is the intuitive

awareness of the oneness of all life, the interdependence of its multiple manifestations and its cycles of change and transformation, . . . [and that] spirituality, or the human spirit, could be defined as the mode of consciousness in which we feel connected to the cosmos as a whole."[270]

Ken The power of vision-logic is not that it sees the interdependence of all things, but rather that it can identify and articulate that "it is itself an intrinsic part of the interrelated Kosmos."[271] As such, vision-logic incorporates the best of both the rational and the transrational which makes it quite difficult for solely rational minds to comprehend.[272]

Q: Transrational? Are you insinuating there is a state of being, a level of consciousness that actually goes beyond the rational?

Ken: Absolutely. The mystical or contemplative levels, fulcrums 7 to 9 which we mentioned earlier, go beyond the rational. While a thorough discussion of them is more than we can manage here, the confusion between prerational and transrational is worth commenting on. The prerational stages of the archaic, magic, and mythic are externally quite similar to the transrational stages of the psychic, subtle, and causal in that they are both nonrational stages. As such, those who see the rational mind as the end state reduce the transrational to prerational. This is what I call the pre/trans fallacy.[273] The fallout of this is that genuinely transrational experiences such as the contemplative behaviors of both Western and Eastern religions is seen as regressive or prerational and thus negated. Of course the opposite can happen as well. Supporters of the transrational elevate prerational experiences to transrational, which reinforces the rationalist's position that all transrational experience is bogus.

Q: So the issue here appears to be one of validity. What constitutes an experience as

a valid transrational experience?

Ken: The answer lies in deep science, in the application of the three strands of valid knowing. Is there an *injunction* that leads to an *illumination* for which there is *confirmation* by a community of knowers? Unfortunately, for the Idealists the answer was no; they didn't have an adequate practice for reproducing their insights. Or, as is the case for many of their New Age descendants, their practices are ones that revert to the magic or the mythic worldview and as such are prerational, not transrational as they would like to claim.[274]

Humberto: Francisco Varela maintains that Western secular thought has no practice "that works with cognition and lived experience in a direct and pragmatic way."[275] Because traditional science has separated itself from everyday lived experience, it is incapable of transcending from the rational mind set to vision-logic. Therefore, Varela and his colleagues recommend that in order to overcome this problem, science, through phenomenology, must shift from reflecting on lived experience to the practice of "mindfulness meditation" which allows the mind to be present in the experience–allows the experience to bring itself into the mind's consciousness. They argue that the tradition of mindfulness awareness offers a path leading to centauric thinking which "requires the embodiment of concern for the other with whom we enact a world."[276]

Max: While your colleague and his friends have a valid point, I am afraid, given Ken's suggestion that the majority of society functions at the mythic-rational stage of consciousness, that we have a long wait before the general population of phenomenologists, let alone scientists in general, embrace mindfulness meditation. Until then, we will have to rely "on the interpretive sensitivity, inventive thoughtfulness,

scholarly tact and writing talent"[277] of the human science researchers as they are.

Q: Before going any farther, what's the downside of this vision-logic?

Ken: Like all other levels of consciousness, vision-logic is faced with its own pathologies. The more complex a holon becomes, the greater the possibility for dysfunction. "And the greater the depth of transcendence, the greater the burden of inclusion,"[278] which is where the problem lies for the integral-aperspectival mind. Aperspectival awareness with its apprehension of multiple perspectives privileges no perspective. However, the effort required to take into account all the different perspectives can become quite disorienting, quite overwhelming. Forgetting that "*relative* does *not* mean that no perspective has any advantage at all,"[279] can lead to a "total paralysis of thought, will, and action,"[280] that is, *aperspectival madness*. In other words, in viewing all perspectives as equal, none are seen as having any real depth, which leaves only flatland, a postmodern wasteland–a world without depth, without Spirit.

Jim: Another problem arising with vision-logic is our ability to produce the technology which allows for a worldcentric economy, a technology which, in the hands of individuals with less-than-planetary consciousness, is used to further global but not worldcentric agendas.[281] For example, the internet, a worldcentric technology, is used to spread hate literature and foster terrorism to say nothing of its use to make money for some at the expense of others.

Q: So where do we go from here?

Jim: "As Einstein is often quoted as saying: No problem can be solved from the same consciousness that created it."[282] On a cultural level, this means problems created from a mythic membership mentality, such as the tribal wars of Eastern Europe, Asia, and

Africa, will require the world community to find solutions based on a rational or vision-logic perspective rather than on their old mythic membership positions. It means developing theories of human development that are inclusive of women and minority groups rather than simply taking the white male life cycle as being the norm.[283] On an individual level, it means resolving personal issues associated with the lower rungs of our functioning by accessing our higher rungs of consciousness. Given that each of us, individually and collectively, is an interwoven fabric of levels of consciousness, and that evolution is as of yet an unfinished process, I believe solutions to our gravest problems are still possible.

Ken: Unfortunately, "the cognitive means usually run way ahead of the willingness to actually climb that ladder of expanding consciousness."[284] However, having said that, I believe our hope for a better future lies in the integration of the Big Three domains of holonic existence: art, morals, and science. Through its foundation in a rational worldview, science, both traditional natural sciences and human sciences, in conjunction with other societal institutions, must take the lead in creating a future focused on the *basic moral intuition*: "*protect and promote the greatest depth for the greatest span.*"[285] "The evolutionary drive to produce greater depth is synonymous with the drive to overcome egocentrism, to find wider and deeper wholes, to unfold greater and greater unions."[286] We cannot do this alone. We must engage the personal values, collective wisdom, and technical knowhow of all from around the globe if we are to succeed in our journey toward the ultimate objective truth: "All beings are perfect manifestations of Spirit or Emptiness."[287]

Jim: Such an engagement requires a uniting force. Despite the contention that no one

knows how paradigms are actually integrated into human culture,[288] I maintain their presence is facilitated by strong metaphors. Brent Kilbourn argues that "a metaphor which has scope and precision in its ability to account for a wide variety of seemingly disparate phenomena could conceivably form a basis of a worldview." Historically, each worldview has had its own metaphor.

For the magic epoch, it was the *image*. A picture of the hunted animal drawn in the earth was shot with an arrow to ensure the success of the hunt. In the mythic world *god* became the metaphor for uniting the sources of power. Throughout history innumerable wars have been fought in "God's" name. The rational worldview has taken the *machine*, given to us by Descartes, as its model of the world, a model so ingrained in our culture that its presence permeates our very being in ways that go beyond our comprehension.

In order to engage the world in the transition to vision-logic, (a transition Fowler calls "a watershed time of cultural and intellectual change that equals or exceeds the eighteenth-century Enlightenment in depth and significance"[289]), a strong metaphor with great depth must emerge from the upper rungs of our collective consciousness. The web-of-life metaphor, while effective in uniting the components of the "It" domain, misses the mark in terms of depth. When I think of the web-of-life, I am always reminded of a spider's web, which, while beautiful, is only two-dimensional and as such without depth. I think a better metaphor, one that best represents the four dimensions of holonic existence as well as the self-organizing principle of all of life, and possibly the entire Kosmos, and as such the evolution of consciousness as understood from a vision-logic perspective, is the ***human mind***–the most complex of all self-organizing networks.

Humberto: Yes, the mind is a powerful metaphor, for it is the mind that allows "us to treat any situation that we live as a starting point for recursive reflections."[290] Our mind gives us the ability to consider our actions, to choose our actions and the emotioning that drives them. Our problems, the world's problems, belong to the emotional domain and will only be changed by changes in our emotioning. Will metaphor effect such a change? I don't know. But what I do know is that "we shall remain human only as long as our operation in love and ethics is the operational basis of our coexistence."[291] I also know that I personally want to contribute to a cultural change in which "love, mutual respect, honesty and social responsibility arise spontaneously from living instant after instant."[292]

Max: The starting point for this kind of cultural change is in finding the universal in the particular. As such, "phenomenological engagement is always personal engagement: it is an appeal to each one of us, to how we understand things, how we stand in life, how we understand ourselves,"[293] collectively and idiosyncratically. Each of our stories, each of our lived experiences, contains some essence of truthfulness. The aim of human science then is to identify and articulate the essence of each particular experience, the universal meaning common to all who share the experience.

Jim: So we end where we began, with human science research as a loving act, an act in which another is seen as a legitimate other. But legitimization of self and others is not limited to human science research; it is core to what it means to be human. It is integral to each stage of our spiritual development.[294] Love, as the emotional basis of knowing, of knowledge, is the essential ingredient necessary for the continuation of the evolution of consciousness individually and collectively. In sum, we are left with Fritjof Capra's words: "There can be no wisdom without compassion."[295]

If you look carefully to the north, just above Cassiopeia, you can see the Andromeda nebula, the most distant object perceptible to the unaided eye.[296] Knowing that its light has traveled for one and a half million years to reach us here in this moment, how can you but wonder "*what else is going on*?"

As I am humbled by the presence of this distant light, I am humbled by the depth of vision-logic within each of you and by the manifestation of Spirit within each of us.

The fire is all but embers; it is time to go . . .

Know Thyself Revisited

The preceding conversation represents an effort to unpack the complexities of knowing, knowledge, and reality through reflection on the notions of enactivism, the ontology of cognition, and the unified field theory of consciousness within the context of deep science as applied to lived experience. Although I know more now at the end of the conversation than when it started, I realize how much more there is to know–how many topics untouched, how many perspectives unseen, how many voices unheard. There are volumes of text regarding such matters as the constitution of reality, the various ways of knowing, and the social structure of knowledge which I have yet to study. The limitations of enactivism, the importance of the biology of cognition in the fields of sociology and psychology, the philosophical implications of the four quadrants of holonic existence, and the application of deep science to the mental and spiritual realms remain to be addressed. While there are innumerable topics left to investigate and questions to answer, the ideas explored in this chapter represent a working epistemology

from which I can examine lived experiences of sensemaking.

The writing of this conversation as a reflective process of *knowing how we know* has significantly influenced how I apprehend the world. First, in coming to understand that cognition is not representational and that the world is brought forth by the distinctions we make, I have replaced the construction metaphor of knowledge with an evolutionary metaphor. The construction metaphor, based more on a representational than an enactive perspective, lacks life and is too static to accurately depict the dynamic processes of knowing. Take for example, the building of a brick structure in which the first brick laid remains the same with the addition of other bricks. In the end, the interconnection of bricks creates something new, yet in and of themselves each brick remains unchanged. This image fails to capture Humberto Maturana's observation that subsequent knowledge changes prior knowledge.[297] Evolution, unlike construction, is a dynamic "interweaving of processes" that are the "result of self-transcendence."[298] Hence, knowledge viewed through an evolutionary metaphor is seen as alive and dynamic. This metaphor portrays knowledge as emergent much in the same way as an oak emerges from an acorn. As such, it provides a more precise and representative account of knowledge than the construction metaphor. This shift in metaphor has given me a completely new way of comprehending knowledge.

Next, the notion of holons has profoundly influenced my understanding of the constitution of reality and the meaning of truth. Ken Wilber's synthesis of the four quadrants of holonic existence[299] has given depth to the ecologic and holistic beliefs which comprise my worldview. In the process of coming to comprehend the profundity of this synthesis, I have separated myself from the dualistic struggle between objective and

subjective truths, and come to embrace the integration of the objective, subjective, and intersubjective domains. This integration involves more than just acknowledging the existence of these domains; it includes realizing that there is no existence without the inclusion of all three domains and that each domain is integral to the others. While we talk of them as if they are separate, they aren't. There is no "I" domain except in the context of the "We" domain which exists only in an "It" domain. In other words, the world consists of an endless nesting of holons within holons, contexts within contexts. The validity of a truth or truthfulness then is determined by the context within which it is set.

From these insights, I have come to understand the evolution of life and the evolution of the universe as the evolution of holons, as the evolution of consciousness. I have come to understand that I am still in the middle of an evolutionary process of understanding this evolution. My continuing efforts to grasp the meaning of the evolution of consciousness as the unfolding of Spirit will no doubt cast my current understanding in a new and different light.

Finally, in composing this chapter, I have come to appreciate Max van Manen's insistence that writing is an integral part of human science research.[300] Writing, as the interplay between what is known and what is emerging, compels us to dig deeper, to reach farther, to wrestle with our reflections in order to discover the meaning of our experiences. It compels us to challenge our certainties, to entertain new possibilities. Each revision, each change of word, sentence, or paragraph, constitutes a new way of seeing, of understanding, and hence a *revisioning* of what had previously been seen. In writing this chapter, the most dramatic revisioning occurred with the map metaphor.

Through the writing process, I began to realize that the metaphor is not simply about the relationship between map and territory but rather about the relationship between map, experience with the territory, and territory. This change in thinking is evident in the change from first to final draft of Q's comments on pages 35 and 36:

1st Draft

Q: I think I'm catching on. If I understand all of this correctly, a territory does exist and through interaction with it, the map maker creates a map of the territory; however, the map is not the territory. We only know the territory reflectively, that is indirectly from the history of our lived experience. Consequently, we cannot comment on the ultimate nature of the territory.

Final Draft

Q: I think I'm catching on. If I understand all of this correctly, a territory, that is a physical world, does exist. Through interaction with it, the map maker creates a map of his or her experience with the territory; consequently, the map is not of the territory, but rather, of the map maker's experience of interaction with the territory. Furthermore, we only know our experience with the territory reflectively, that is, through reconstructing it from the perspective of our personal and cultural history of our lived experience. As a result, we can only comment on our recollection of our experience of interaction with the territory, never on the ultimate nature of the territory.

Reading this final description of the map metaphor, I see that it too is incomplete, simplistic, and limited. It says nothing about how to orient the map or use it to navigate through lived experience. While the validity of a map lies in its structural resemblance to

the structure of the territory, its functional value lies in the map reader's ability to effectively use it to navigate the lifeworld. It is one thing to create a map; it is quite another to use it, given its inherent generalizations, limitations, and inaccuracies, to successfully navigate through the territory of lived experience.

As I wrote and rewrote this chapter, I began to question the map as a metaphor for knowing in that at its core it is representational which enactive knowing, as understood through Maturana and Varela's biology of cognition, is not. Given that I have no replacement metaphor and that we live life *as if* knowing is representational, I will continue with this metaphor until a more effective one arises. With the limitations of the map metaphor in mind, the goal of this chapter is to develop a map that will provide a basis for "knowing thyself," to create an integrative epistemology in which knowing, knowledge, and reality arise from a common ground, to explore the evolution of what counts as knowledge.

What has been achieved is an epistemology of participation,[301] an epistemology in which we come to know the world through our full participation in it, through bringing it forth by the distinctions we make and the significance we give it as a result of our interactions with the world and with each other. It is an epistemology grounded in an integration of theory and lived experience. It is one in which we as knowers must come to recognize the tenuousness of our certainties and open ourselves to the notion of multiple possibilities. It is one that requires us to take responsibility for our actions, our knowings. It is one that informs us that the world is as we create it, and, if we want it to be different, we must be different. It tells us that we can be different. The choice is ours. This is not just a theoretical epistemology isolated from the lived world, but rather it is

one that realizes its roots are buried deep within lived experience and, as such, includes art and ethics as well as science. It is one that informs life as well as research.

It is from the perspective of an epistemology of participation that I examine the lived experience of a field trip as a case study in sensemaking. But first a description of the case study.

NOTES

Gathering at the Fire

[1] Becker cited in Fowler, 1981.

[2] Wilber,1995, p. vii.

[3] from the dust cover of *The Marriage of Sense and Soul.*

[4] Wilber, 1995, p. vii.

[5] Wilber, 1995, p. vii. Author's italics.

[6] Wilber (1996) defines the Kosmos as containing "the cosmos (or the physiosphere), the bios (or biosphere), psyche or nous (the noosphere), and theos (the theosphere or divine domain)" (p. 19).

[7] Wilber, 1995. p. vii.

[8] Wilber, 1995, 1996.

[9] Wilber, 1995, 1996.

[10] Wilber, 1995, 1996.

[11] from the "Preface" to *Researching Lived Experience.*

[12] van Manen, 1990, p. 22.

[13] Kitchener, 1986, p. 81.

[14] Following Geertz (1973), Varela et. al (1991), and van Manen (1990), I use phenomenology in its most general sense as an interpretive science in search of the meaning of experience.

[15] van Manen, 1990, p. 29.

[16] van Manen 1990, p. 46.

[17] van Manen, 1990, p. 156. Author's italics.

[18] Korzybski, 1958, p. 58. Author's italics.

[19] Geertz, 1973, p. 25.

[20] Stake, 1988.

[21] Measor, 1985.

[22] Burgess, 1985.

[23] Yin, 1981, p. 59.

[24] Wilson, 1977.

[25] Wilson, 1977, p. 254.

[26] Stake, 1978, p. 5.

[27] Emerson et al., 1995, p. 12. Author's italics.

[28] Wolcott, 1988.

[29] Richardson, 1990.

[30] van Manen, 1990, p. 5.

[31] Maturana and Varela, 1998, p. 246. Author's italics.

[32] Laing cited in Capra, 1988, p. 318.

[33] Maturana and Varela, 1998, p. 247.

[34] Maturana, 26 October 1998, University of Calgary Lecture.

[35] van Manen, 1990, p. 12.

[36] Emerson et al., 1995, p. 5.

[37] Emerson et al., 1995, p. 5.

Explanatory Paths

[38] van Manen, 1990, p. 36.

[39] Maturana, 1988, p. 28.

[40] Varela et al., 1991.

[41] Varela et al., 1991, p. 31.

[42] Wilber, 1996, p. 315.

[43] Throughout his work, Wilber refers to the cultural value spheres by various terms: I, We, and It; subjective, intersubjective, and objective; art, morals, and science; and the beautiful, the good, and the true after Plato.

[44] Wilber, 1996.

[45] Laszlo cited in Kilbourn, 1980, p. 40.

[46] Capra, 1991, p. 367.

[47] Wilber, 1998. Also see Capra, 1982, p. 39.

[48] Maturana, 1988, p. 41.

[49] Maturana, 1988, p. 29.

[50] Capra, 1991, p. 177.

[51] Gaarder, 1994, p. 203.

[52] Wilber, 1995.

[53] Kilbourn, 1980, p. 37.

[54] Capra, 1996, p. 29.

[55] Capra, 1996.

[56] Maturana and Varela, 1998, p. 80.

[57] Here "organization" means "those relations that must exist among the components of a system for it to be a member of a specific class" (Maturana and Varela, 1998, p. 47).

[58] Maturana and Varela, 1980.

[59] Wilber, 1995.

[60] Of the 20 tenets of holons outlined in *Sex, Ecology, Spirituality*, the six detailed in *A Brief History of Everything* are of most concern to us at this point in our discussion. They include: #1, All of reality is composed of holons; #2, all holons share certain characteristics which include but are not limited to: (a) self-preservation or agency, (b) self-adaptation or communion, (c) self-transcendence or creativity, and (d) self-dissolution; #3, holons emerge; #4, holons emerge holarchically, i.e. hierarchically; #5, emergent holons transcend but include predecessors; and #12, evolution has directionality toward greater complexity, relative autonomy, differentiation, and integration.

[61] Koestler, 1967, p. 48.

[62] Koestler, 1967, p. 54.

[63] Wilber, 1995, 1996.

[64] Wilber, 1995, 1996. See Appendix A for a more detailed graph of the four quadrants.

[65] According to Steven Pinker (1997), a triune-brained organism is one which possesses a three layered brain consisting of a basal ganglia or reptilian brain, the limbic system or primitive mammalian brain, and the neocortex or modern mammalian brain. The human brain is considered to be a triune brain.

[66] Wilber, 1995, pp. 120-121.

[67] Wilber, 1995, p. 121.

[68] Koestler, 1967; Wilber, 1995.

[69] Wilber, 1995, p. 121.

[70] Wilber, 1996, p. 87.

[71] Maturana, 1998, Part II, Art and Design, unpaginated.

[72] At this point in the discussion it is important to note the difference between organization and structure as Maturana and Varela (1987) define them. "*Organization* denotes those relations that must exist among the components of a system for it to be a member of a specific class. *Structure* denotes the components and relations that actually constitute a particular unity and make its organization real" (p. 47).

[73] Both Mingers and von Glasersfeld indicate that it has taken them "many years" to a "decade" to gain clarity and be able to interpret Maturana's notions. Kenny describes Maturana's theory as "not an easy theory to grasp ranging as it does across several specialist fields from the neurophysiology of perception through social communication to epistemology" (1985).

[74] Mingers, 1995, p. 29.

[75] Here "structure" means "the components and relations that actually constitute a particular unity and make its organization real" (Maturana and Varela, 1998, p. 47).

[76] Maturana and Varela, 1998, p. 99.

[77] Maturana and Varela, 1998.

[78] Mingers, 1995, p. 30.

[79] Mingers, 1995, p. 32.
[80] Maturana and Varela, 1998, p. 164.
[81] Maturana and Varela, 1998.
[82] Mingers, 1995.
[83] Maturana and Varela, 1998, p. 169.
[84] Maturana, 1998. Part I, The Nervous System, unpaginated.
[85] Maturana and Varela, 1980, p. 51.
[86] Varela, 1979.
[87] Maturana and Varela, 1998.
[88] Maturana and Varela, 1998, p. 75.
[89] Maturana and Varela, 1998.
[90] Wilber, 1995, pp. 63-64.
[91] Maturana and Varela, 1998.
[92] Maturana and Varela, 1998.
[93] Maturana and Varela, 1998, p. 196.
[94] Maturana and Varela, 1998.
[95] Maturana and Varela, 1998.
[96] Maturana, 1988.
[97] Mingers, 1995, p. 93.
[98] Kenny, 1985.
[99] Maturana, 1988, p. 33.
[100] von Glasersfeld, The Birth of the Observer, unpaginated.

Bear in the Woods

[101] van Manen, 1990.
[102] Varela et al., 1991, p. 227.
[103] Wilber, 1995, p. 537. Author's italics.
[104] Maturana, 1988.
[105] Maturana and Varela, 1980, p. 8.
[106] Wilber, 1998, p. 177. While Wilber is referring here to the domains outlined in the 4 quadrants, I believe his comments apply equally to the individual domains Maturana is referring to.
[107] Mingers, 1995.
[108] Wilber, 1996, p. 65.
[109] Wilber, 1996, p. 60.
[110] Maturana, 1988, p. 54.
[111] Maturana, 1998, Part II, Reality, unpaginated.
[112] Maturana, 1988, p. 55.
[113] Maturana and Varela, 1998, p. 27.

[114] Minsky, *Society of Mind*, as cited in Varela et. al, 1991, p. 139. Author's italics.

[115] Varela et al., 1991, p. 205.
[116] Varela, 1979, p. 231.
[117] Mingers, 1995, p. 208.
[118] Varela et al., 1991, p. 156.
[119] Varela, 1979, p. 275.
[120] Varela et al., 1991.
[121] Mingers, 1995, p. 193.
[122] van Manen, 1990, p. 102.
[123] Maturana, 1988, p. 39.
[124] Maturana, 1998, Part II, Reality, unpaginated.
[125] Maturana, 1998, Part II, Reality, unpaginated.
[126] van Manen, 1990, p. 150. Author's italics.
[127] Varela et al., 1991, p. 149.
[128] Maturana and Varela, 1998, p. 246.
[129] Maturana and Varela, 1998, p. 211.
[130] Maturana, 1988.
[131] Maturana, 1988, p. 43.
[132] van Manen, 1990, p. 61.
[133] Mingers, 1995, p. 78.
[134] Mingers, 1995.
[135] Kenny, 1985, Part I, Life, Love and Languaging, unpaginated.
[136] von Glasersfeld, The Birth of the Observer.
[137] von Glasersfeld, The Birth of the Observer.
[138] Maturana, 1988.
[139] Maturana, 1998, Part I, Languaging, unpaginated.
[140] Maturana, 1988.
[141] Maturana and Varela, 1998, p. 193.

Evolution of Consciousness

[142] Kitchener, 1986.
[143] Wilber, 1995, p. 126.
[144] Kilbourn, 1980.
[145] Kilbourn, 1980, p. 35.
[146] Maturana and Varela, 1987, p. 233.
[147] Maturana, 1998.
[148] Wilber, 1996.

[149] Piaget, 1942, *Intellectual Evolution* as cited in Kitchener, 1981, p. 409.

[150] van Manen, 1990, pp. 9-10.

[151] Koestler, 1967, Wilber, 1995, 1996.

[152] Wilber, 1995, 1996.

[153] Varela, 1979, p. 86. Author's italics.

[154] Wilber, 1996, p. 140. Author's italics.

[155] Jantsch, 1980, p. 75.

[156] Jantsch, 1980, p. 183.

[157] Piaget as cited in Bringuier, 1980, p. 40.

[158] Wilber, 1998.

[159] Wilber, 1996.

[160] Wilber, 1996, p. 138.

[161] Wilber, 1996, p. 74 and p. 139. Wilber has a tendency to use words interchangeably; consequently, there are a variety of terms for the same concept as is the case with the stages of consciousness.

[162] Piaget's cognitive stages include sensorimotor (Wilber's emotion), preoperational (Wilber's symbols and concepts), concrete operational, and formal operational. Wilber's vision-logic is an extension of formal operational.

[163] Wilber, 1996, p. 139.

[164] Wilber, 1996, p. 148.

[165] Piaget, *Genetic Epistemology*, 1971 as cited in Kitchener, 1986, p. 37. Also see Bringuier, 1980 and Wilber, 1996.

[166] Italics added.

[167] Wilber, 1996, pp. 141-142. Wilber uses holarchy to mean the hierarchy involving holons.

[168] Wilber, 1996, p. 142.

[169] Wilber (1995) refers to self-preservation or agency as a holon's ability to preserve its own individual structure of wholeness within the context of its interrelationships. He defines self-adaptation or communion as a holon's capacity to function as a part of another whole. Self-transcendence or creativity is the capacity to go beyond what went before by building on the fundamental features of a predecessor and thus creating a new whole. Finally, Wilber describes self-dissolution as the decomposition of a holon into subholons.

[170] Wilber, 1996.

[171] Fowler, 1981.

[172] Wilber, 1996.

[173] Wilber, 1996, p. 145. Author's italics.

[174] Maturana and Varela, 1998, p. 23.

[175] Bringuier, 1980.

[176] Wilber, 1996, p. 145.
[177] Wilber, 1996.
[178] Myss, 1996. The seven sacred truths include: (1) All is One, (2) Honor One Another, (3) Honor Oneself, (4) Love is Divine Power, (5) Surrender Personal Will to Divine Will, (6) Seek Only the Truth, and (7) Live in the Present Moment (p. 286).
[179] Fowler, 1981.
[180] Maturana and Varela, 1980.
[181] Wilber, 1998, p. 71. Author's italics.
[182] Capra, 1996, p. 6.
[183] Wilber, 1996, p. 44.
[184] Wilber, 1995, p. 170.
[185] Myss, 1996.
[186] Kerr and Bowen, 1988.
[187] Fowler, 1981.
[188] Gebser, 1985, Wilber, 1996.
[189] Fowler, 1981.
[190] Gebser, 1985, Wilber, 1995, 1996.
[191] Gebser, 1985, Wilber, 1995, 1996.
[192] Fowler, 1981, p. 149.
[193] Campbell, 1988, p. 63.
[194] Belenky et al., 1986.
[195] Wilber, 1995.
[196] Fowler, 1981, p. 164.
[197] Wilber, 1998, p. 50.
[198] Wilber, 1995.
[199] Wilber, 1998, p. 75. Author's italics.
[200] Belenky et al., 1986.
[201] Fowler, 1981, p. 179.

Old Stump

[202] Gebser, 1985, p. 42. Author's italics.
[203] Wilber, 1995, p. 252.
[204] Kilbourn, 1980.
[205] Kilbourn, 1980.
[206] Wilber, 1996. p. 201.
[207] Wilber, 1996.
[208] Wilber, 1996, p. 166.
[209] Goleman, 1995.

[210] Maturana, 26-27 October 1998, University of Calgary Lecture.
[211] Koestler, 1967, p. 190.
[212] Koestler, 1967, p. 190.
[213] Wilber, 1995, pp. 202-203.
[214] Wilber, 1996, p. 332.
[215] Maturana, 1988, Part III, Desires and responsibility, unpaginated.
[216] Weick, 1995.
[217] Maturana, 1988, and 26-27 October 1998, University of Calgary Lecture.
[218] van Manen, 1991, p. 531.
[219] Wilber, 1995, 1996.
[220] Goethe cited in van Manen, 1990, p. 6.
[221] Wilber, 1998.

Deep Science

[222] Capra, 1982, p. 39.
[223] Borhek and Curtis, 1983, p. 79. Author's italics.
[224] van Manen, 1982a, p. 46.
[225] van Manen, 1982b, p. 297.
[226] van Manen, 1982b, p. 298.
[227] Varela et al., 1991, p. 23.
[228] Wilber, 1998, p. 152. Author's italics.
[229] Wilber, 1998.
[230] Wilber, 1998, p. 176. Author's italics.
[231] Horgan, 1996, p. 6.
[232] Wilber, 1998, p. 156. Author's italics.
[233] Brown cited in Wilber, 1998, p. 157. Wilber's italics.
[234] Horgan, 1996. p. 43.
[235] Wilber, 1998, p. 157.
[236] van Manen, 1990, p. 131.
[237] van Manen, 1990, p. 127.
[238]Maturana, 1988; Maturana and Varela, 1998.
[239] Kenny, 1985, Part II - The Multiverse, unpaginated.
[240] Kuhn, 1970.
[241] Wilber, 1998, p. 122. Author's italics.
[242] Wilber, 1998, p. 159.
[243] Wilber, 1995, p. 145. Author's italics.
[244] van Manen, 1990, p. 27. Author's italics.
[245] Maturana and Varela, 1998, p. 27.

[246] Maturana, 1988, p. 80.
[247] Wilber, 1996, p. 114. Author's italics.
[248] van Manen, 1990.
[249] Wilber, 1996, p. 117. Author's italics.
[250] Maturana and Varela, 1998, p. 28.
[251] Maturana, 1988, 1998.
[252] Maturana, 1988, p. 36.

Vision-Logic

[253] Descartes, 1968, p. 54.
[254] Wilber, 1996, p. 191. Author's italics.
[255] Maturana, 1988; Maturana and Varela, 1998.
[256] Wilber, 1998. Italics added.
[257] Gebser, 1985.
[258] Wilber, 1995.
[259] Wilber, 1995, p. 220.
[260] Wilber, 1995, p. 185.
[261] Fowler, 1981, p. 186.
[262] Belenky et al., 1986, p. 144.
[263] Fowler, 1981.
[264] See Capra, 1991, *The Tao of Physics.*
[265] Wilber, 1998, p. 131.
[266] Fowler, 1981. Italics added.
[267] Mingers, 1995.
[268] Wilber, 1995, p. 537. Author's italics.
[269] Fowler, 1981.
[270] Capra, 1988.
[271] Wilber, 1998, p. 132.
[272] Wilber, 1998.
[273] Wilber, 1995.
[274] Wilber, 1995.
[275] Varela et al., 1991. p. 244.
[276] Varela et al., 1991, p. 247.
[277] van Manen, 1990, p. 34.
[278] Wilber, 1996, p. 325.
[279] Wilber, 1996, p. 193. Author's italics.
[280] Wilber, 1998, p. 136.
[281] Wilber, 1996.

[282] Wheatley, 1994, p. 5.
[283] Gilligan, 1982.
[284] Wilber, 1996, p. 310.
[285] Wilber, 1996, p. 335. Italics added.
[286] Wilber, 1996, p. 180.
[287] Wilber, 1996, p. 132.
[288] Livingston, 1994.
[289] Fowler, 1996, p. 147.
[290] Maturana, 1998, Part III, Reflections, unpaginated.
[291] Maturana, 1988, p. 82.
[292] Maturana, 1998, Part III, Reflections, unpaginated.
[293] van Manen, 1990, p. 156.
[294] Myss, 1996.
[295] Capra, 1988, p. 37.
[296] Menzel, 1964.

Know Thyself Revisited

[297] Maturana, 1988.
[298] Jantsch, 1980.
[299] Wilber, 1985, 1986.
[300] van Manen, 1990.
[301] Varela et al., 1991.

CHAPTER 3: JOURNEY INTO THE ROCKY MOUNTAINS

We shall not cease from exploration
And the end of our exploring
Will be to arrive where we started
And know the place for the first time.

T. S. Eliot, Four Quartets

A journey begins, as the ancient Chinese proverb instructs, with a single step. But what constitutes that first step? Is it the initial step out the door on the day of the actual journey? Is it that moment when one decides to engage upon the journey? Is it some prior event which triggers an interest in the object of the journey? Or is it when one becomes aware of a compelling need for movement be it physical, intellectual, or spiritual? Similar questions can be asked about the journey's end. Is the journey over when one arrives home? Does it end when one runs out of stories to tell? Or is it when one is compelled to embark upon some new adventure? Whatever moments are chosen for start and end, the journey is always nested in the middle of a bigger journey–a thread in some broader tapestry. And so it is with this case study.

At first, it made sense to me that the Rocky Mountain pre-conference field trip in and of itself constituted my case study, but, as I lived through the experience of my research, I came to realize that the boundaries of this case study were not nearly as definite nor as clear as I had imagined at the onset. This field trip was not an isolated event but rather a part of the flow of the larger context of lived experience of the participants and the communities to which they belong. While the basis of this case study is a particular geological field trip, my research permeates beyond to include my anticipation and preparation prior to the field trip as well as the impact of the field trip

on my thinking once I returned home.

This chapter is a description of events leading up to and including the actual six-day field trip. The purpose of this chapter is to provide the reader with a detailed account of the exterior-collective aspects of the events which occurred during the case study as well as a look at some of the interior-individual and interior-collective aspects. Subsequent chapters will provide a more in-depth investigation of the interior experiences of the field trip participants and of the researcher as observer participant.

The data presented here was collected via several approaches. The primary approach consisted of jotting down notes during each day of the field trip and converting these jotted notes to prose text each night before retiring. (Unless otherwise indicated, italicized comments are direct quotes from my prose field notes.) This note taking approach was supplemented with two tape recorded interviews in which I was the interviewee. The first was a self interview in which I asked myself questions as I was returning home from the field trip. In the second my wife interviewed me as we looked through a photo album compiled of 65 pictures I had taken during the course of the field trip. Material for this chapter also includes information collected from four open-ended, tape recorded interviews conducted with participants during the field trip. In total these interviews included ten of the fifteen field trip participants. This chapter also includes information from five post field trip interviews and e-mail correspondence with eleven of the participants; however, the majority of this post trip material will be discussed in the next chapter.

Although I have chosen events that seem most directly related in time and content to my investigation of sensemaking, it is important to understand that the events selected have been pulled from a larger context of my doctoral studies which in turn has been

taken from my life-long, lived experience as a learner. Each of these larger contexts, while not explicitly discussed, has, to one degree or another, influenced this case study.

Looking backward it might appear as if my research project was well thought out in advance. However, that was not the case. It was much more serendipitous than well thought out–I was at the right place at the right time; I was receptive to possibilities.

In January 1997, I met with Bryant Griffith, Assistant Dean of the Graduate Division of Educational Research at the University of Calgary to discuss my intention to pursue a doctoral degree with a focus on the social construction of knowledge. At the time, I had no idea what my research would look like nor that this meeting would be the catalyst for shaping the direction of my research. A month or so later as I was walking to class, I met Bryant in the hallway. He briefly spoke to me about doing research with the Yoho-Burgess Shale Foundation. As I had never heard of the Burgess Shale, I thought he had confused me with someone else, but he assured me he had not. Later that week when we talked more formally in his office, Bryant indicated that working with a group of scientists at the Burgess Shale might be a great opportunity to study their process of sensemaking. He gave me a name and number to call, and I was on my way.

As it turns out, throughout the summer the Yoho-Burgess Shale Foundation conducts regular tours to the Burgess Shale quarries and the Mount Stephen fossil beds. While most of these tours are open to the general public, this particular summer a group of paleontologists attending a six day pre-conference field trip of the Rocky Mountains had booked a private tour to both sites as part of their trip. I wasn't at all clear how joining this group would serve the purpose of my research, but I pursued it anyway imagining that it would all make sense as it unfolded. Thus, after making a few phone calls and meeting with Carl, one of the trip organizers, I gained permission to be a

participant for the entire six day field trip. I acquired ethics approval for the project from the University of Calgary ethics committee, and, in keeping with their guidelines, the names of all participants and other individuals encountered during the field trip have been changed to preserve individual identities. On August 14th, the evening before embarking on the field trip, I, the rookie ethnographer, traveled from Calgary to Edmonton to begin my research.

14 August 1997: The Night Before

It was late afternoon when I arrived in Edmonton and took a room in a hotel near the university. As I started organizing the equipment for the field trip–tape recorders, microphones, blank tapes, and hiking gear–I realized that I was feeling quite anxious about entering into this research project with a group of people whom I hadn't met and knew next to nothing about except that they had an interest in participating in this pre-conference field trip. Also, since I had never done an ethnographic style study, I wasn't sure I actually knew how to take fieldnotes. Even though I had read Roger Sanjek's *Fieldnotes: The Makings of Anthropology* and various pieces by Stake, Wilson, and Wolcott, it was unclear to me what I was really supposed to do. How would I know what was important? What was I to record? When should I take written notes; when should I use the tape recorder? Would I be able to get all the information I needed? Overwhelmed by these and other questions that raced through my mind, I went for a bite to eat at a nearby restaurant.

As I walked back to the hotel, I came to realize that "I only needed to focus on tomorrow not the entire trip. What a relief." All I had to do was to take one day at a

time and to "notice what I notice." Also, from my studies in applied behavioral sciences, I remembered that behaviors exist typically as reoccurring patterns, thus, if I missed something important, not to worry because it was likely to happen again. With these thoughts in mind, I ended the day with the following journal entry:

> *I must have courage–I must take initiative by striking up conversations; I must stay open–eyes, ears, mind, and heart–to all that is happening and trust that that which is important will be recalled. I must use and experiment with my notetaking skills–after all this is research. Finally I must be bold–in getting out my notepad and recording notes, and in taking out the tape recorder and recording conversations.*
>
> *P.S. Trust that you already know what you need to know to do the research project effectively.*

15 August 1997: Entering the Rockies

Dressed in jeans, t-shirt, running shoes, and pile jacket, I was indistinguishable from any of the others who gathered together for this field trip. We met in a classroom at the University of Alberta, sixteen of us in all. The company included six university professors, two individuals associated with American museums, two amateur paleontologists, two post-doctoral fellows, three graduate students, and one undergraduate student. The two field trip organizers, Carl and Paul, both professors from western Canadian universities, briefed us on the trip itinerary, after which I discussed my research project with the group and distributed copies of the Letter to Participants (Appendix B) and the Declaration of Informed Consent (Appendix C) to each of them.

All participants signed the declaration and proved to be willing participants throughout the trip.

Shortly thereafter we made our way through the rain, which was to remain with us throughout the day, and piled into the two vans which were to be our means of transportation for the next six days. One van driven by Tolsoe, a doctoral student studying "baby trilobites" under the supervision of Carl, carried four passengers and all our luggage. The other van driven by Carl carried the remaining twelve passengers (see Appendix D for seating arrangements of passengers throughout the trip).

As we drove from Edmonton to Jasper, I talked extensively with Jerry, a sixty-four year old retired chemist from the eastern United States and active amateur paleontologist with an interest in the preservation of fossils. He knew about half of the people in the group prior to this trip.

Our conversation was wide ranging:

> *Jerry commented that Stephen J. Gould in Wonderful Life presented a rather biased view. One that may have gotten paleontologists motivated to prove him wrong. Some of whom apparently already have in rebuttal papers. When asked about different schools of thought within the field of paleontology he deferred to Carl and Paul, but as far as he knew there were "no big problems." He commented that the only way to learn paleontology was by being out in the field. In discussing distant and vast amounts of time, Jerry offered that he understands time mathematically, i.e. one million years is related to so many "storms of the century."*

During our morning stop for gas and coffee, I sat with Janet, a geology professor at an American university in the western United States and the only woman on the trip,

and Andy, a curator of invertebrate paleontology at a mid-western American museum who would be taking up a professorship at a university in California in the fall. Janet and Andy had recently been on another field trip together. Carl joined us. The three of them related stories about their international travel adventures and about other paleontologists they all knew. Of particular interest were Andy's stories about Soviet paleontologists:

> *In one instance Andy and his wife were attending an end-of-expedition celebration in which his wife was taking photos that evidently included Soviet paleontologists. Later, an American working for the US Geological Survey requested copies of her photos in order to verify the identity of particular Soviet paleontologists. In another story Andy commented about being on a field trip with some Soviet paleontologists who were in the possession of rock hammers which they appeared to not know how to use.*

Andy's insinuation was that the Soviets were more spies than paleontologists.

Upon arriving in Jasper (370 kms west of Edmonton), we stopped to eat lunch, to buy food for the next few days' lunches, and to browse the tourist shops. Hans, a German professor whose specialty is trilobites of northern Africa, and I stopped at the Jasper National Park Information Centre where he purchased a field guide to plants of the Canadian Rockies. He told me that those individuals on the trip who knew him would expect him to answer their questions regarding the local flora as botany was one of his more serious hobbies.

After lunch we drove 163 kms south from Jasper to Saskatchewan River Crossing and then another 44 kms northeast to the David Thompson Resort. While low hanging clouds and rain obscured most of the scenic views of the mountains, we occasionally got a break in the weather and a chance to get out of the vans to "look at some geology" as Carl

would say. Our two leaders would relate the geology and paleontology at each of these sites, one filling in what the other didn't know. Usually Carl would start the conversation by discussing what he knew of the site and then defer to Paul, who would talk in more technical terms about what he knew. On more than one occasion, one would ask the other, "What do you know about that?" When describing the geology both men would frequently end their comments with a phrase to the effect of ". . . as far as we know." At Tangle Mountain, Paul commented on the name changes of various geological formations from "meaningless American names" to more local Canadian names.

While Tolsoe, Kildong, and Patrick were observed taking notes at various times during these stops, there was always a great deal of picture taking. Everyone had a camera; Phelim, a professor of geology and paleontology from a university in China, had the group's only video camera. In the mid-1980's, Phelim spent two years working with Hans in Germany. In the intervening years they met once in Siberia and now in Canada.

In between stops, Phelim, Mongryong, and Kildong referred to various geological maps, while several people, most notably Kildong, Mongryong, and Levi, referred to the 80 page Excursion Guidebook prepared by Carl and Sam, a third year geology student hired to work as Carl's assistant for the summer. Sam, who at the age of nineteen was the youngest member of our group by more than a decade, was also responsible for arranging our overnight accommodations. Despite Sam's youth and inexperience as a geologist, when Carl was asked about the age of a rock slide we passed, he referred the question to Sam who had recently stopped at the site on another field trip with a group from one of his university courses.

Our longest stop of the day was at the Columbia Icefields. On our way back to the vans from the foot of the glacier, Paul showed me an interesting limestone rock with

brown striations. He told me he had collected specimens of this rock, taken them home and contemplated them for some time. It seems no one really knew how they were formed. A fellow researcher wrote a paper proposing how they might have formed. But Paul knew right away that this proposal was wrong, even though he didn't have an alternative explanation.

While riding in the van or standing along the highway listening to Carl and Paul describe the local geology or walking along the trail, I found it more effective to jot down notes than to tape record what was being said. For this purpose I used a 3 inch by 5 inch notebook of unlined pages. This style of notebook facilitated my mind mapping technique of notetaking in which a theme word placed in the middle of the page served as a hub for other key ideas connected to the theme. Initially I had placed an individual's name in the middle of the page thinking that this would be the best way to keep track of information connected to any particular person. However, before day's end I realized that this strategy was quite unworkable. I shifted to placing a title of an activity ,"van", "lunch" or "quarry" in the middle of the page instead of a person's name. This worked much better. I was pleasantly surprised at how much data I was able to collect with so little writing. Using this short-hand method of taking notes in a cold and wet outdoor environment proved to be highly effective. Socially, it was a very unobtrusive way to record what people were doing and saying. Just prior to retiring each night, I used the mind map jottings to refresh my memory of the day's events and to write out my fieldnotes.

We arrived at the David Thompson Inn late in the afternoon. There, as for most of the trip, we shared accommodations (see Appendix E for list of accommodation roommates). The major exception to this was Levi, an amateur paleontologist with a

sleep disorder, who choose to room by himself.

Before going for supper, all but Kildong, Tolsoe, Mongryong, and Levi joined Carl and Paul in their room for a glass of wine and conversation. Our two leaders discussed at length their favorite whiskies–Carl described the best of Irish whiskies, while Paul praised the attributes of Scotch whisky. They also discussed their ability to identify English accents, and told numerous stories about field trip adventures and the antics of various paleontologists. One such story about a paleontologist who took a faculty position at one university while on sabbatical from another university, thus drawing double salary, led to comments about knowledge claims based on little data:

> *One comment in particular concerned a geological map of some part of China which Carl suggested was more fiction than reality. Paul suggested that this fictionalizing of reality may be true historically as well as currently and that researchers tend to "go on intuition" when lacking adequate data. He also suggested that historically paleontologists were "more boldly interpretive" than today.*

When the wine ran out, we went to dinner where the stories continued to flow. We returned to our rooms around 10 pm. It had been a full day. As I rewrote my fieldnotes, I realized that I had already learned a great deal about the group with which I was traveling. I was feeling much more confident and looking forward to the remainder of the trip. I concluded my notes with the following comment:

> *I feel totally included in the group. Everyone I've struck up a conversation with has been quite open and willing to answer my questions.*

16 August 1997: Mount Stephen Fossil Beds

The next morning I ate breakfast with my roommate Martin, a Welshman doing post-doctoral work in Australia. Paul joined us. We talked mostly about the pressures of publishing scientific papers.

Martin informed us that the Australian university where he was doing post doctoral work has a point system for professors publishing work in professional journals. Each professor earns points by publishing in international journals. The more prestigious the journal, the more points awarded. Martin suggested that this process discourages the development of Australian journals in that they are excluded from the point system, i.e. no points are awarded for being published in Australian journals.

After breakfast, we climbed into the vans and headed back to Saskatchewan River Crossing and southeast toward Lake Louise.

For the second day in a row the weather is overcast and rainy. Low clouds drift around the base of the mountains giving them a mystical quality. Even though there is a certain beauty to the fresh snow on the crags of the upper slopes, the views are disappointing for those who have come from so far away to see the magnificence of the Canadian Rockies. Jokingly Paul points out formations hidden behind the clouds.

On the drive I sat at the back of the van where I could see everything that was going on. There was much more talk today than yesterday. Janet sat up front with Carl who once again chatted away throughout the drive. Unfortunately, from my position in the back of the van, I couldn't hear the particulars of their discussion. However, Patrick,

a graduate student working with Paul, told stories about the wild exploits, feuds, and unorthodox collecting adventures of early paleontologists such as Andrews, Cope, and Marsh.

> *Patrick appears to be quite taken with Andrews. He told of Andrew's wild and unorthodox collecting adventures, and of Andrew's relationship with Marsh. The friendship between the two went awry and turned into an actual war–shooting at each other, blowing up each other's collection sites and other such incidents. Sam joined in the conversation as did Henry, who coordinates after school programs for a large museum in the eastern United States. All three were quite engaged in adding bits and pieces to the story.*

From storytelling the conversation flowed into a discussion of the idea of historical perspective and how historic notions can't be judged by present day perspectives. Patrick faulted Stephen J. Gould in this regard for his criticism of Charles Walcott's interpretations of the fossils found at the Burgess Shale quarries. Sam, who had recently finished taking a philosophy of science course as part of his university studies in geology, spoke out against the idea of scientists knowing absolute truth. He and Henry both agreed with Patrick's comment that "there is always bias." Patrick went on to say that what we know today will in six years be as wrong as what we knew six years ago.

The conversation ended with Patrick talking about being labeled "paleo boy" by geology classmates who had little time for fossils until, while on a field trip, they realized the importance of fossils in locating oil reserves. Patrick described it as a "change in attitude" regarding the need to know about fossils. He referred to his geologist classmates as being typically interested only in that which was profitable. Sam indicated having had similar experiences with geology classmates.

Later, during a conversation about caving Jerry related a time when he had become quite claustrophobic while trying to squeeze through a thirty foot long tunnel. Paul told several stories about caving accidents and deaths including an incident in a cave known as the Rat's Nest, one of the few caves I have ventured into.

Our itinerary for the day, in addition to numerous stops along the way to Lake Louise where we would spend the night, included visiting the Mount Stephen fossil beds 800 metres above the town of Field, B.C. and 145 kms from the David Thompson Inn.

Before having us sign release-from-liability waivers, Peter, our guide for the day's trek as well as the next day's visit to the Burgess Shale, informed us that the hike we were about to take involved a very steep two hour climb, two to three times as steep as any in the Park–1700 feet of elevation gain over a distance of 3 kilometers. Not only was it steep but also quite slippery due to the rain. It was dangerous, and if we were not used to being in an exposed area, now was the time to decide not to continue. Once we started, we all had to stay together. If one person decided that they could not go any farther, then the entire group would have to stop there and return to the trailhead. At the end of his lecture about the difficulties of the climb, Peter asked, "Now does everyone have a clear picture of what it is like?" Of course everyone answered, "Yes." Afterwards, several of us laughed about the difference between what we imagined the climb to be like and what it actually turned out to be.

Peter had also warned us to keep a look out for bears, but it was wasps that were the problem. About half way along the climb, we disturbed a ground wasp's nest, resulting in four of our group getting stung, the worst of whom was Levi who was stung on the bridge of his nose directly between his eyes causing significant swelling that lasted several days. Carl was stung on the hand and also suffered some swelling which bothered

him for another day or so. The other two who were stung showed no symptoms. The next morning Carl approached Levi and compared stings and swellings. Carl's wrist was quite swollen and he was experiencing headaches. He wasn't sure if he was going to be able to go on the next day's hike with us to the Burgess Shale.

We arrived at the fossil beds without any further incidents. On a clear day the town of Field is visible from the beds as are the mountain slopes across the valley, but all we could see was the fog enclosing the slope we were standing on. No one complained; we were there to see fossils, and fossils were what we found. It was difficult to find a slab of shale that did not have a fossil of one sort or another embedded in it. Within minutes, with cameras and sandwiches in hand, the group dispersed in search of fossils. Not only is this site well known for its quantity of trilobite fossils, but also the quality of them, that is specimens of whole trilobites with clear presentation. As people found interesting specimens, they placed them on big rocks for others to see and photograph. Others who had been there before us had done the same as there were numerous "collections" scattered throughout the site. Both Peter and Carl were ready and willing throughout the afternoon to discuss any of the various specimens people found.

All fossils occurring in any Canadian National Park are protected by law; thus, collecting is prohibited except by special permit. Consequently, photographing specimens replaced collecting.

> *These guys have a very strong ethic. I would be surprised if anyone took even one fossil from there. I mean these are like the prize treasures and these guys are standing upon thousands of them and they're just hanging there and nothing will ever be done with them and they don't take them because, you don't take them. They have that kind of scientific integrity.*

The usual practice when taking pictures of fossils was to place a coin near them to give an indication of size. As the rest of the group took pictures of fossils, I took pictures of them in action. It was when photographing them taking photographs that I realized the value of photography as a recording device both for them as paleontologists and myself as an ethnographer. Consequently, my picture taking as a recording process became more strategic and less random. However, as the afternoon progressed, picture taking gave way to fossil hunting. Of all the fossils I found, I was most excited by a perfectly preserved *Anomalocaris* claw. *Anomalocaris* was the largest predator of the Cambrian shelf habitat. There is an interesting evolution-of-knowledge story behind this animal's claw. The claw, which is quite shrimp-like in size and form, was originally categorized as a species of its own. Only later, after much research and rethinking was it realized that this fossil was actually a part of a larger animal.

In addition to taking pictures and searching for fossils, I had a long conversation with Levi. Being a full time business man he declares himself as strictly an amateur paleontologist. He started studying geology about five years ago and considers it "the most technical of all the sciences." Thus, he is always asking "dumb questions." After the field trip he would be presenting a paper at the trilobite conference. On our way down from the fossil beds, Levi and I talked at length with our guide Peter about the changing nature of the understanding of scientific knowledge claims:

> *Peter cited plate tectonics theory, which was developed only 30 years or so ago and is now the basis of the geology courses he teaches, as a major shift in the thinking about and understanding of geology. Their conversation included criticism of Stephen J. Gould's "I'm right and you're wrong" attitude toward Charles Walcott which subsequently led to a discussion of the changing nature of*

knowledge in which Peter suggested that the general public views science as more truth-based than do the scientists themselves.

In the end we all agreed that the acquisition of scientific knowledge was an evolutionary process.

At the end of the hike we had a short question and answer period in which Paul made a very matter of fact comment to the effect that he was right and someone else was wrong. As he continued, Carl interrupted him several times suggesting an alternative point of view.

I remember looking at Paul as Carl was challenging his ideas, and Paul getting a quizzical look on his face like, "Okay, I'm not going to argue here. Yes, yes, it's possible but let's go on." At this point Carl acknowledged that he was "playing the devil's advocate" and having a good time of it.

Later, while Carl and Paul were occupied making arrangements for our next day's trek to the Burgess Shale, the rest of us visited the Burgess Shale Information Centre in Field. After purchasing a few post cards and bookmarks with pictures of fossils on them, I engaged in conversation with Patrick. It was after twelve years of navy life and a reading of *Wonderful Life* that Patrick realized he wanted to become a paleontologist. While this book was a major influence in his life, now as a graduate student who is well on his way to becoming a paleontologist, he was quite willing to point out its flaws. Later, Paul commented that Gould's book had a positive influence on many of his students.

Patrick is unique among his fellow students in that most of them have entered paleontology via geology, whereas he arrived there via biology. Consequently, he approaches problems much differently than geology-based paleontologists. This

difference is evident in his research in which he contends that certain organisms lived in mud which was low in O_2. To demonstrate this possibility he extracted blood samples from a related living species and analyzed its ability to capture O_2 under conditions similar to the fossil species. Patrick argued that a geology-based paleontologist would not have considered taking this kind of approach to investigating the problem.

Patrick has been working for the last two years on a paleontological project in Newfoundland. While this project started out as a master's project, it may be advanced to Ph. D. status because of the amount of time and the quality of research involved. However, some faculty of his university are concerned that in doing this it would not provide Patrick with enough experience writing at a professional level.

From Field we drove the 25 kms back to Lake Louise and checked in at the Youth Hostel. I roomed with Kildong, Mongryong, and Tolsoe. The four of us went out for supper together. Our conversation centered around the nature of each of our cultures. We talked about how Korean women have the opportunity to go to university, but as soon as they get married they are limited to being housewives. This is the case for Kildong's wife.

Upon returning to our room, I took an opportunity to tape record an interview with them. As we sat on the floor with the tape recorder between us, I asked questions and they responded.

During the interview I learned that Kildong, while not a trilobite specialist, was one of the only professors of paleontology in Korea who was currently studying trilobites. Because trilobite research in Korea is in its infancy, he ordered Tolsoe, who was one of his first masters students, to go to Canada to study under Carl who is a noted trilobite specialist. Mongryong is Kildong's first doctoral student and he is also sending

him to Canada to do post-doctoral work with Paul. Part of the importance of this trip was for Mongryong to meet Paul. Kildong, who did his doctoral studies in the United States, firmly believes that it is best for his students to study where there are abundant intellectual as well as physical resources.

One of the primary values of this field trip for all of them was to make connections with other trilobite people who they would otherwise never meet. Their presence was also seen as being of value to the North Americans for the same reasons, as Paul indicated later. The Koreans found that face to face conversations were much more valuable than the written information they generally are able to access. Their conversations were as much about getting to know each other as about research. Kildong mentioned that in the first two days of the trip he had talked with Hans about a topic currently under consideration by a paleontological organization to which they both belonged. He and Andy had discussed what each of them were doing in their research.

The other primary reason for them participating in this field trip was to get a first hand look at the Rocky Mountains. While they were disappointed that the weather had reduced the visibility of the mountains, they were quite excited about seeing the trilobites. They do not have complete trilobite specimens in Korea like the ones they saw on Mount Stephen. Kildong had never seen fossils of such fantastic preservation in Korea.

Kildong and Mongryong, who were not as familiar with English as Tolsoe, had difficulty understanding all the technical and area specific geological terminology used during our stops to "look at some geology." As a result, they spent considerable time reading the guidebook, which they wished had been better organized and with bigger pictures. They found it difficult to correlate the small and consequently indistinct pictures with what little they could see of the geology of the mountains.

We ended our conversation with a discussion about the evolving nature of scientific information. All agreed that what is considered truth today may not be considered truth in the future. In Kildong's words,

> *What is truth is based on the scientific information at the time. If the assumption is wrong, the solution should be wrong. But at the time, the assumption is seen as right; thus, the solution is considered acceptable at least at that time.*

With the interview complete and mid-night quickly approaching, I wrote out my fieldnotes concluding them with the following comment:

> *I am getting data. I'm beginning to get a feel for what is important as data, i.e. I realize I'm missing important conversations that possibly contain data I could use. Fortunately, what goes around comes around. It will be there again tomorrow.*

17 August 1997: The Burgess Shale

This was the day everyone had been waiting for–the trek to the Burgess Shale quarries. Carl remarked that "at least half the people on the trip are here primarily to see this site." This was definitely the case for Martin, who said, "When I heard that the trip was scheduled to visit the Burgess Shale, I signed up immediately." Carl went on to say that the main reason we were going there was "because it is well exposed, there are really interesting fossils there, and a lot of people consider it to be the most famous fossil site in the world."

Despite the importance attached to our destination, the group's excitement was masked by a calm reverence as we climbed into the van on yet another rainy day. We drove to Field where we met David,[1] a director with the Yoho-Burgess Shale Foundation,

and Peter, who once again served as our guide. From Field we drove to the trailhead near Takakkaw Falls. We arrived shortly after nine o'clock. As the clouds started to clear, views of the mountains emerged. The group's spirit lightened–cameras came out as rain gear was stuffed into backpacks.

I noted for the second day in a row that Patrick was busy fixing sandwiches for himself and Paul, while Paul chatted away with others in the group. When I asked Patrick about this, he informed me that he did not mind fixing Paul's lunch. As Patrick explained it, Paul allowed him to go about his research undisturbed and saw to it that adequate funding, $ 20,000 to date, was available for his Newfoundland research project.

Last minute preparations complete, the journey began. Whereas the hike to the Mount Stephen fossil beds had been steep, the hike to the Burgess Shale quarries was long, nine hours from start to finish with 18 kms of hiking, including 2500 feet of elevation gain and 3400 feet of elevation loss. No one complained. In addition to Peter, we were joined by three Burgess Shale research assistants who were returning from their time off work.

Throughout the day's hike, I was busy eavesdropping on conversations and jotting down notes. The better part of the morning was spent listening to the flow of stories shared between Andy and Paul. They have known each other for approximately ten years. A good portion of their conversation involved inquiring about mutually known colleagues:

> *Andy related an incident about a colleague who both he and Paul thought to be quite a competent paleontologist. In presenting a paper at a conference, their colleague began her presentation with some self-deprecating remarks about her own research, which for Andy "led to a loss of interest in her topic." Paul mused*

about the difficulties of pulling off such an approach. He mentioned one fellow he thought was quite good at it.

They also discussed the research each had been involved with since they last met. Andy talked at length about his and his wife's transfer from the mid-west to the west coast of the United States. They also discussed the problems with university chair appointments and promotion systems, as well as attendance at Geological Society of America meetings. Andy indicated that his main reason for attending the GSA meetings was to network with other people working on projects similar to what he was working on. He also found it of value to attend these meeting when he was looking for new employment opportunities. Paul talked about a German geologist who came to work with him after having met at one of these meetings. They also discussed issues concerning writing and publishing academic papers. In regard to writing for the general public as Stephen J. Gould has done, Paul commented that "as you move to writing journalism, you need to realize that you won't be taken seriously." This was evident in the number of times throughout the field trip that I heard people criticize various concepts Gould put forth in *Wonderful Life*.

At one point the flow of stories turned to drinking episodes involving various paleontologists. In listening to them talk about a colleague who has a drinking problem, I noticed that both men expressed concern for this person's well being rather than criticism. Andy mention that this person had recently married. Both he and Paul thought this was a good thing for this person and that being married might help reduce the drinking problem. One story flowed into another:

One, told by Paul, involved quite a heavy drinker at a geology conference dinner. It seems that this person, having drank more than his share of alcohol, passed out

falling face first into his food just as the guest speaker was about to address the audience. The group of people sitting with this fellow thought it best not to create any disturbance by moving him so they left him as he was. Mid-way through the speaker's presentation, the fellow sat up and vomited all over the table. His friends quickly removed him to the washroom where he was last seen with his feet sticking out from under one of the stalls.

Next Andy prefaced a story with an apology for its grossness, then went on to relate a very funny incident about a woman who had gotten sick from drinking too much:

A rather inebriated female paleontologist, while conversing with a colleague in his hotel room, let out a loud belch. She excused herself and continued the conversation. Then without a word she turned her head to the side and vomited all over her friend's bed. Turning back to her colleague she simply commented, "do go on."

This story prompted Carl, who I hadn't realized was also listening in on Andy and Paul's conversation, to relate another gross and embarrassing tale about himself:

It seems Carl, having decided to travel in luxury on one of his research field trips, purchased a collapsible toilet designed for back country use. At the first call to use it, Carl made his way off into the woods and did his business. As he reached for the toilet paper, the toilet lived up to its name and collapsed into the sphagnum moss which he proceeded to use to clean himself.

This flow of story telling appeared to have a life of its own. It had a natural spontaneity to it based on association as much as anything else. One story seemed to trigger someone's memory of a similar story which in turn triggered another and so on. The stories were accompanied by considerable laughter and a sense of joy.

Just prior to our mid-morning break, a very delightful and attractive young woman (a friend of mine who I had not seen for several years) appeared on the trail ahead of us. Recognizing me she ran up and gave me a big hug and a kiss. The group was quite impressed and teased me about it for some time afterward.

Paul and Andy indicated that there was little need on this trip to discuss technical or research issues as they were quite familiar with each other's work as well as that of the others within the group through reviewing papers for acceptance for publication as well as from reading professional journals. For many of the geological and paleontological publications the reviews are signed so the author of the paper knows who thinks what about what he has written. Jerry mentioned that in his work as a professional chemist, reviews were never signed so he never new who had reviewed his papers.

Paul estimated that there are only about 50 or so active paleontologists in Canada and possibly only 70 some active trilobite specialists worldwide. Both Paul and Andy were in agreement that most of the group was aware of the professional differences between various individuals and, as is typical with paleontologists, were quite willing to express their differing opinions with each other. They expected that more of this kind of discussion would occur as people presented their papers at the conference.

We stopped for lunch on a lovely open slope that provided us with great views of the mountains. After lunch I listened as Andy questioned Peter about his work with the Foundation's out-reach education program in which local high school students were involved in doing some fairly sophisticated research. I also had a discussion with Carl about the value of tenure for university professors. He sees tenure as a mechanism for protecting professors from political interference not from incompetence.

Just prior to arriving at our destination, the forest gave way to the talus slopes of

the Burgess Shale, which lie between Mount Field to the south and Wapta Mountain to the north. The quarries are located in the clay shales of the Stephen Formation, the same formation as the fossils beds we visited on Mount Stephen. This is what everyone had been waiting for. At that very moment, a single gray cloud passed over dropping a touch of rain and then moved on.

As we approached the old Walcott horse trail that leads up to the quarries from the main trail, people started quizzing Peter about Walcott's discovery of the site. While there were many versions told during the trip as to what actually occurred on that historic day, the way I remember it is that Charles Walcott came to Alberta to collect fossils from the Stephen Formation. Late in the summer of 1909 while riding his horse back to his camp, Walcott found the trail blocked by a large rock. He dismounted and proceeded to clear the trial. In the process of doing so, he discovered the rock to be a fossil-bearing slab of shale. Some have it that the fossil was *Marrella*; others aren't so sure. The rest, as they say, is history.

According to Stephen J. Gould, the Burgess Shale is, in the minds of many but not all, the world's most important animal fossil bed ever unearthed in that "its power to alter our view of life cannot be matched by any other paleontological discovery."[2] The diversity of animal life found in these Cambrian rocks outstrips that of any other and as such has given rise to new interpretations of the evolution of multicellular animal life. It is from the fossils found in these rocks that paleontologists hope to be able to unravel some of the mysteries of early animal life evolution. Carl disagrees with Gould's notion of the Burgess Shale being the world's most important fossil locality:

> *I've always thought the importance of the Burgess Shale is overblown. I think every fossil is equally important and every fossil locality has the potential to be*

important. The Burgess Shale certainly does have a wider range of information than is usually available. While I've always felt its importance to be exaggerated, it is important to have these sorts of icons that everybody looks to, and, somehow or other, they make people more interested in paleontology. It's like dinosaurs. Dinosaurs are vastly over inflated in the media and the public's mind, yet without dinosaurs I think paleontology would be suffering as a discipline. The Burgess Shale, I suppose in invertebrates, is the equivalent to dinosaurs.

The Burgess Shale was first quarried between 1910 and 1917 by Charles Walcott, Secretary of the Smithsonian Institute. He was followed by Percy Raymond in the 1930's and Harry Whittington who was with the Geological Survey of Canada during the 1960's. Presently, the National Geographic Society funds Connor Moore of the Royal Ontario Museum to work the quarry. It was Connor who greeted us as we arrived.

Connor was generous with his time. After discussing the history of the Walcott quarry, he described his standard display of fossils. This was rather humorous, because Peter, standing on a ledge above and to the side of Connor, held up little pictures of each specimen Connor described. While these little pictures would be important for the average tourist group, for most of our group it was not at all necessary. But it was helpful for me. Later, Connor showed us his special collection of "keeper" fossils which were not typically shown to tour groups. He also took us to see the Raymond quarry which is the middle one of the three Burgess Shale quarries and situated directly above the Walcott quarry. The upper quarry is quite small and the trail up to it is steep and rocky so we did not venture up to it. While at the Raymond quarry, Sam had his picture taken in the exact location and pose that Stephen Gould had his taken when he visited the site. Sam thought of this as a bit of a joke in that he contends Gould's only reason for visiting

the quarries was to have his picture taken for his book, *Wonderful Life*.

With the sun shining between high scattered clouds, cameras clicked away. In addition to fossils, people and vistas were popular topics for photos. Henry set up his camera on a tripod and took pictures at 18 degree intervals through a full 360 degrees. The resulting pictures, when scanned into a computer program he has back at the museum, allow the viewer to pan the entire landscape as if standing in the spot where the camera was.

In addition to the conversations with Connor, people talked with the three research assistants who, with hammer and chisel in hand, were busy breaking loose slabs of shale and examining them for fossils. One of the field assistants explained to us that if they didn't find anything of interest, the rock was discarded and they continued with another piece. He went on to say that for a fossil to be of interest, the specimen needs to be either a rare species or of an unusual presentation, or show some uncommon characteristic.

Besides Connor and the research assistants, Miles, a retired geologist who volunteered his time and expertise to map the various bands of rock which run through the quarry, talked with small groups about the work he was doing. In conversation with Hans, Miles complained that some thirty years ago the terminology "lower," "middle," and "upper" Cambrian had been agreed upon by members of a major paleontological association to be abandoned. Miles had co-authored a paper about this decision, a paper he claims was ignored by the paleontological community. Later in conversation with Carl and Paul, Hans mentioned that he "only knew of two of Miles' papers," whereas Carl was "not familiar with his work at all."

Generally, everyone had positive things to say about the work going on at the

quarry. However, Carl and Paul would like to see Connor publish more on what he has uncovered. They also commented, and others agreed, that it would be of value to have other paleontologists work the site in conjunction with Connor.

We spent close to two hours at the quarries. Our time there had an intenseness to it. Whether people were examining a specimen with a magnifying glass, taking a photo, or having a discussion, it was done with a sense of reverence and awe, with a concentrated focus. As our time at the quarry came to an end, Connor rounded us up for a group picture.

There was a great deal of laughter as people ran back and forth between the group and the research assistants who were taking the pictures–one each from each of the sixteen different cameras. Jerry held a welcoming sign made especially for our group by one of the researchers, and Sam, in his youthful playfulness, held Connor's rather large plastic replica of *Anomalocaris* like rabbit ears behind Henry's head. With the photo shoot complete, we said our farewells and were on our way. The journey back to Field took about three hours.

We descended the quarry trail back down to the main trail and then continued along the ridge that leads to Mount Burgess. Once the trail crosses over the ridge, it descends quite sharply down to Field. From there to the highway, it was one switchback after another. As we descended the slope, our party of hikers naturally separated into groups of individuals who travel at the same speed. Andy and Paul went first as they had volunteered to shuttle the van back from the trailhead. Martin, Sam, and Carl were next followed by Henry and me. We were followed by Hans and Phelim, then Janet and Patrick, and finally the rest of the company with Peter bringing up the rear.

On our way down, Henry and I discussed, among other things, the educational

programs he coordinates at the museum where he works, how he makes sense of geological time by comparing one rock or fossil with another, i.e. 'A' is twice as old as 'B', how he was finally getting used to the local geological names, and his getting to know members of the group, none of whom he knew prior to the field trip. During our conversation, he referred to the hike to the Burgess Shale as a "pilgrimage" for some. This was the first reference to this experience being a pilgrimage, and, as such, I didn't pursue it any further at the time.

Henry and I arrived back at the Teahouse in Field about 6:30 pm. As we waited for the rest of the group to descend the slopes, Paul, who had returned with the vans, talked about the need to do paleontology that makes connections between fossils and living organisms. He sited Patrick's work as an example of the kind of research that needs to be done in this regard. Near-by Hans and Phelim discussed various trilobite issues, a conversation that continued throughout the evening.

Upon arriving back at the Hostel, I engaged Hans, Janet, Henry, and Jerry, who were all rooming together, in a group interview over dinner. I opened the interview with a question about the value of the Burgess Shale experience. Hans responded that for him it had "a tourist aspect." He then added that it's "a must to have been at the Burgess Shale." Later in the conversation he commented that the reason he choose this pre-conference field trip over the post-conference trip was because "I'm really interested in seeing the Burgess Shale." He went on to say that he was there to see if the Burgess Shale fit with how it was depicted. He concluded that it "fit like a glove." Given that everyone had probably seen all the films and pictures and read all the descriptions, Janet doubted if anyone was really surprised at what they saw. What was important to her was the personal experience. In telling her students about it, she would be able to go

beyond what she had read and talk about what it was really like up there. Henry echoed her remarks and added that the pictures are all so little and fragmented, but by being there "you get a much better feel for it." Jerry responded with:

> *The whole reason I came on this trip was to go to the Burgess Shale. The Mount Stephen fossil beds were important, but I would have come just to go to the Burgess Shale. It's the pilgrimage thing if you will. I've read a lot about it. I've seen most of the specimens in the Smithsonian. I've read an awful lot about Walcott and know a lot about him. . . . I learned a hell of a lot today because, although you can read all these things about where it is and how long the trip is, until you've done it, until you've been there, you don't realize how isolated the thing is. But just to see the Burgess Shale, to see what they have to go through to work the bed–to see the quarry itself. Standing in the quarry was exactly what I thought it would be. I mean just exactly what I thought it would be. . . . I thought it was one of the nicest things I've done in the last ten, fifteen years. I really enjoyed it. I would have crawled to the damn thing.*

From here our discussion moved on to how many other localities there are like the Burgess Shale that have yet to be discovered. We talked about the vastness of the Rockies and other mountains around the world. Jerry informed us that Walcott was a master at finding the unusual:

> *He had remarkable powers of observation. When he looked at something and it was different, he knew it was different. It wasn't just a stain on a rock. Some of the stuff they showed us you had to tip a certain way or sometimes swirl some water on it to see what it was. And if it had been out in the sun for five or six years who knows what it would look like. To notice these things takes good powers of*

observation–the ability to know when something is different. Walcott had done things like this over and over again. This wasn't the first time he stumbled on things. He was an extraordinary individual.

The remainder of the conversation moved from the importance of trilobites as a fossil index used to establish the relative age of different rocks to the dwindling number of paleontologists, particularly trilobite specialists, and how difficult it is to interest students in pursuing a career in paleontology, to mass extinctions of trilobites, to the difficulty of gaining agreement on terms and stages, to conflicts between individuals who would be on the post-conference field trip.

With dinner and the interview complete, I joined Paul, Martin, and Andy for a beer at a nearby pub. Our conversation focused on the intricacies of the process of reviewing academic papers and the high cost of subscribing to technical journals–in the thousands of dollars a year for some. I was astonished.

Around 11 pm, we returned to the hostel. I found a quiet spot in the common room and wrote out my fieldnotes for the day. After hours of listening to various people tell stories, I began to realize the importance of story as a device for building, maintaining, and defining community, in particular the community of trilobite specialists within the greater community of paleontologists and geologists.

It struck me that my stories (an attempt to fit in, to be part of the group) don't wash because they are about anonymous outsiders. This was a major insight for me today. I am also starting to see the stories as fitting into categories, i.e. gossip, personal (work, family), adventure (travel, work). These are not as yet fixed categories, just initial hunches.

I also began to comprehend how being there makes a difference in knowing.

18 August 1997: Tanglefoot Creek Trilobite Beds

At 6:45 am while lying in bed, I made the following journal entry:

Last night, once in bed, I got to thinking about how sharing experiences was part of building community, i.e. holding like-minded folks together as well as bringing new folks into the fold. The common experience is a social, mental, emotional, and spiritual process. Having trekked to the Burgess Shale was a very powerful community building process. The wasp stings were one of the asides that reinforces the bond.

Once I was up and about, the Koreans invited me to join them for breakfast Korean Style–hot instant noodles. We ate in the Hostel's communal kitchen; the others ate in the Hostel's restaurant. Later, Kildong and I joined Patrick and Andy in the restaurant for coffee.

Andy told us he had three reasons for choosing this trip. First, he knew Carl and Paul were "nice guys" and "fun"; second, it relates to his work; and third, he wanted to visit the Burgess Shale.

By eight o'clock we were on the road. We made a quick visit to Chateau Lake Louise, then headed west to Golden, and south to Cranbrook, a journey of some 280 kms not including a lengthy side trip to the Tanglefoot Creek trilobite beds.

The morning ride was uneventful. The effects of two consecutive days of extensive hiking were evident both in the quietness of the group on the drive and as people slowly exited the vans for lunch at Nubury Lake just south of Fort Steele. There were many stiff legs and sore feet. However, the sun was warm and the lake beautiful; we enjoyed a peaceful lunch. Most of the group sat on the grass at the edge of the lake.

Carl, Andy, Martin, Jerry, and Sam sat on a wooden dock that extended out onto the lake. Sam went for a swim.

After lunch we headed for the Tanglefoot Creek trilobite beds. Paul and Carl's first visit to these beds is an interesting story. Paul had heard a story about this place from a collector and decided to check it out. He arrived at the site to find Carl already there. Carl had heard about the beds from a completely different source and was there for the first time as well. It was quite the coincidence. Knowing that Carl would do more with the specimens collected there than he would, Paul left the site for Carl to explore.

The drive from Nubury Lake to Tanglefoot Creek was approximately 50 kms, much of which was on an old logging road. We drove until we came to a spot where the road was washed out. Neither Carl nor Paul could remember exactly how far we had left to go. But, after studying the map, it was determined that we were within a kilometer or so of the creek which led to the trilobite beds. Thus, we headed off on foot to where the creek intersected the road.

Because of my experience as a leader of extended wilderness trips, Carl asked me to bring up the rear. For the most part, I walked with Janet and Levi who were at the back of the group. Being the worse for wear after two days of strenuous hiking, they talked about how this field trip was unlike any they had previously experienced. Most other geological field trips they had been on involved driving along the highway with periodic stops to look at some geology and listening to a mini-lecture given by the trip organizer. This trip, while it did involve some looking at roadside geology, involved virtually no lecturing. The long hikes were something they had not experienced before on a conference field trip. They both agreed that they were "losing their enthusiasm for the hiking."

After hiking over 5 kms, I began to feel anxious as we had been out of contact with the others for some time. To ensure that we had not somehow missed the turn off, I picked up my pace, leaving Janet and Levi behind. Within a few minutes, I could see Tolsoe and a second unidentified person ahead of us. Knowing that we were still on track, I rejoined Janet and Levi. Janet assured me that the group would wait for us at the turn off–I was not so sure. In the end, she was right. As it turned out, after 7 kms or so we caught up with the group waiting for us at the turn off. From there it was another 3 kms of bushwhacking through forest and dry creek bed to the upper Cambrian trilobite site.

The hike was much longer than anyone had anticipated. Yet when we arrived at the trilobite beds, there was a renewed enthusiasm. Here, for the first time on the trip, we could actually collect, not just look at, fossils. After a short briefing by Carl, the group, with hammers in hand, dispersed across the barren slopes of the creek in search of 500 million year old trilobites. I was the only one without a hammer. I felt like the odd man out, but that did not stop me from searching for fossils. With some coaching from Paul as to what to look for, I quickly found a small, but whole, trilobite which I kept as my one and only trilobite keepsake. I continued searching for most of the afternoon, but found none as nice as the first one.

Throughout the afternoon, Carl took the time to show the specimens he had found to anyone who was interested. He identified them for us and then offered to identify any of ours. With great speed and confidence he quickly divided up my small collection of 10 to 15 trilobite pieces into three separate species–the most common of the area.

After a couple of hours of collecting, we headed back to the vans. I hiked down the creek to the road with Hans who had collected 137 whole trilobite specimens, the

most of anyone in the group. As we made our way down the creek bed, he answered many of my questions about trilobites. Throughout the trip he was always willing to talk with me, as was everyone else.

Back on the road I recorded a conversation between Patrick and Levi as we walked to the vans. Unfortunately, I missed recording the first part of it because the microphone was not turned on. However, I did discover the problem part way through and was able to record most of the conversation. As we talked, both Patrick and Levi indicated that they were on the trip primarily to visit the Burgess Shale. Patrick described the visit to the Burgess Shale as "a pilgrimage to the holy shrine," and as "a must for every paleontologist." He was concerned that it might not live up to his expectations, but it did. It was as Levi had expected as well.

> In discussing factors that influence their thinking, Patrick commented that
>
> *You can't just read somebody else and say, "Oh, yah. That sounds good." I usually have ideas of my own and then I might see papers written that may support or refute what I thought and that's basically the process. If I see enough good points that are against the ideas that I had then I have to change the way I'm thinking.*

Our conversation also included discussions about catastrophism versus gradualism, the nature of geological time, the question of whether geological time can record instantaneous events, and what constitutes an instantaneous event. In discussing the attempt on some people's part to shift the perception of paleontology from a soft science to a hard science, Levi indicated that "the hard sciences look at paleontology as a descriptive science because it doesn't use or need any mathematics. However, some paleontologists are trying to make it more statistical, more mathematical." Patrick added

that "hard sciences have labeled paleontologists as mere stamp collectors who contribute nothing of value to science. This stings a lot of people's pride. Consequently, some of them are trying to elevate it to a hard science."

In discussing the cultural differences with regard to students questioning their professors, Patrick suggested that in his experience it was okay to question the ideas of a professor:

> *Last year in a seminar Paul was teaching there were a few German students in the class and they were absolutely shocked at the Canadian students who would get up and start arguing with Paul over some point. To the Germans that is just not done. Whatever the professor says is law, which is a very sad way of doing things because there are some people who have some very bad ideas.*

Patrick went on to say that arguing with your professor was part of learning how to make an argument and to defend one's position as well as change another person's thinking. He sited the following example:

> *And both the professor and the student can learn from these arguments because when you're in the midst of an argument like that it challenges you to think about it in ways you may not have thought about before. If you just make your decision and then never think about it again, then it stagnates. But if you get something challenging your ideas, you're forced to defend it, forced to think about it and it'll grow. A good example of that is a paper I wrote in zoology–I do some work in zoology as well as geology–on feeding mechanisms of local florates. Now, the professor that I was working under had been studying this for most of his life, and he and another person, Washington, had been arguing in the literature for about twenty years over how it worked. Eventually the topic just sort of died off for the*

last 15 years because they were at a stalemate. I read the literature. And, based on the observations that they made–I assumed that the observations that each of them had made were correct–designed a new model that incorporated all of the observations they had made and presented that to my professor. His first reaction to this was "Oh, what a lot of nonsense." Then he thought about it and said, "Well, wait a second. Patrick's right!" And then started doing a whole bunch more research, reopened the whole field to see if I was right or not and is now publishing some papers on a topic that had been dead for 15 years just because I decided to challenge the way he had thought of it.

Levi indicated that he was more likely to ask questions for clarity as opposed to challenge a professor's thinking or ideas. While he knows his questioning tends to irritate people at times, he finds geologists generally to be friendly people. Despite his status as an amateur paleontologist, he has never felt rejected by the professionals, but neither has he been accepted into the inner circle.

From there our conversation moved on to a discussion of how both Patrick and Levi interpreted Peter's description of the hike up Mount Stephen as mentioned earlier in the chapter. Patrick assumed that Peter was giving out a warning to people he knew were experienced geologists and consequently used to rigorous climbing. As a result, Patrick became "awful nervous about the climb." Levi interpreted it the opposite way. He understood Peter simply to be "just telling us that because it was his job." Interestingly, their realities of the climb were totally different. For Patrick it was nothing worse than what he had done dozens of times before, while for Levi, it was the steepest and most difficult climb he had ever experienced.

We arrived back at the van tired and happy to be off our sore and blistered feet.

Jerry, who was among the first to return to the vans, soaked his feet in the river while he waited for the rest of us to arrive. It was 8:30 pm by the time we were all back and ready to leave, and with still an hour long drive on the logging road and another half hour by highway to Cranbrook ahead of us, no one complained. By 10:20 pm we were checked into the hotel but had not yet eaten dinner; still no one complained.

Each day before starting off on our hike, we were given the opportunity to remain behind–no one did. Such is the nature of trilobite hunters.

Before we went to dinner, Andy presented Carl with a bottle of Irish whiskey and Paul with a bottle of Scotch as a token of our thanks for the fine job they had done in organizing and leading the field trip. We all contributed four dollars to the cause.

At dinner I shared a bottle of Retcina with Paul, Henry, and Martin.

Martin talked about how important it is for him, being so isolated from other paleontologists because of living in Australia, to make connections with other paleontologists and how this field trip plays an important role in doing just that. This is particularly important as his post doctoral appointment is coming to an end, and he will be looking for new employment in a very tight market place. Several people mentioned at various times how there is less and less money and fewer and fewer jobs available for paleontologists.

We finished dinner and returned to our rooms around mid-night. Henry wrote in his journal as I wrote in mine. Besides everything I have already mentioned, I noticed that both Sam and Tolsoe, as Carl's apprentices, were learning what it took to be field paleontologists, not just in terms of the technical aspects related to knowing paleontology and the physical effort required in collecting specimens, but also in terms of group travel.

Tolsoe was initiated to the demands of driving on logging roads. To and from

Tanglefoot Creek, Carl, who was an old hand at driving on logging roads, drove at a fair speed, leaving Tolsoe and the others behind. Every now and again we would stop and wait for them to catch up with us. At one point after we had been waiting for them for quite awhile, Carl commented that they must have had a flat or something, but such was not the case. Tolsoe was simply driving much slower than Carl. Tolsoe also learned about the intricacies of loading and unloading everyone's luggage.

Sam, on the other hand, learned the value of keeping track of expenses. At one of our stops for gas, Sam made a purchase on the expense account but had forgotten to get the receipt. Carl made him go back into the store and get it while the rest of us waited in the van. When Sam returned with receipt in hand, Carl explained to him, "It's one of the things you've got to learn."

19 August 1997: The Ammonite Mine

At breakfast, Paul made a friendly comment about me jotting down notes in my notebook all the time. His comment left me with a real sense of inclusion. Carl followed up with a comment about my notes including all the rude stories they told, and the incidents of him interrupting Paul, which were numerous. This made everyone laugh. Listening to this and the rest of the breakfast conversation, I realized that meals were an important setting for conversations, for sharing ideas, stories and information. Not only was it important to note what was being said, but also who was listening to what was being said. Hence, I started recording seating arrangements at meals, (see Appendix F).

While we were loading the van in the morning, Sam, with girl-friend in hand, passed by us as they crossed the parking lot on the way to her car. I was surprised,

given that he is the youngest of the group, that no one said anything to him about having a female companion. I expected he would receive some razing from the group, but he didn't. When he returned to the van where a small group of us were standing, Carl instructed him to wash the van windows. Carl pointed out that Sam was being paid to be his assistant for the summer.

After our fossil collecting experience at Tanglefoot Creek, I realized I was feeling more like a participant than an observer. I noticed that I was becoming more and more interested in the geology and paleontology that we stopped to look at along the way. In the van I was looking through Ben Gadd's *Handbook of the Canadian Rockies* and decided I would purchase a copy once I returned to Calgary. However, when we arrived at the Frank Slide, the gift shop had a copy for sale for $40. Now most people who had purchased copies during the trip had paid between $35 and $40. I negotiated with the clerk to reduce the price to $35, which she did. I was quite excited about this interaction and told several people about it. It felt good to have an in-context story to share with the group.

I noticed throughout the trip that several people wore trilobite or paleontology t-shirts, some of which had been purchased during our visit to Field, and others prior to our trip. As we walked around the Frank Slide, I realized I wanted one of my own and decided to buy one when we visited the Tyrell Museum if I could find one.

While Sam and I were touring the Frank Slide we discussed our visit to the Burgess Shale; he referred to it as "holy ground for paleontologists." Upon leaving the Frank Slide, Phelim reached forward, tapped Hans on the shoulder and in a soft, quiet voice, reminded him to fasten his seat belt.

From the Frank Slide we drove to Magrath to visit an Ammonite Mine. The

open-pit mine operated by Canada Fossil Ltd. is a long deep trench from which ammonites, squid-like animals related to the nautilus, are extracted. The ammonite fossils range in size from two to three feet in diameter and up to a foot deep. They contain very colorful gem-like deposits used to make jewelry. In addition to the mine, we visited Canada Fossil's claims along the St. Mary River. Our guide told us that one of his responsibilities was to comb the shoreline of the river in search of ammonites that have eroded from the banks and to keep an eye out for poachers. We were allowed to collect broken pieces along the river as the quality of the ammonites when exposed to the air deteriorates quite quickly. Levi collected several pieces of ammonite. Because he had more than he could take back on the airplane, he gave me two samples, his best and another which showed the ammonite's sutures.

Our drive from Cranbrook to Drumheller via Magrath and Calgary covered a distance of approximately 700 kms. At lunch I tape recorded an interview with Paul regarding the story he mentioned to me at the Columbia Icefields about contemplating specimens of ribbon limestone in order to understand the lithification process used in its formation (see Chapter 4, pages 158 and 162-3).

Later during the day I had a long conversation with Andy regarding the value of the trip for him personally. He commented that it helped him gain a deeper understanding of Paul. He saw Paul as a very creative person who was well grounded in his field. Andy described him as sometimes getting it right and sometimes not, but always going for it. Despite any differences of opinion they might have regarding trilobites or paleontological issues in general, they remained close friends.

Andy commented that in this business one gains recognition and credibility through publishing significant monographs. He also saw the trip as an opportunity to

discuss the finer points of such papers written by the various members of the group. Making connections with other participants was also an important aspect of this trip for him. He had been discussing with Hans the possibility of one of Hans' graduate students coming from Germany to work with him in California.

In conversation with Henry, I learned that this trip was unlike any other field trip he had previously been on. As Janet and Levi had mentioned earlier, most of the others were in and out of vehicles to look at a roadside site, none of this walking 20 kms a day as we had done. Henry had no idea prior to the trip what it would be like.

Just east of Ft. McLeod, Carl asked me to drive the van. I drove to Calgary where we stopped at the Greyhound Bus Depot to drop off Paul and Patrick. They had to return home in order for Paul to finish preparing his conference presentation. Carl, Jerry, Martin, Kildong, Tolsoe, and Levi were also presenting papers at the conference.

Before leaving the bus depot, Carl asked me for ideas about where we should go for dinner:

I choose Earl's. I couldn't have made a better choice. The service was great as was the food. I was proud to be able to entertain my friends in my home town.

Again it was quite late when we arrived at our hotel in Drumheller. It was mid-night before I began to write out my daily fieldnotes.

I am amazed at how much information I have. At times during the day I think nothing is happening, then, when I sit down to write, I discover just how much has gone on. Tonight I have written for over an hour and still have lots to say.

I noticed last night at dinner and throughout today, there was much more talk about paleontology and geology than there had been previously. This group used their technical vocabulary like household words. While there was some separation between

those who know the language and those who do not, the use of this technical language appeared to just be part of the territory. I never got the sense that it was being used to gain status or to show hierarchical position. I think positions were fairly well established prior to the trip. Over the course of the trip I noticed that I was becoming more familiar with the terminology. I did not always understand what the terms meant, but I recognized them by sound and context.

20 August 1997: The Royal Tyrell Museum

At breakfast I chatted with Carl. He indicated that this trip was intentionally designed not to be lecture-based. He figured "everyone was an adult and able to ask questions" if they were interested in knowing more about the geology or paleontology of an area. Also at breakfast, Hans and Phelim discussed the change in the last ten years in paleontologists' understanding of Cambrian time boundaries.

After breakfast, as we drove the short distance to Horse Thief Canyon we again had difficulty finding our way:

> *One of the interesting reoccurring situations over the past few days has been Carl's faulty memory in locating the place he intended to take us. Each of these times (Tanglefoot Creek, Canada Fossil Mine and Horse Thief Canyon) his memory was inaccurate and we either had to back-track or go out of our way or walk considerably farther than anticipated. Interestingly enough, the group showed no apparent stress or concern about this.*

Hans indicated that unlike many groups which have two or three malcontents, this group had none. He experienced paleontologists in general as being quite a harmonious group.

During the course of our drive, Carl and Hans told stories. Carl told of a previous trip to the Drumheller area when he had gotten his vehicle stuck. He also told stories about doing geological field work in Australia and driving in Ireland. Hans told stories, among other things, about life in Germany. In between stories Carl pointed out the local geology and provided information about dinosaurs. At one point when we stopped to look at some geology, Martin commented that "you can never see too many rocks."

The view from the Horse Thief Canyon overlook was magnificent. Everyone had cameras out and was taking pictures. The canyon is made up of layered bands of clay. Henry and Janet explained to me how these layers were formed.

While Sam and Hans scrambled down into the depths of the coulee–Sam seeking dinosaur bones and Hans taking photos–the rest of us gathered around Carl as he told stories about the two paleontological icons, Cope and Marsh, whom I heard about earlier in the trip. The story is that Cope's wish was to become the "type specimen" for *Homo sapiens*. So upon his death, his wish became true, and Marsh traveled from place to place with Cope's skull in hand showing it off. Carl ended his story with a disparaging remark about the narrowness of having a "syphilitic male WASP" as the type specimen for humans. We all agreed.

From Horse Thief Canyon we made our way to the Royal Tyrell Museum, the last of our paleontological stops. The morning was warm and sunny. Waiting for the museum to open, we waited around outside chatting and taking pictures of life-size model dinosaurs. While we waited Carl informed us that there may be some surplus money available because the trip had not cost as much as anticipated. He inquired as to what people wanted done with this surplus. He could send each of us our share, turn the money over to the conference to help cover conference expenses, or it could be donated

to a particular trilobite publication. With very little discussion, it was unanimously decided to use it to support the trilobite publication.

Once inside the museum, we were greeted by a young woman employee dressed in a trilobite costume. This "living trilobite" was promoting the museum's Burgess Shale Black Light Show which we attended later. Again there was a great deal of picture taking.

Before touring the exhibits, we were met by a museum curator who gave us an hour long tour of the museum's work areas. We observed researchers whittling stone away from fossil bones. One worker told us that it would take at least two years to remove the stone from around the fossil she was working on. Both Henry and Andy asked our curator guide numerous questions about the operation of the museum. Carl expressed concern about the refusal of the curators at the museum to acknowledge his and other academics' photos and species descriptions. Our curator guide relied, "It probably won't change."

From the fossil extraction room we went into the fossil storage room. I was surprised at the vast variety of fossil specimens that were housed in the museum's storage area. Previously, I had only thought of the museum as housing its public exhibits. I had no idea that it was actually a library containing vast collections of specimens used mainly for research.

While we were examining the ammonite collection, Carl discussed two "bite hole" theories:

> *One theory has it that the bite holes result from limpets grazing on them, while the other has it that they are tooth marks caused by mosasaurs. In discussing the first theory, Carl commented that there were "complications with the story." He went on to say that the way the theory process works is "I have an idea" and then*

someone else says, "I have a better idea."

Once the guided tour was complete, we embarked upon an independent tour of the museum's public exhibits. While most visitors to the museum spend their time looking at the dinosaur exhibits, members of our group spent most of their time examining the Precambrian and Cambrian displays, particularly the one containing trilobite fossils. I started out with Sam, Henry, Martin, and Jerry. Later, I met up with Kildong, Mongryong, and Tolsoe. Afterward, I wandered around the exhibits on my own for a while.

At one of the Precambrian exhibits showing an Australian *Cyclomedusa*, Martin explained to Jerry, Sam, and me how this creature attached itself to the substrate and formed as a fossil. He pointed out that the *Cyclomedusa* on display was positioned upside down. He attributed this to one author who made this error, which was in turn copied not only here but elsewhere. This was not the only mistake noted by members of the group.

Both Jerry and Carl noted numerous mistakes in other trilobite displays including spelling and naming errors as well as the poor quality of some specimens. Despite these flaws, people still maintained considerable respect for the work done by the museum. Carl suggested that the problem was simply one of not having a trilobite expert help them set-up the trilobite displays. He described the museum as "very good and, with some work, it could be great."

After an hour or so of visiting the exhibits, we gathered together for the Burgess Shale Black Light Show which was delightful.

Two young women began by narrating a five minute slide show about the Burgess Shale. I knew it all. I was even able to go beyond what they had said. The timing

couldn't have been better. I felt very connected to the presentation as I had been to the Burgess Shale. The light show consisted of puppets handled by the two young women and a recorded narrator's voice. The relationships and interactions occurring between various life forms (I recognized all of the animal forms) found at the Burgess Shale were portrayed using black lights. What I found most interesting is that I could pick out their sources of information. For example, they mentioned the "weird wonders," a term taken from Stephen Gould. They also showed the differences of opinion regarding which was the correct upright position for Hallucigenia. Thus, they went beyond Gould, as I had.

Our drive from Drumheller to Edmonton was uneventful. Our only stop was for lunch in Stettler. During the drive Kildong asked me about various aspects of the local farms. As we talked, I came to realize that this field trip was not just about geology and paleontology; it is also about culture. Through conversations, questions, and stories we come to a better understanding of how each of us live.

As we neared Edmonton, we started the departure process by first dropping Janet off at her hotel near the Edmonton International Airport. As Andy retrieved her bag from the luggage van, she said a quiet good-bye and quickly disappeared into the hotel. Once in Edmonton, we dropped Jerry off at his hotel. He left with handshakes bidding farewell to Sam and me and "see you at the conference" to the others. Levi and Henry's departures were similar. Next we stopped at Carl's residence where Tolsoe departed with Kildong and Mongryong, both of whom reminded me to write to them via e-mail. Phelim and Hans remained at Carl's, while Andy, Sam, and Carl drove me to the university where I had left my vehicle.

After picking up my vehicle, I met with Henry who accompanied me as I tried to

locate a facility that could make a copy of Phelim's video. Being a Chinese formatted video, no one was able to copy it. Before returning the video to Phelim, Henry and I went for dinner at an Earl's near the hotel where he was staying. From there I went to Carl's to return Phelim's video. Carl invited me in for pie and coffee. Andy, Hans, and Phelim were all staying over night at Carl's and flying together the following morning to the conference. Everyone was going on to the conference except Sam, Patrick, and me.

Pie and coffee became another occasion for storytelling. Andy told about eating cheese from the Queen's table. Apparently, once a block of cheese has been cut and served to the Queen of England, it is immediately removed from the table. This cut block of cheese is then served to guests dining in other areas of the Palace. Several years ago Andy had the privilege of being one of the honored guests who was served the Queen's cheese. This story prompted Carl to tell a story about receiving a telephone call from Buckingham Palace. While attending a meeting in London, a secretary entered the room and announced that there was a call from Buckingham Palace for Carl. Everyone at the meeting was duly impressed. Carl never revealed that it was a colleague visiting the Palace and not the Queen who had called.

These stories led me to initiate a discussion about the role of storytelling during the field trip. During our conversation, Carl commented that everyone had told stories, and that I had told stories too. He also remarked that I "fit in well" with the group and that everyone accepted me. Andy, Hans, and Phelim all agreed.

I left Carl's just before nine o'clock. The field trip was now officially over, at least in terms of this case study. From Edmonton, I drove to our family cabin at Silver Lagoon near Bowden. There I continued my nightly ritual of converting the day's jottings to prose fieldnotes.

Returning Home

On the morning of August 21st, I drove from Bowden to Calgary. Along the way, I turned on my tape recorder and spent an hour asking myself questions about the field trip. During the field trip, my fieldnotes consisted mainly of descriptions of experience. I tried to keep interpretations and analysis to a minimum, but as the trip progressed this became more difficult to do. Once the trip was over, I felt at liberty to turn my attention toward interpretation and analysis. Consequently, while the content of the self-interview was primarily about the experiences of the field trip, it contained more of my interpretive thinking than did my fieldnotes.

Immediately upon arriving in Calgary, I took my film in for one hour developing. Later that same afternoon, after collecting the developed photos, I organized them into a photo album. That evening and the next morning, I described the people and events depicted in the photos to my wife. We tape recorded the conversation, and I talked about everything that happened during the trip. She asked questions as we went along. Over the next few days, I wrote a short caption for each of the pictures in the album.

Now, two years later, using all the methods of collecting information described above, I sat down and wrote this chapter. In those two intervening years, I developed a mental framework (see Chapter 2) for making sense of the data I collected during the field trip. The basis of the next chapter is the interpretation and analysis of that data.

NOTES

17 August 1997: The Burgess Shale

[1] As with the names of the field trip participants, the names of those individuals associated with the Yoho-Burgess Shale Foundation and the Burgess Shale quarries have been changed.

[2] Gould, 1989.

CHAPTER 4: THE MAP NOT THE TERRITORY

If the doors of perception were cleansed everything would appear to man as it is, infinite.

William Blake, The Marriage of Heaven and Hell

Having given an account of the field trip in the previous chapter, it is now time to give meaning to the events which occurred during it. In this chapter I focus on analyzing the activities, actions, and comments of the participants in terms of the sensemaking patterns which emerged during the field trip as a lived experience.

I began this research project with the intention of exploring the question, "*How does what occurs on a scientific field trip influence the evolution of knowledge within a community of scholars?*" Prior to the field trip, my expectation was that during the trip people would actively generate new ideas "in the moment" as a result of the activities in which they were engaging and that this process would be easily discernible. As a result of having participated in the field trip, I now realize that this expectation was naive.

What I have come to understand is that this field trip was not a "breaking-new-ground" expedition as I had anticipated; instead, it was more of a "visiting-well-established-sites" tour. Hence, the type of knowledge construction which occurred on the trip was more subtle and personal than I first imagined it would be. It was more about confirming and sharing current knowledge than about generating new knowledge. In terms of broad-scale sensemaking, the field trip proved to be more foundational than generative. It served more to develop and maintain a community of knowers from which knowledge emanates than immediately producing knowledge new to the community. How I have come to these understandings is the focus of this and the next chapter.

Assuming that meaning is dependent upon the interplay between lived experience and theoretical (cultural and social) constructs, the task of this chapter in analyzing the sensemaking processes and activities which occurred during the field trip is to integrate lived experiences with theoretical constructs in such a way that the meanings generated from this integration resonate as valid for both field trip participants and informed readers. Or to paraphrase Ken Wilber,[1] through the integration of subjective truthfulness and objective truth we seek mutual understanding. To achieve this end, my analysis incorporates the three strands of valid knowing (instrumental injunction, direct experience, and communal confirmation), as outlined in chapter two, and the three cultural value spheres (subjective, intersubjective, and objective domains of knowing), also outlined in chapter two, with three sensemaking themes (being there, storytelling, and living together) which emerged directly from the lived experiences of the participants during the course of the field trip.

Background Constructs

Science is a way of knowing, a way of making meaning, which demands that knowledge claims be based on experiential evidence. Thus, it requires a methodology for obtaining direct evidence and evaluating the validity of that evidence. Examined from this perspective, the experiences of the participants of the Rocky Mountain pre-conference field trip as a case study in sensemaking will be framed within Ken Wilber's notion of deep science.

The methodology of deep science, as discussed in chapter two, begins with an *injunction* in the form "If you want to know this, do this."[2] In general, the geological field

trip is one such injunction embedded within the larger injunction of doing geological science. According to Martin Rudwick, "geology is a science in which fieldwork is a central element of practice."[3] As such, it informs geologists and paleontologists as to one of the activities in which they must engage in order to understand various aspects of geology and paleontology. If you are to know the nature of rocks and fossils, you must see them in the context of the environment in which they exist–you must go there and see them for yourself. In other words, the injunction is the objective or "It" domain of knowing where scientists seek representational truth through *direct experience* with the external physical world as afforded by the field trip. The injunction, along with direct experience, embodies Humberto Maturana's notion that knowing is doing and doing is knowing.[4]

Direct experience with the physical world forms the basis of new assertions which are presented to other members of the scientific community for *confirmation* or rejection. Or alternatively, it forms a first hand basis for examining the assertions made by others within the community who have visited the same sites. This is the subjective/ intersubjective or "I" and "We" domains of knowing in which scientists make interpretations and seek meanings for that which they have experienced. Specifically in this case study, the Rocky Mountain pre-conference field trip, as an injunction, brought the participants into direct contact with a small section of the Canadian Rocky Mountains and a few specific paleontological sites from which they could make assertions, from which they could confirm or reject the ideas and notions they brought with them whether they be their own or those of others.

In an effort to understand the field trip experience as a case of sensemaking, the sensemaking processes and activities emerging from the participants' experiences have

been organized into three themes. Within the context of deep science, these themes serve as conceptual constructs which provide a structure for analyzing the sensemaking processes and activities observed during the field trip. When considered collectively these three themes incorporate the seven characteristics Karl Weick describes as constituting an instance of sensemaking: identity construction, retrospection, enaction of sensible environments, social, ongoing, focused on and by extracted cues, and driven by plausibility rather than accuracy.[5]

The first theme, *being there*, focuses on the value and practice of going out into the field to learn about and understand geology. It is also about the immediate experience brought about by direct experience with the external environment. The second theme, *storytelling*, concentrates on giving meaning to the direct experiences of the field trip as well as on building a sense of community from which confirmation or rejection is given. The third theme, *living together*, also concentrates on building a community of knowers who develop and maintain a sense of shared knowledge.

While these themes are discussed as if they are separate, independent entities, it must be realized this is done for the purpose of illustrating the sensemaking processes and activities which occurred during the field trip. In the actual lived-experience of the field trip, these themes emerged not as separate entities independent of each other but rather as interdependent processes and activities which generated and supported one another. In Maturanian terminology, the three themes were brought forth as a result of the distinctions in patterns of behavior we, the field trip participants and I, were able to notice. In other words, the three themes are mental constructs used to make sense of the sensemaking processes occurring during the field trip.

Being There

Being there, as a sensemaking activity, concerns the events and activities of the pre-conference field trip which supported the ongoing process of extracting cues from direct interaction with the physical world. It included among other activities, driving through the Rocky Mountains, stopping to "look at some geology," and visiting various fossil localities as well as the Royal Tyrell Museum (see chapter three for full description of these activities). These first-hand field activities coupled with map study, guide book reading, picture taking, and note taking, as well as in-the-moment discussions concerning the geology at hand, facilitated the ongoing nature of sensemaking for field trip participants by extending their sensemaking activities beyond laboratory, classroom, and text-based experiences to direct face-to-face encounters with the rocks and fossils within the context of the natural environment. These first hand experiences are of particular importance to geologists and paleontologists "because so many important geological features are not mobile."[6] Hence, the field trip functioned to reinforce and expand what was previously known from other indirect sources. Comments made by various participants throughout the field trip bear this out:

> **Tolsoe:** *I had never been to the Burgess Shale. I went there to see the forms. I had seen all of the fossils from the text book pictures, but it wasn't real in my mind. When I saw them in the field, in the outcrop, that was real. I saw those animals with my eyes. So, they're real, they're not fake. When we went out in the field, they came alive and then it struck my mind, "Wow, it's there." Seeing is believing.*
>
> **Sam:** *You can never get enough from books, so going up there [to the Burgess Shale] is a totally different story. If you look at things only through text, you're not*

going to get the full picture.

Going to the Burgess Shale excites you about reading about evolution and stuff–it sort of led me in the right direction. It makes it more real.

Patrick: *In visiting the Burgess Shale I was able to more easily put myself in Walcott's shoes and understand his interpretations of the fauna. By treading the same paths he took and visiting the quarry and looking at the actual fossils, it was easier to turn back the clock to 1908 and try to see the fossils and their meaning unencumbered by the preconceptions of nearly 90 years of subsequent interpretation.*

So by visiting the site I tried to imagine how I would have fared in Walcott's place had I found a new and previously unstudied group of organisms.

Not only did the direct interaction with the mountains, the rocks, and the fossils enable the field trip participants to extract cues that would facilitate their understanding of the geology and paleontology of the localities visited, but, as Kildong and Tolsoe stated, it allowed them to make connections with previously visited localities:

Kildong: *Today we looked at some good trilobite specimens. I have never seen preservation like that in Korea. Fantastic preservation.*

Tomorrow, I hope to look at more Cambrian-Ordivician rocks. This may help me understand the comparison of rocks separated by long distances–Korea and here in North America.

Tolsoe: *They [Kildong and Mongryong] are trying to correlate Korean trilobites with other parts of the world. They saw particular species on the mountain [Mount Stephen] they think they might correlate with a certain part of the Korean Cambrian seascape.*

In addition to the connections made by the Koreans, other individuals saw things they had never seen before or experienced emotional and sensory responses that come only from having been there interacting with the environment. Still others came to new realizations as a result of having experienced geological localities first-hand.

Jerry: *I hadn't realized how complex the Canadian Rockies were. It's an incredibly complex environment.*

Carl: *You certainly remember the things you see, feel, and touch. That's the important part about it [the field trip]. I think you're absorbing the information you were exposed to in the field and it's partly a tactile experience. Something that you don't read on a page. You actually pick up a specimen and you talk to people and you remember the day and the weather and everything else.*

[What you see] has to be in context. You have to have other things around it, beneath it, and above it to truly see how these things are important.

Sam: *I was really into trilobites, and I loved Anomalocaris. I was happy when I found one on Mount Stephen. It was off to the side and hadn't been piled up on another rock. No one else had found it. No one had seen it ever, and it's millions and millions of years old, hundred of millions of years old. It's just a neat feeling.*

Hans: *For me actually it is somewhat amazing how many people spend a lot of time in that locality [the Burgess Shale], but it's still not really clear what happened. That's remarkable.*

Being there involved getting to know the physical world through interaction with people as well as through direct experience with the environment. Stopping to "look at some geology" is a particularly good example of how this manifested itself during the field trip. While Carl and Paul would begin these sessions by sharing their knowledge of the

formations under consideration, they quite intentionally kept their comments to a minimum in order for others to contribute to the discussion by asking questions or by making comments regarding similar formations they had seen in other parts of the world. Often on these occasions people would break up into small groups of two or three and spend a few minutes conversing about the geology of the locality. On our way down to Field from the Burgess Shale, Henry remarked that, as a result of these stops to look at some geology, he was finally becoming familiar with the local geological terminology for the various formations of the Rocky Mountains and thus able to converse more easily with others about them. Though not to the same extent as Henry, by the end of the trip I, too, had become familiar with some of the more commonly used geological and paleontological terms. Being able to discuss the geology with others while looking at it was an integral aspect of *being there* as Kildong and Levi's remarks suggest:

> **Kildong:** *[Different formations are] difficult to talk about. If we discuss them while looking at the rocks, then we may understand them much better.*
>
> **Levi:** *I must have spent an hour with him [Peter] on the way down [from Mount Stephen] just trying to clarify what he meant by the fault [on the cathedral of Mount Stephen]. It's not a simple concept. There's all sorts of different variations.*

Both Kildong and Levi's comments are consistent with the notion that knowledge is not simply out there in the external physical world waiting to be discovered. Rather, knowledge is what people create through their co-creation of shared experience of the external physical world. Their comments reflect Humberto Maturana's idea that our understanding of the external world is dependent upon the distinctions we are able to make as a result of our experience with others in that world.[7] In the following excerpt taken from a post-field trip interview, Peter's comments on the value of the field

experience in relation to the laboratory experience give further support to this notion:

Peter: *As a field geologist your typical first [sensemaking] experiences are in the field. When you're working on a hypothesis, you're trying to solve something– you've got the idea in your head. Now you're out in the field looking at the rocks trying to make sense of it, trying to find that piece that finally makes it fit. As you are walking around and you're doing your field work and collecting the data, you suddenly find yourself on "the" outcrop. Suddenly, there it is, the relation makes sense. This is the thing that puts everything into context. This totally tosses out a half dozen hypothesis. It can't be anything else.*

I think the thing about a field experience as opposed to a lab experience is that it is far less controlled. On any natural rock outcrop, there's countless variables. So you're out there looking at nature in all its variations. You've got certain ideas in your head, so you're filtering it through your context and coming up with answers. In a lab experience you have already done the filtering. You cut off nature so your results are already small. So if someone else comes in and looks at your results, you're still looking at that first. Whereas in the field, if you're trying to figure things out, its all there.

It's also large enough that you bring other people in, you're standing on the same place, you're all looking at the same thing at the same time, but you're all looking at it somewhat differently depending upon what your background is. And so with a field experience you can suddenly have far more interaction with other people because you can share far more. Suddenly, you are having to be there on the same spot with two or ten other people whatever it's going to be, and you're all expressing your own version of reality. You're all looking at the same thing.

You're all saying "This is what it is. This is what it has to be. This is what I see." And the person beside you is looking at exactly the same thing but coming up with a completely different view of it and you're having to deal with it right there. So typically, a field trip, a field experience, is by far the best learning experience, or the chance for you to jump to a different level.

You get on an outcrop on a field trip, with ten of your colleagues with whom you share some common background, but your field experiences are different. You're going to get all those different experiences at once and there is going to be heated debate, there always is. I think they're never quiet, especially if it is a contentious issue. So you get it all out there; it's all discussed. You walk away but the arguments continue. The heatedness of the exchange really burns the images into your brain, so when you walk off, you may go back to the hotel at night but the ten of you are still arguing about the same thing--you are going to hash it out until you come to some sort of resolution.

Seen from Peter's comments, one of the distinguishing characteristics of the field experience versus the laboratory experience is that being there "puts everything into context." This allows for extracting cues from "countless variables" that would otherwise be absent in a laboratory experience. As Peter suggests, all who are standing there on the outcrop filter what they see based on their own background. From a Maturanian point of view, people on Peter's outcrop are making sense of what they see as a result of the distinctions they are able to make which in turn is based upon each individual's personal history rather than on a single pregiven reality independent of the observer. Peter goes on to say that these differences in perspective lead to debates which go on "until you come to some sort of resolution." Thus, his remarks support Karl Weick's contention that

sensemaking is both an enactive and a social process.

In a continuation of the above excerpt, Peter points out that context, as provided by field experience, is missing in journal articles as well as during conference presentations. Consequently, neither prove as valuable a source for sensemaking for him as does field experience.

Peter: *For me personally I get very little from reading a journal article. All I ever read a journal article for is to get ground work. For instance, today I photocopied an article about an ore deposit in Australia because I'm starting to be curious about the little fine sulfide grains in the Burgess Shale and what their origin is and what that might tell us about the exact environment. Now I'm reading that just to get the ground work about what other people have said about these shapes of grains. What have other people done? But it's the lowest level of research in the field. Just getting some very, very broad ideas.*

It's very, very rarely that I read an article that changes my perspective on things because it's static. It's either "Oh ya, I like that because it is a point that I think," so you underline it for referencing in your papers. Or you come across something and you go "Where does that come from. I don't see that." And what you end up writing in the columns is "Why this? What about this?"–lots of questions, but there can be no exchange. It's all that you've got. It's frustrating, you just want to pull extra information out, but there's none to be had.

. Whereas in a one to one situation, let's say at a conference, you're sitting back doing that same sort of thing, saying "Oh I like that," or "Where does that come from? It doesn't make any sense to me from what I've seen." Well, now you have the question period afterwards where you can start to pull in some of

those questions. But still it's just an exchange of words. They're trying to bring their reality and give it to me. But what I want to see is exactly what it is that it's based on.

Peter's desire to "see exactly what it is that it [the other person's interpretation] is based on" gives support to the argument that *being there,* as described in this thesis, is a critical sensemaking activity.

Up to this point in our discussion, *being there* has been limited to actual time spent in the field. However, as a sensemaking activity it extends beyond the time and space boundaries of the field trip through souvenirs purchased, specimens collected, and pictures taken. All three occurred regularly throughout the pre-conference field trip. Souvenirs, ranging from t-shirts to postcards to guide books, were purchased along the way at shops in Jasper and Field, as well as at information centres at the Frank Slide and the Royal Tyrell Museum. When the situation allowed, fossils were collected by each and every participant. And whenever there was an opportunity during the trip to photograph geological formations or fossils, every single member of the group produced a camera. Below, Mongryong comments on how he used his photographs to extend his field experience beyond the immediate:

Mongryong: *I took so many pictures of mountains, rocks, and fossils with color slides. As soon as I came back from Canada, I had a slide show for my students and family.*

Not only do such artifacts remind people of their field experience, but as Paul explains, rock or fossil specimens can also serve as a focus of contemplation for understanding the geological processes associated with the particular sample collected during a field experience:

Paul: *So I collected the samples and I spray-lacquered them so they looked okay and left them on the mantle piece. I would just look at them, you know, then pick them up and look at them, and think about them and just look at them all the time and keep thinking. And so over about maybe six months, I felt that maybe, I really do understand them. . . .*

I'm sure that can happen in paleontology. You put some nice specimens out and you're thinking about them all the time and you could come up with let's say an interpretation.

Anyway, for me this is something I do myself a lot if I'm contemplating something, a model or theory. I'll put stuff out so that I can look it, a lot of people don't do that, but it works for me. It keeps me thinking because for me I like to deal with ideas a lot not just documentation, and if you have reminders, it keeps you thinking so that a thought might come to you in an unusual way. You're reading a book on the john or you're cooking or something or walking to school or whatever, and then an idea pops into your head because the question has been circulating in your mind. I think most people probably do that if they are concerned about ideas and connections.

From Paul's comments, artifacts such as rock or fossil specimens have the potential to influence sensemaking through ongoing, retrospective construction of meaning long after the original field experience. While not stated explicitly in Paul's remarks, I think it is fair to say that contemplation as he practices it is grounded not only in direct field experience associated with the specimen under consideration but also in an understanding of basic geological principles pertaining to the specimen. I, for example, being a person with minimal knowledge of geology, could contemplate Paul's specimens

for years and still not be able to make sense of the geological processes influencing their formation. Or in Martin Rudwick's words, "Without experience of the familiar–that is to say, without that initial training in interpretation–the observer of the unfamiliar will experience only bewilderment; he will not gain new conceptual insights that will stand up successfully to later testing."[8]

From a geologist's point of view, the value of field experience as a sensemaking experience has long been understood and, of all the comments made during the pre-conference field trip, is best summarized by the following observation:

> **Carl:** *There was a famous old geologist called Reed. One of the comments he made is that "all else being equal, the best geologist is the one who has seen the most rocks." And he'd say that "experience is important and field work for geologists is going out and seeing a lot of different sections and a lot of different rocks. A lot of different situations provide you with more of a memory bank and perhaps more tools than somebody who hasn't done that."*

In other words, to know geology or paleontology, one must practice the injunction of doing field work, of having direct field experience.

From the actions participants engaged in during the lived experience of the field trip and from the comments they made throughout and after the field trip, *being there* emerged as a distinguishable pattern of sensemaking activities that were ongoing, enactive, focused on and by extracted cues, social, and retrospective. As a result of the direct experience provided by the field trip, participants verified prior knowledge as well as extended their base of current knowledge by (1) experiencing the full environmental context within which various fossil localities exist, (2) engaging in on-site interactions with others, (3) creating strong emotional and sensory memories, and (4) collecting

artifacts. Hence, the field trip experience, viewed through the lens of *being there*, is more than an injunctive strand of knowing which instructs the scientist as to what to do. It is more than a procedure for disclosing data. It is, as Barry Lopez suggests, an essential element in the structuring of "mind":

> The speculations, intuitions, and formal ideas we refer to as 'mind' are a set of relationships in the interior landscape with purpose and order; some of these are obvious, many impenetrably subtle. The shape and character of these relationships in a person's thinking, I believe, are deeply influenced by where on this earth one goes, what one touches, the patterns one observes in nature.[9]

From this structuring of mind, experience is given meaning via story–story being "a way of thinking, a primary organizer of information and ideas, . . . a way in which we can know, remember, and understand."[10] It is through story that an experience is carved out of what is otherwise an endless flow of lived experience.[11] And, *being there* is the reservoir from which stories arise.

Storytelling

Unprocessed experience is meaningless in that meaning comes from "the kind of attention" given to experience,[12] in other words, the story told. Stories represent individual and collective beliefs and values as well as the interpretations of lived experience. They are generated by the internal dimensions ("I" and "We" domains) through interaction with the external dimensions ("It" domain). Stories, by "imposing a sense of coherence on the disparate elements the narrative contains,"[13] function as explanations of how the physical and social aspects of our world work. Throughout the

field trip when we stopped to "look at some geology" or visit a fossil site, stories of the geology or the paleontology were told, often with the caveat, "as far as we can tell," "we think," or "it's been suggested that . . . ." Whenever we hiked the trails, rode in the van, ate meals, or gathered together for a drink, stories about life as a geologist, past and present, or about life in general were part and parcel of the activity (see chapter three for examples of the stories told). From this proliferation of stories, *storytelling* surfaced as a reoccurring pattern of sensemaking activities. As such, *storytelling* served as part of the ongoing, retrospective process of extracting cues from direct experience and from being together with other geologists and paleontologists. In discussing the practice of interpreting field observations, Peter articulates how *storytelling* is an essential component of the sensemaking process used by geologists and paleontologists:

> **Peter:** *To me the beauty of doing research geology is that you are making stories. You're out in the field, you're collecting data, you're looking for certain clues, but in the end you fully acknowledge that you've only got a tiny, tiny fraction of the total information. Let's say even if you are just making a map of the Canadian Shield where I've done most of my work, you're talking about seeing probably a maximum of 10% of the ground, the rest is covered by trees and swamps. So you've got all these segregated pieces and now your job is to make it cohesive, to fill in all the empty space–to make a picture, to make a story. But you're doing that based on everything that has come before.*
>
> *If you walked in without knowing any geology, you've got random blocks. It would mean nothing. The ability to connect them up starts to make the story. [This ability] is based on all of your education before that and particularly all your personal experiences, every time you've connected something up before and made*

a pattern.

Or put more simply:

> **Patrick:** *Paleontology is detective work. That's what it is. You search for the clues. You solve the crime.*

Stories help facilitate the confirmation/rejection strand of valid knowing within a community of knowers who study the same or related phenomena and share a relatively common approach to that study but don't necessarily agree with each other's interpretations. The interplay between different understandings of various phenomena generates questions, discussions, and subsequently the evolution of knowledge within a community of knowers. In telling stories about observed phenomena, the storyteller is asking others within the community: "Does my story resonate with the group's story? Does it extend or expand on the stories of others? Does it contradict? Is it plausible? Does it make sense?"

Paul, in reference to the spray-lacquered rocks he left on his mantle piece to contemplate (cited earlier in this chapter), describes an incident which illustrates the confirmation/rejection process as it occurs within the community of geologists:

> **Paul:** *It just so happens that we don't really understand how some of these rock types are deposited. We can make thin sections and we still don't really understand them because sometimes the sediment grains are no longer recognizable. The process of lithification of those rocks is not really well understood. But at the time, a guy was publishing a paper where he argued for a certain phenomenon in order to result in that kind of rock type because we see that a lot in the Cambrian all over the world, a very similar kind of rock type. Sometimes these people call it a ribbon limestone where you have thin beds of*

limestone, sometimes undulating thin beds of limestone, and then dolomitic interbeds and so from a distance it looks like ribbons. Although I had worked on that in Newfoundland, I felt that I understood it quite well. I knew this guy was publishing his paper or he published it and so I decided to tackle a response rather than just let it ride, sort of take up arms and say, "Okay, so and so . . . ." So I wrote a discussion paper.

That happens now and again with controversial things and people will write a discussion paper and really present a disagreement, air their disagreement. The process is called a discussion-reply. So you write a paper that discusses their theory, usually because you don't agree with it or you think there are some major mistakes, and you want to make sure everybody knows that rather than just letting it ride and then responding to it down the road with just an alternative view that is kind of buried in another paper. Then that person gets a copy of your discussion paper and they prepare a reply and say, "No I didn't make this mistake," or sometimes they do admit they have made a mistake.

So they [the discussion paper and the reply] are printed back-to-back. It is potentially quite a good thing; except, they have to be monitored carefully by the editors, so that somebody doesn't weasel out of something which is generally what people try to do. I don't weasel around and say, "Well, you know, the reason why we overlooked that particular thing was because of the following reasons and really it's that guy's fault."

Anyway, this thing was published and I was contemplating a reply because I felt that I did understand those rocks much better, at least well enough to know that the proposal was simply wrong, ya know, simply wrong and that we have got

to keep working at it. I felt that maybe, I really do understand them better than he did or in a different way, at least enough to know that guy was wrong.

From a sensemaking perspective, in the initial paper the researcher gives what he believes to be a plausible account of the phenomenon under consideration, and presents it to the community via a professional journal for confirmation or rejection. In Paul's case, his discussion paper rejected the ideas presented in the initial paper thus keeping the search for cues, which may clarify the phenomenon, ongoing.

Another example of the confirmation/rejection process, discussed throughout the six-day field trip, is the ongoing controversy regarding the classification of Burgess Shale fossils. Charles Walcott, first to classify the strange new specimens from the Burgess Shale, classified them all within modern phyla. Nearly eighty years after Walcott, Stephen J. Gould published *Wonderful Life* in which he argued for revision of Walcott's classification of the "Burgess oddities" based on the work of Harry Whittington, Simon Conway Morris, and others.[14] And more recently according to Carl, "Simon Conway Morris wrote a book that attacked Stephen Gould and his views in *Wonderful Life*." In discussions of this topic, most of the field trip participants agreed that while Walcott's classification is inadequate based on what we know today, few agree that Gould has found the correct answer.

Carl: *A lot of people are quite critical of Stephen Gould's ideas involved in his book. Certainly the scientific community hasn't sided with him too well.*

The following responses are typical of how field trip participants generally make sense of controversies within their field of science:

Janet: *You can hear the different stories, but it's not your research area. And without going out and actually seeing that rock, that cathedral sitting in the middle*

of Mount Stephen, you don't know what the relationship is between those, so you hear the different pieces and you say, "Okay, these are the different stories that are being debated right now and maybe eventually in three years–ten years from now–one of them will be the dominant one."

A lot of times you hear two stories, and they're incompatible. You have no a priori knowledge–both sets of arguments sound possible. You don't necessarily favor anything, and how can you if you don't go out there and actually see it for yourself.

Peter: *[On a field trip] you are on the same spot of ground arguing over what's happening. You might say, "This is clearly just like what I saw on a field trip I was on in Nova Scotia." Or, "I've seen the same sort of thing up north of Toronto in cottage country four years ago." Or someone will say, "It's exactly what we see in Western Australia," while someone else is going to say, "I've seen this exact same thing in South Africa." Everyone's got a different answer. It exactly matches whatever they worked on previously. So the story you create is always an additional chapter to the stories you've already written.*

But, when you're trying to put it all together, it really is just a matter of you've got your certain character traits, certain rocks, you know them. You know that they've got characteristics that go with them. Whereas to a first year student basalt is just this black rock, to the geologist basalt means that you're in an ocean basin, that you're by a volcanic vent–all the stuff that comes with it. This comes with each of the pieces that you find. They've already got the story that's bound to them. Now you've got to take the story that each little piece is telling you and try to make the bigger story where all the characters fit in.

Both Janet's and Peter's comments suggest that knowledge is dependent upon the knowledge maker. That is to say, knowledge is not simply about what geologists see, but rather about how geologists interpret what they see based on what they have previously seen. Peter in particular is suggesting that knowledge evolves from the context of our personal experience. The implication of this is that from the accumulation of all our previous experiences we are able to draw out the similarities and differences between what we have experienced and what we are experiencing and thus make new interpretations. This supports Humberto Maturana's contention that our explanations of the external world are dependent upon the distinctions we are able to make in the moment which in turn are based on our ongoing history of structural coupling with both our social and physical environments.[15] Thus as Karl Weick maintains, "to talk about sensemaking is to talk about reality as an ongoing accomplishment that takes form when people [individuals or a community of knowers] make retrospective sense of the situations in which they find themselves and their creations."[16] In other words, stories are about sensemaking which is more about plausibility, coherence, and reasonableness than about accuracy.[17] This is apparent in Paul's remark relating to knowledge claims based on little data:

Paul: *The elegance of a story is more important than the reality.*

Robert Fulford contends that stories are our connection to history past and present.[18] They are the thread that binds together a community's lived experience. Fulford goes on to say that historically, stories began as gossip as a process for "compressing events and exploring their meaning."[19] In one way or another, participants of the field trip view themselves as storytellers and their work as storytelling:

Paul: *We're gossipers.*

Janet: *Everybody tells stories. Historical geology is stories. It's part of what we do. Whether the fact that we tell stories about field experiences or a person that fell into a creek or whatever–basically our field is telling a story. . . . [We are] trying to reconstruct the past. Historians do the same thing in a different manner I imagine. You don't want just dry facts. Dry facts are "The quarry is x meters high and this is where we found fossils A, B, and C." You want to know what that means. That's the story.*

Carl: *I think storytelling is an important part of the trip. I mean certainly when you go on geological field trips you almost always get around to bear stories at some stage or other at least if you work in Canada. I guess if you work in Texas it's probably snake stories or something else. Maybe rattlesnake stories. Who knows? But they're an important part of the culture and I think it's a way of people sort of interacting and relaxing.*

We come to know who we are and how to be through the stories we are told and the stories we tell.[20] During the field trip, stories helped to establish the identity of individuals as paleontologists. One morning over coffee, Andy attributed his interest in paleontology to family outings throughout the British countryside during his childhood. At boarding school he realized that most of his classmates were interested in birds and that he "wouldn't ever be an expert in that," so he looked for something different.

Several times during the field trip Levi talked at length about his evolving status as an amateur paleontologist. On one occasion he commented that in general, though not necessarily with our field trip group, he felt "tolerated more than accepted." Another time he stated that he "wasn't rejected by the professionals," but neither was he in the inner circle. He attributes this to his habit of constantly asking questions which is his

way of learning, his way of becoming a paleontologist. As he explains:

> *It gets irritating after a while for people, but I can't help myself. I want to know what the hell the words mean! Geology is an arcane language and I want to know what it means.*

He found geologists as a group "friendly people to be with."

On other occasions Patrick described his motivation to switch careers from being a sailor to becoming a paleontologist, and Kildong explained the challenges of being a paleontologist in Korea. Throughout the field trip others told similar stories.

Not only were there stories regarding personal identity, there were also stories which spoke to the identity of paleontologists as a group. Stories about Andrews, Cope, Marsh, and Walcott, the historical icons of paleontology, were heard regularly as were stories about more contemporary figures such as Stephen J. Gould and others. On the climb to the Stephen Formation, Peter, who was particularly familiar with the local history, related the story of how Walcott came to Field in 1909 based on a story he had heard about a railroad worker who had found a fossil while working on a railway cutaway. Later, on the way to the Burgess Shale quarries, Peter described Walcott's discovery of the first Burgess Shale fossil. There were also the adventure stories told by the more experienced members of our group: Hans and Phelim's travels in Siberia, Paul's experiences of the Rockies, and Carl with his tales from around the world. For the field trip participants, these stories served to make sense out of who they are and what they do individually as well as collectively.

> **Hans:** *Stories of field adventures are essentially the moments when you prove to have escaped from the normal life and the ordinary job. We like to tell these stories because they indicate the moments that a normal tourist would hardly*

experience or, even better, "survive" (if you take this meaning not too rigidly). Falling down a cliff in southeastern Siberia is not remarkable because you survive it somehow without too much damage and show up as a tough guy, but because your neighbour would never make it to this cliff. And if he really would, he would never be able to meet the people again, who joined him, and fully reiterate this situation. Telling stories is exciting, but telling these stories to people who know the actors in this drama, has the charm that makes James Bond, Flash Gordon, or Quincy as a serial hero more attractive than as a single event.

Henry: *I'm not too sure what these stories [about historical paleontological figures] "mean". There is a sense of shared history. . . . I guess that although these stories are not examples of stellar behavior or examples of a higher ideal they do provide a history. I think that many field scientists are, and know they are, a bit eccentric and they tend to enjoy it. I enjoy working in the field and I do funny things with the students some times that surprise them, but it also stimulates them to think about things differently. Several times along our field trip Carl and Paul did funny things–laying down next to a "no fossil collecting" sign for a photo, ranting on in exaggerated accents while collecting in the field. . . . We are all characters and so were Cope, Marsh, and Andrews.*

I think these stories help establish/bind the "community."

As Hans suggests, stories of field adventures are told to express the uniqueness of field experiences common to field geologists and paleontologists. This is in keeping with Max van Manen's belief that such stories not only bring forth but also clarify shared meanings for those who have experienced similar field situations. In being told to others within the community, these stories reinforce a sense of individual and collective uniqueness as well

as a sense of identity separate, as Hans says, from "your neighbour [who] would never make it to this cliff."

Along with identity, stories are about membership within a community. As well as serving to communicate core values, model appropriate behaviors , and invent the community's history,[21] stories establish a sense of membership. Or to paraphrase Henry, it is okay to be "a bit eccentric" and to do "funny things" as "we are all characters, and as such "these stories help establish/bind the 'community.'"

Robert Fulford argues that a good story is essential to a healthy sense of self-worth.[22] While this appeared to be the case for others during the field trip, it was certainly the case for me. In my mind, and as is implied in Hans' statement above and Carl's statement below, a good story meant having a story to tell that related directly to members of the community, not anonymous outsiders. Until I had such a story of my own to tell, I felt like an outsider. My purchase of Ben Gadd's *Handbook of the Canadian Rockies* during our visit to the Frank Slide (see chapter 3, p. 119) became the story that made me feel like a bonafide member of the group.

> **Carl:** *[Storytelling is] one way you get to interact with people about mutual friends or people you both know or that you haven't seen for a while. I think that the worst part is where you get people who talk about people that the other person doesn't know. I mean, aren't interested in. I've occasionally had interaction with strangers who have spent their entire time talking about somebody that you're never going to meet and have no academic or any other interest with you. Their sole reason for being in the conversation is that they're known to the person you're talking to. That I always find rather annoying. But when you're talking about somebody that you know of or you work in a similar field or you both know,*

then I think that's an important way of reaching out to each other as well as finding out about somebody you're interested in.

Storytelling was integral to nearly every activity we engaged in during the field trip. In addition to the social contexts of storytelling described above, storytelling was the primary way of explaining the geology and paleontology of the sites visited. As mentioned earlier in this chapter, each time we took a "look at some geology" Carl and Paul would relate to us the story of the geology and paleontology as they knew it. For example, at Athabasca falls Paul described the geology of Mount Kerkeslin which is situated across the valley from the falls. Among other points of interest he directed our attention to the Shaly limestone of the Middle Cambrian and the red bands of Petyo limestone. Carl added that trilobites were present in the Mural limestone of the lower portion of the mountain. Others would also contribute to the story by adding what they knew, thus expanding the story.

Similar sharing occurred among all the participants throughout the field trip during long van rides, on the trail, at meals, or whenever there was an opportunity to have a conversation. This exchanging of knowledge via story included historical, cultural, and personal concerns as well as scientific concerns. Thus, the *storytelling* engaged in by the field trip participants can be regarded as a significant sensemaking factor in the development of shared meanings. Given that "narrative as opposed to analysis, has the power to mimic the unfolding of reality"[23]–be it the reality of geological and paleontological phenomena or the reality of social-cultural phenomena–the field trip participants came to know more about the world around them and about each other through the ongoing, social mechanism of *storytelling* in the context of *living together*.

Living Together

Although sensemaking was accomplished during the field trip through ongoing interactions with the physical world as discussed under the theme *being there*, it was also a product of ongoing interactions of the cultural and social world experienced through *living together*. As Humberto Maturana explains, sensemaking results from the structural coupling occurring between an organism (or community of organisms) and the environment, or between organisms (or communities of organisms).[24] In applying this notion of structural coupling to the social interactions occurring during the pre-conference field trip, it follows that through the recurrent social interactions individual "knowing" and community "knowing" co-evolved. That is to say, through the process of *living together* in the context of the six-day field trip, individual stories blend into and subsequently shape the stories of the community. Likewise, through shared lived experience, the stories of a community blend into and shape the stories told by its members. Hence, *living together* provides the forum in which the individual as sensemaker within a community undergoes "continual redefinition, coincident with presenting some self to others and trying to decide which self is appropriate."[25]

From this perspective, the pre-conference field trip, besides being seen as a scientific event (an injunction) which provided direct experience with the environment (illumination), can also be viewed as a social event which served to build and maintain a community of sensemakers. This community building occurred throughout the field trip as members new to the community, had the opportunity to get to know established members of the community. At the same time, established community members had the opportunity to renew existing friendships as well as build new ones with other

established members they had yet to meet. This was particularly true for individuals like Kildong and Phelim who were geographically quite isolated from the rest of the community.

While there are numerous ways in which scientific communities are maintained, living together twenty-four hours a day for six days in relative isolation from regular work and home environments provided an opportunity for field trip participants to come to know each other in a manner not typically possible at conferences, or in institutional workplaces, or through professional journals. The primary difference between this experience of living together and the other types of experiences is that not only does the field trip engage people at a cognitive level as do the others, but it also engages people at a visceral level. Hence, mind and body are unified in knowing. This is the underlying message of Carl's comment quoted earlier:

> **Carl:** *You certainly remember the things you see, feel, and touch. . . . You actually pick up a specimen and you talk to people and you remember the day and the weather and everything else.*

Although all communities by their very nature are maintained via social and cultural activities, the field experience demands and provides a categorically different experience than what occurs at conferences and in institutional settings. Negotiating the physical environment together bonds people at a visceral level as well as a social level. Slowly limping back from Tanglefoot Creek with Patrick and Levi, each of us suffering our own aches and pains acquired from three arduous days of hiking, provided a shared experience not soon forgotten. Physically demanding challenges as encountered during the field trip bring out aspects of personality not normally experienced in other settings. This is affirmed in the following comments by Carl and Sam:

Carl: *I think in the field too you see people under different circumstances. And I know if you go on a very small field trip and spend weeks with people, you very quickly learn who's grumpy in the morning and who pulls their share of the weight and who's lazy and who can limp through the day if necessary and so on. And who doesn't. So you do develop a level of trust that you won't have necessarily just from an interaction at a conference.*

One thing I learned from that trip is if I went collecting with somebody and I wanted them to collect a lot of specimens I would take Hans along. In the time we were up in the Cranbrook locality he collected 137 complete trilobite specimens. We didn't have very much time up there with the long walk and so on, but I think he collected probably ten times as many specimens as most. I know some people only collected two or three in the time that he collected 137. And he identified them all and sent me a list after the thing by e-mail–He didn't find any new types, but he was very effective and conscientious.

Sam: *I walked with Carl for a while, and we talked about things besides paleontology, like mushrooms and stuff like that other than just what he is actually studying.*

I enjoyed talking to and sitting down drinking with the paleontologists on the trip. I found it interesting to see how these people who are completely immersed in their field talk about other paleontologists in an informal way (and by first name most of the time) and how they verbally critique other people's work–I remember when one of the others was talking to Carl about something in Australia about worms or something and trying to convince him of his view. He was really adamant about it. Carl received it really well. They seem to be free to argue about

other paleontologist's views without showing much negativity toward the individuals as scientists. I was happy to see this as I believe it is essential for the advancement of science.

Throughout the extended time spent together over the duration of the field trip participants were able to "develop a level of trust" not commonly achievable in other professional contexts. Both Carl's and Sam's comments suggest that identity is not only established from one's own point of view, a "Who am I?" perspective, but also from the point of view of others, a "Who is he or she?" perspective. Sam's comments illustrate this point. Who Carl is, as seen through Sam's eyes, changes over the series of interactions between the two of them. No longer is Carl simply a paleontology professor, he is also a person with other interests. Because of this kind of interaction both individual and community evolve. Thus, the extended time of being together during the pre-conference field trip afforded people a powerful context for communicating and negotiating who they were as individuals within the community of paleontologists to which they already belonged or to which they sought membership. According to Charlotte Linde of Stanford University, we "communicate our sense of self to others and negotiate it with others."[26] Hence, one of the outcomes of people participating in the field trip as expressed by various participants was connecting at a deep level with others who share common interests:

Mongryong: *I had a great experience in Canada. In particular, meeting and conversing with many friends from other countries.*

Carl: *My own personal view of such trips is that they are most useful for scientists getting to know each other. They certainly learn some field geology, and improve their field experience, which will assist them in their own work elsewhere.*

But the reason I go on this kind of field trips is to meet people. The contacts made on field trips are usually much stronger than those made at a meeting where people mainly attend talks.

Tolsoe: *I think all of us [Kildong and Mongryong] are here to meet trilobite people. We can't get any information in Korea. There's written information on paper, but there's the personal thing, you know–the political things. Also we are here to meet trilobite people, hear trilobite people and to get useful information, because the trilobite research in Korea is in an infant stage.*

After the field trip, it was certain to me that I know more people in the trilobite field. That makes it easy to communicate with them, to get some information, advice, and suggestions for my research. I feel like I'm in the trilobite field. All the people were talking about trilobites and that was good.

Sam: *I was the youngest. I didn't feel like I was disrespected or anything. They realized I did have an understanding of what was going on. I did a lot of listening, especially with all the driving. I think I talked mostly to Henry. He was a bit younger.. I ended up sitting with him in the van. It just happened by chance.*

I think the field trip influenced my confidence quite a lot because you realize how you can talk to them [the other participants] and you do have things to contribute. I think it does make a big difference. Spending six days traveling with these kind of guys is definitely a good thing.

These comments are examples of how *living together* provided opportunities to "meet" and "hear" people talk which made it "easier to communicate" and thus to acquire "information, advice and suggestions." Over the course of the six-day field trip, this, along with building one's own confidence,–"because you realize how you can talk to

them and you have things to contribute"–allowed for the development of stronger relationships than might normally be made as a result of sitting and listening to a classroom lecture or a conference presentation.

Not only did people have the opportunity to converse with each other while standing together looking at the same piece of geology or hiking to a fossil locality, there was also the possibility to converse while riding in the vans, eating meals, and sharing accommodations (see Appendices D, E, and F for details of each of these arrangements). While not all incidents of these activities were recorded, the data collected does provide an indication of the extent to which people intermingled with each other during these times. An analysis of the summary of this data (see Appendix G for summary of Appendices D, E, and F) shows that Andy, Hans, Phelim, and I each connected in at least one of these three ways with fourteen other individuals, and that everyone else either shared a seat in the van, ate a meal with, or shared a room on at least one occasion with seven different people during the field trip. On average, people had at least one of these types of opportunities for conversation with at least ten other people during the field trip. But more importantly, the data shows an intermingling of individuals regardless of their student, amateur, or professional status. Whereas the quantity of contacts between individuals does not speak to the quality of the interactions, the ongoing relationships after the field trip do. This is evident in the following two comments:

> **Carl:** *Most of the people that were on that field trip, at least half of them, I've had some sort of connection with since. For instance, Jerry sent me a couple of reprints, one on digital photography, which may assist a NSERC minor equipment grant proposal, and the other on how to go downhill without damaging yourself– clearly of some use to myself. I lost both of my big toe nails coming down that*

wretched hill [from the Burgess Shale]. It taught me to have tight boots in the future. You'd think somebody with my level of field experience would know better.

Andy invited me down to San Diego to give a talk at his university. To meet his group and spend a few days with him, which I did. That was very successful and one of my graduate students is going to go down to do a Ph. D. with him in California. So these things lead to other interchanges which involve exchange of information and so on. Without my seeing Andy again, I had met Andy several times before that trip, and then going down to see him and his wife and that group in California, I might have been more reluctant to encourage my graduate student to go there rather than go to Oklahoma which is another place she had an opportunity to do a Ph. D.

I've had some interaction with Hans since then. I've received reprints from him, e-mails. I've sent him reprints. So there's been more interaction between us than there had been before certainly.

I've had some interaction with Phelim, the Chinese worker. In fact, he's provided materials for some research we're doing in Argentina, so there's been some important interaction there.

I've reviewed other people's grants. I have a better knowledge of them as an individual and what they are interested in and what they are doing from meeting them and talking to them on the trail.

I think seeing people is really important. Even if you don't agree with them, it's a way of understanding them and them understanding you. I get along reasonably well with Connor Moore, though I'm critical of him at times. And meeting him on trips like this is good. We get to know each other better.

I think it was important for Tolsoe to have his colleagues [Kildong and Mongryong] there and to show them around and be with them on that trip. It may ultimately have some influence on whether he gets a job and career. I know that there is a position opening up in September and he's madly trying to get his Ph. D. ready so he can apply for it. I think they have a rather tight and interacting community of Korean paleontologists so it's important for him to stay in contact with them. I think one of the reasons they [Kildong and Mongryong] came on the field trip was because Tolsoe was here and they could go with him. They were probably also interested in the Burgess Shale. One of the Koreans [Mongryong] applied to do a post Doc with me–asked if I had money to support him in a post Doc and I wish I did. And maybe that wouldn't have happened if they hadn't been here on that trip.

Tolsoe: *I think meeting people is pretty important–making more connections with different people who have the same interest as I have. I talked to Jerry a couple of times about some projects he and I are both interested in.*

I contacted Andy to borrow some specimens from the museum where he worked before going to California. The loan process went pretty well because of him. If I do post doctoral research, I'm going to California to work with him. His interest is the same as mine–how trilobites develop. I'm thinking of having him as my external examiner.

I contacted Paul because he has a lot of old publications. I only have fourth generation photocopies. I needed original copies so I contacted him.

I also talked to Janet to borrow some specimens–middle Cambrian limestone containing baby trilobites. I needed them for my thesis, so she sent a

chunk of limestone to me. I processed it in hydrochloric acid. It turned out pretty good. Those materials were extra for her, so she shared them with me.

I sent Henry a couple of e-mails because he asked me to get information about a book on evolution, so I sent an e-mail back giving information about that book. He's a nice guy. He told me when I ever go to New York to call him and he will give me a place to stay.

Mongryong was in Saskatoon to do his post-doctoral research [with Paul]. He went back in February after a one year program. Actually, we went on a field trip together last summer in Utah. We spent about 15 days in the Rocky Mountains, just the two of us. It was excellent.

As these comments imply, not only do the relationships developed through *living together* during the field trip involve the exchange of scientific information, that is, data, articles, and specimens, they also include placement of graduate students and employment opportunities both of which relate to the interchange of people within the community. Furthermore, these relationships play an important role in building the community of scientists within which an individual operates. As Martin Rudwick points out, an individual's scientific community includes not only those he or she has trained under and the literature he or she reads, but also the teachers and colleagues with whom he or she engages in scientific discussions.[27] The following comments by Carl and Peter show how connections made during a field trip influence the building of community:

Carl: *In some cases it's just simply because you know the person [from the field experience] that you mention it to somebody else, and you may facilitate an interaction [between the two of them] that the person you met on the field school may never know about. Simply because you say when you're thinking about*

"Should X co-operate with Y or Z?" You say, "Y because I met Y on the field trip and I like him." So then "Why don't you go and talk to Y about it?"

The implication of Carl's remarks is that the quality or depth of a collegial relationship is not simply based on objective criteria relating to the individual as a scientist, but also on one's perception of the individual as a human being–"I like him."

How the nature of collegial relationships influences the sensemaking process can be seen in Peter's comments regarding how his interactions with Paul during the field trip affected his reading of journal articles as well as his thinking:

Peter: *Some of the things he [Paul] said about certain personalities–now those personalities have since written papers and now I read them with a filter of what Paul said. "Oh, ya, ya." And where it might not be my specialty, he's put a filter on the way I'm going to look at that paper from now on. And also again, talking with him and seeing the way his mind works, and liking the way his mind works and seeing some sort of similarity between the way I do research and the way I interact with a group of researchers. Again, when he puts something out, I'm usually more favorable. Even at times "Ooo. That's kind of whacked out." I'll still give it more consideration than I would if it was from somebody else, a complete unknown. Because at least I've got some sort of basis. I think "Okay, I can trust him, so far." Then I'll evaluate after that. At least he's got the first steps of confidence so I'm more likely to take his work and integrate it into my mind frame than I would just anybody else's. Also, because I know the name now and associate it with a face and a personality, I'm more likely just to pick up his stuff if I just kind of glance through it in the libraries. When I'm looking through a journal and notice an article by Paul, I'll probably pick up on "What's he saying*

now? What trouble is he getting in?" So I'm more likely to be aware of what he's doing than just about any other paleontologist in Canada.

Peter's comments illustrate Karl Weick's contention that sensemaking evolves within the context of social interactions.[28] Weick points out that sensemaking is an "intertwining of the cognitive and the social."[29] In other words, one's thinking is influenced by the social interactions one experiences. Given that Peter's remarks were made over eighteen months after the field trip, it is also clear that the influence of his interactions with Paul are not limited to the moment of the interaction but extend over time beyond the initial interaction. Hence, from this and other comments made by the field trip participants, it is apparent that *living together* is an important component not only of the sensemaking process but also in creating a community of knowers from which sensemaking is generated.

Not only did *living together,* in the context of the field experience, provide people with a shared experience of the physical world, it also provided a setting where stories and histories could emerge and evolve. As such, *living together* fostered the development of ongoing relationships which are integral to the development of a sense of community. Seen from the various participant comments, *living together* was an integral part of the sensemaking process both during and after the field trip.

Summary

In this chapter we have addressed the research question, "*How does what occurs on a scientific field trip influence the evolution of knowledge within a community of scholars?*", from the perspective of three sensemaking themes which reflect both the

"what" and the "how" aspects of the question. The "what" which occurred on the field trip was direct experience with the environment (*being there*) in the presence of others (*living together*) with whom experiences were shared (*storytelling*). Embedded within these three themes is the "how" as heard through the voices of the field trip participants.

The implication of the field trip participants' experiences is that *being there*, as an injunctive strand for obtaining valid knowledge, provided direct experience, the second strand for obtaining valid knowledge, and as such influenced the evolution of knowledge in that it made what people had previously heard and read more real. *Being there*, according to Peter, "puts everything into context." Or in Tolsoe's words, "Seeing is believing." Using Ken Wilber's terminology, *being there* is about coming to know the exterior of holons, the "It" domain of reality, through direct interaction with the physical world.

From the participant's perspectives the field experience engaged not only the cognitive aspects of their minds but also the full range of sensory perceptions thus making the experience more memorable as well as more available for incorporation into their thinking. Furthermore, Paul noted that artifacts collected during the field experiences served as stimuli for contemplation well after the field experience was over. Additionally, *being there* provided foundational material for evaluating other's interpretations as well as generating or modifying field trip participants' own interpretations of scientific knowledge. The field experience also provided a basis for making comparisons between geological sites visited during the field trip and those visited elsewhere.

As a source of insight into the complexities of the real world which sometimes get lost in theoretical models of the world, the field trip experience was an intense venue for

learning. According to Sam, he "learned more [during the field trip] than in the entire year of classes." All these sensemaking experiences give credence to Karl Weick's notion that "the concept of sensemaking keeps action [*being there*] and cognition together."[30] This is apparent in Jerry's reaction to the Rocky Mountains as "an incredibly complex environment." His comment suggests that *being there* was inspiring and left people with a sense of the wonder of it all.

While *being there* is only one of many actions which constitute sensemaking, from Weick's point of view it is the one from which the others emanate.[31] *Being there* provided the raw experience, the raw material, from which sense was made through the telling of stories, i.e. illumination. Without experience there would be no stories to be told, and without stories, experience would have no meaning. To paraphrase Janet, stories give meaning to objective data. *Storytelling* is the process by which individual understandings of reality, the internal "I" domain of existence, are integrated with the collective understanding of reality, the "We" domain. *Storytelling* is the interlinking of the subjective and intersubjective interior dimensions of experience. It is through this dialogical process that values and meanings are shared. Through this dialogical process "the action of saying makes it possible for people to then see what they think."[32] Hence, *storytelling* gives shape to experience as well as shaping the storyteller.

Throughout the field trip people shared explanations of particular phenomena with each other. This process of sharing explanations, as we have heard from the field trip participants themselves, is what paleontology is all about. In Janet's words, "Historical geology is stories. It's part of what we do. . . . basically our field is telling a story. . . . [We are] trying to reconstruct the past." The implication of Janet's assertion is that these stories are products of the social process of sensemaking, that they were

alive and ever changing. Blending together one story with another, bigger and bigger stories are created in an endless ongoing process of generating and revising knowledge.

As Ken Wilber and Humberto Maturana have argued, a further implication of this evolving nature of stories, the evolving nature of knowledge, is that objective knowledge (representational truth) is dependent upon the knowledge maker. Peter's comments regarding the paleontologist's task of giving coherence to "random pieces of information," to "make it [the information] cohesive, to fill in all the empty space–to make a picture, to make a story," are consistent with Wilber's and Maturana's arguments. Peter gives further support to this notion saying that making the story is based not only on the information available in the moment but "on everything that has come before." Hence, the goal of *storytelling,* as an explanation of phenomena, is not absolute truth but rather progressive clarification of relative truth. Or as Karl Weick proposes, sensemaking, while based on cues extracted from experience with the world, is as much about plausibility as it is about accuracy.[33] *Storytelling* is about truthfulness (the subjective and intersubjective domains of reality) as well as representational truth (the objective domain of reality).

Not only do paleontologists make sense of the physical world through storying, they also make sense of their social world by telling stories about previous field adventures and about the experiences and theories of other paleontologists past and present. From the stories they told, the field trip participants created a sense of identity both for themselves as individuals and as a community.

Living together during the field trip provided a forum for participants to get to know each other not only through the stories told but also through ongoing social interactions. Through extended and recurrent interactions with each other, the field trip participants had opportunities to develop levels of trust and understanding of one

another that went beyond professional competencies and status. Students, amateurs, and professionals intermingled with each other regardless of social position. This is reflected in Sam's comment, "I was the youngest. I didn't feel like I was disrespected or anything. They realized I did have an understanding of what was going on."

Through diverse and sometimes difficult activities people learned about each other as people not just as paleontologists. In addition to sharing rooms and meals and long van rides, together they endured the rain and underwent long, arduous treks through the mountains, as well as exploring fossil beds and delighting in the splendor of the mountains. Through these and other activities, field trip participants experienced the nuances of each other's personalities normally unavailable in less adventurous and demanding environments. As Carl pointed out, "you very quickly learn who's grumpy in the morning and who pulls their share of the weight and who's lazy and who can limp through the day if necessary and so on. And who doesn't." Observing how others responded to the trying situations of the field trip was an opportunity to learn what it meant to be a field geologist or paleontologist. For example, one lesson I learned was that field workers do not complain even when they have to wait until ten o'clock at night before they have dinner as was the case upon our arrival in Cranbrook after our third day of rigorous hiking.

The experience of *living together* was also a chance to renew old friendships–Hans and Phelim meeting again for the first time in several years–and to catch up on what people were doing in their day to day lives. It was also an opportunity to create new relationships. As Tolsoe pointed out, as a result of the field trip "I know more people in the trilobite field. . . . I feel like I'm in the trilobite field." *Living together* was also a time for building relationships which extended beyond the field trip and served as the

foundation for mutual exploration of scientific understandings and the subsequent evolution of what counts as knowledge within the community. This is evident in both Carl's and Tolsoe's comments about the numerous exchanges they have had with various field trip participants. From all the interpersonal interactions during and after the field trip it is apparent that one of the primary values of the field trip was relationship building, community building. Or in Carl's words, the value of "such trips is that they are most useful for scientists getting to know each other."

Through six-days of *being there*, *storytelling*, and *living together*, sensemaking occurred and knowledge evolved not as a result of any one of these themes independent of the others but because all co-existed together as inseparable aspects of a given lived experience. To use Ken Wilber's words, "Each is intimately related to the others, for the simple reason that you cannot have an inside without an outside, or a plural without a singular."[34] Taken jointly *being there*, *storytelling*, and *living together* incorporate the seven characteristics of sensemaking outlined by Karl Weick,[35] and thus demonstrate that the Rocky Mountain pre-conference field trip was indeed an instance of sensemaking.

Being a researcher in the role of observer participant, I paid attention to the interactions between field trip participants and engaged them in conversations that provided data regarding their sensemaking experiences related to the field trip. In addition, I had my own lived experience of the trip. Hence, from these lived experiences and from my interpretation of the information collected from the other participants as well as from my history of previously accumulated experiences and associated mental constructs, I analyzed the data collected and gave it a structure which reflects meanings consistent with those of the field trip participants.

While other events and interactions occurred during the field trip which in one

way or another influenced the evolution of knowledge, *being there, storytelling,* and *living together* emerged from the data collected as the most distinguishable patterns of sensemaking. Collectively these themes, reflecting the recurrent interactions in which the field trip participants engaged, serve as mental constructs for understanding the field trip experience as an occurrence of sensemaking. As such they represent one possible reality, one interpretation of the field trip experience as an instance of sensemaking.

In analyzing what the field trip participants did, what they said, and what they thought, it has been possible to interpret and establish the field trip experience as a case of sensemaking. Yet, in the process of analyzing the data, it became progressively clear that, while this analytic process satisfied the demands of my rational mind in terms of making valid knowledge claims, it was incomplete. There was more to this field trip experience than met the eye. Somehow analysis alone had failed to capture the underlying essence of the field trip as a sensemaking experience. Looking at the results of the data, I thought, to use Ken Wilber's words, "*something else is going on.*"[36] To discover that *something else*, I explored the field trip experience from a synthetic or integrative perspective in addition to the analytic approach already undertaken. In doing so, I came to realize that this particular geological field trip was, in the truest sense of the word, a pilgrimage. While some of the field trip participants had referred to our trek to the Burgess Shale as a pilgrimage, I took their meaning to be more metaphorical than literal. However, by reversing the analytic process and synthesizing the data collected, I realized that this field trip, in the way it was structured and eventually conducted, was in many ways parallel to religious pilgrimages. Hence, I began to see the field trip literally as a pilgrimage. The next chapter explores the six-day Rocky Mountain field trip as a pilgrimage.

NOTES

Background Constructs

[1] Wilber, 1996.
[2] Wilber, 1998, p. 156.
[3] Rudwick, 1996, p. 143.
[4] Maturana and Varela, 1998.
[5] Weick, 1995.

Being There

[6] Rudwick, 1996, p. 143.
[7] Maturana, 1988.
[8] Rudwick, 1996, p. 147.
[9] Lopez, 1988, p. 65.
[10] Livo & Rietz, 1986, p. 2.
[11] Fulford, 1999.

Storytelling

[12] Weick, 1995.
[13] Witten, 1993, p. 106.
[14] Gould, 1989.
[15] Maturana, 1988.
[16] Weick, 1995, p. 15.
[17] Weick, 1995.
[18] Fulford, 1999.
[19] Fulford, 1999, p. 1.
[20] Fulford, 1999.
[21] Witten, 1993.
[22] Fulford, 1999.
[23] Fulford, 1999, p. 15.

Living Together

[24] Maturana and Varela, 1998.
[25] Weick, 1995, p. 20.
[26] Quoted in Fulford, 1999, p. 14.
[27] Rudwick, 1996.
[28] Weick, 1995.

[29] Weick, 1995, p. 38.

Summary

[30] Weick, 1995, p. 30.
[31] Weick, 1995.
[32] Weick, 1995, p. 30.
[33] Weick, 1995.
[34] Wilber, 1998, p. 75.
[35] Weick, 1995.
[36] Wilber, 1995, p. vii.

CHAPTER 5: AN INSTANCE OF PILGRIMAGE

We were the first that ever burst
Into that silent sea.

S. T. Coleridge, The Rime of the Ancient Mariner

The purpose of this chapter is to explore the Rocky Mountain pre-conference field trip as a pilgrimage. Pilgrimage, in its broadest sense, refers to any long journey. However, in reference to the pre-conference field trip, I am using the term pilgrimage in its narrower sense as a journey to a sacred site or sites. It is from this perspective that I am positioning the pre-conference field trip as analogous to a religious pilgrimage. The notion of this particular field trip as a pilgrimage came to me through the integration of (1) field trip participants' comments regarding the visit to the Burgess Shale, (2) my own experience as one of the field trip participants, (3) personal experiences with other pilgrimages, and (4) a holistic look at the meaning of the field trip as a lived experience which transcended yet included being an instance of sensemaking. Said differently, through my tacit knowledge of the field trip experience, that is, through "a multitude of unexpressible associations which give rise to new meanings, new ideas, and new applications of the old,"[1] I have come to understand the pre-conference field trip as a pilgrimage.

As an observer participant, not only was I able to notice how the events of the field trip and the activities of the participants paralleled those described in traditional pilgrimages, I was also privy to participant accounts of what these events and activities meant to them. In addition, I had my own inner experience of the trip to draw on. As a result of these factors, I have come to understand that the field trip, like a traditional pilgrimage, was about the basic human need to connect with something beyond one's self.

As Martin Rudwick observes, "the explicitly religious purpose of a pilgrimage and the explicitly scientific purpose of geological travel are at a deeper level closely comparable."[2] The common purpose of pilgrimage and geological travel involve "transformations of one's inner state and outer status."[3] For members of the pre-conference field trip this transformation entailed gaining new understandings through first hand experience with the geology and paleontology of various fossil localities as well as with the Rocky Mountains in general. It also included developing and maintaining community membership.

Field Trip as Pilgrimage

To discuss a scientific field trip as a pilgrimage is a challenging task for several reasons. First, while sacred sites and the religious customs related to pilgrimages have been studied in some detail, the study of the pilgrimage process as a social-cultural event has been neglected.[4] Consequently, our understanding of the social and cultural role of pilgrimage is not clearly understood.[5] If this is the case for religious pilgrimages, then it is even more so the case for secular pilgrimages.[6] To my knowledge, other than a single, short paper by Martin Rudwick, virtually nothing has been written about geological travel as pilgrimage. In reference to pilgrimages, J. J. Preston states, "we know less about them than we do about the remote planets of our solar system."[7] Hence, in discussing the field trip as a pilgrimage, we are traveling relatively uncharted waters.

The second difficulty arising in discussing the field trip as a pilgrimage is that such a discussion entails terminology which goes beyond the normal bounds of conventional science. Thus to engage in this discussion means bringing together two very different traditions of knowing, religion and science. An encounter of this type requires a vision-

logic perspective, a perspective which integrates the two traditions without negating either. Therefore, the field trip as pilgrimage needs to be situated in a context broader than that provided by either science or religion alone–one that transcends yet includes both.

This broader context can be achieved by viewing both the scientific field trip and the religious pilgrimage through the lens of deep science. From this standpoint, their commonality lies in being injunctions that serve to provide participants with a deeper understanding of their respective communities' shared ideals. As such, their essential purpose is the same, to connect with "something beyond one's everyday experience."[8]

Given this commonality, redefining some of the terms generally associated with religious journeys in such a way as to include geological travel provides the broader context required for discussing the field trip as a pilgrimage. Pilgrimage, which is generally thought of as a religious word, can in a broader sense be used "to speak of journeys to sites that are held in high esteem and represent values served."[9] Under this broader definition of pilgrimage, the field trip journeys to the Burgess Shale, the Mount Stephen fossil beds, and the Tanglefoot Creek trilobite beds all qualify as sites held in high esteem and representative of values shared in common by geologists and paleontologists. Coleman and Elsner maintain that museums also fit within this broader meaning of pilgrimage sites:

> As symbolically rich end-points of a journey to a site and controlled movement within that site, they [museums] have similar qualities [as religious sites]. In front of such relics, a person is confronted–literally put in touch with–a tangible embodiment of all that the place might represent.[10]

Thus, the Royal Tyrell Museum, too, qualifies as a pilgrimage site.

Another concept associated with religious pilgrimages is that of "sacred sites." While several researchers contend that sacred sites are embodiments and representations of cultural and social ideals,[11] the actual sanctification process of sacred sites is not well understood. However, we do know that sacred sites emerge and develop through the humanization of geographical locations.[12] In other words, a site's sacredness is determined by its history and the associations made with it. Hence, the 500 million year old biological history as well as the nearly one hundred year old social history of the fossil sites visited during the field trip qualify them as sacred sites. Specifically, the Burgess Shale's reputation, as the world's most important fossil locality, qualifies it not only as a sacred site but as "the" sacred site of the paleontological world.

A third difficulty in discussing the field trip as a pilgrimage is that "each culture has fashioned its own version of the pilgrimage, and every pilgrim has interpreted this cultural model to suit his personal life and spirit."[13] Thus, pilgrimage has as much to do with the internal state and experience of the person participating in the pilgrimage as it has to do with the external, visible behaviors of the individual in that pilgrimage is about making a personal "connection with the ultimate, however that is understood."[14] In other words, from a personal perspective, what constitutes a pilgrimage varies from one individual to another. For example, while Henry described the trek to the Burgess Shale as a pilgrimage and Sam referred to the Walcott quarry as "Holy Ground," Peter, who had been to the site many times before, commented that it had become "common place" and that "a lot of the wonder of it had disappeared."

While it is not possible to declare the field trip a pilgrimage from the perspective of each and every participant, it is possible to describe the field trip as a pilgrimage from a cultural-social perspective. Culturally, the field trip is "a central element of practice"[15]

for pursuing the goals of geologists and paleontologists in much the same manner as a pilgrimage is a "culturally sanctioned endeavor"[16] for pursuing the sacred ideals of the religious devotee.

Although pilgrimages vary from culture to culture and from shrine to shine, they share a common structure. A typical pilgrimage entails (1) preparation for the journey, (2) journey to the site, (3) encounter at the site, (4) journey home, and (5) integration back into the home community.[17] The pre-conference field trip included each of these stages. First, besides all the individual participant's preparations made for getting to Edmonton from places as far away as Korea, Australia, and Germany, Carl and Sam prepared an excursion guidebook, booked tours and accommodations, and arranged for our transportation. Second, not only did the field trip include a trek to the Burgess Shale quarries which were the main attraction of the field trip, but like many traditional pilgrimages, it included visits to other sites of lesser notoriety. The Mount Stephen fossil beds, the Tanglefoot Creek trilobite beds, the Ammonite mine, the Royal Tyrell Museum, as well as the Rocky Mountains in general all constituted "sacred" sites visited during the field trip. Third, field trip participants explored each site with great intensity, taking photos and collecting fossils where permitted. Fourth, after the field trip most of the participants continued on to the geological conference held in eastern Canada before heading home. Finally, integration back into the community commenced for some with attending the conference, while for all it included the sharing of the experience via photos and stories with friends, family, students, and colleagues as well as exchanging information, ideas, and specimens with fellow field trip participants.

In addition to these five stages, traditional pilgrimages are characterized by the following features: (1) a sense of presence, (2) special clothing, (3) the path taken to the

site, (4) taking something home, and (5) difficulty of access to the site.[18] Each of these characteristics were evident at one time or another during the pre-conference field trip. Individually, as well as collectively, they illustrate how the pre-conference field trip was a pilgrimage.

A sense of presence. What distinguishes sacred sites from more mundane places is the sense of presence of the divine. Of all the sites visited during the field trip, the Burgess Shale best exemplified what is meant by a sense of presence. The day of our visit to the quarries was stellar. The rain had stopped, the clouds had separated, and the sun warmed the air. As I stood there on the high, open slopes of the Burgess Shale, looking out across the forested valley at the breath-taking magnificence of the Canadian Rocky Mountains with their hanging glaciers, snow-capped peaks, and emerald green lake below, I felt exhilarated. If there was one moment during the field trip that for me was a connection beyond self, this was it. The magnetism of the Burgess Shale as a sacred site, as a site for experiencing the wonder of the universe, is reflected in Peter's comments regarding people on other trips he has taken to the site:

> **Peter:** *People were coming from around the world to see this [the Burgess Shale]. I had a person who came from Boston. He was what we call one of the Burgess Shale pilgrims. He was going to get there. He was sixty years old. He was a good fifty pounds overweight. He had just had knee replacements put in. There was no discouraging him going. He was going to make it. He was going to see the Burgess Shale. And that's all there was to it. No matter how much pain he was in, he was going to get there. He was an extreme, but nevertheless, there were all these people who just were coming in having read everything that existed, having seen all the documentaries on it. They were obsessed.*

> *These pilgrims, when they got up there, they just went boom, they were gone, I mean they were off in their own little world. . . . They were the sort of people who were having these "religious experiences" up there. Having this thing about trying to make connections with this idea that they've had in their head for so long, that they'd seen as remote. And suddenly being there touching it, holding it, they were there in their own happy little world. They were amazing to watch.*

The Burgess Shale experience alone qualifies the field trip as a pilgrimage. In Carl's words, "a lot of people consider it to be the most famous fossil site in the world, and so it is a pilgrimage to the Burgess Shale." He went on to say that "the trilobite beds at Mount Stephen was also a pilgrimage."

Special clothing. While the clothing worn by the field trip participants may not have appeared as particularly special, there was a uniformness about it. For the most part people wore jeans, sweaters or sweatshirts, light pile or cotton jackets, anoraks, and hiking boots. But it was more in what they didn't wear that was most distinctive. No one dressed in high-tech gear so common among mountain hikers. Also, the participants' clothing was well worn. No one had to purchase new gear to go on this expedition; they already owned it.

The path taken to the site. The path to the sacred site is a reminder of what is being experienced, of what happened at the site.[19] This was particularly evident on the way to the Burgess Shale quarries. Throughout the hike to the Burgess Shale there was no mention of Charles Walcott's discovery of the fossil beds until we emerged from the forest and stepped out into the vast open slopes of the ridge where the quarries are located. It was there that people started talking about Walcott and asking if we were on the horse trail where he found the fossil-bearing rock which led to the discovery of the

fossil beds. The questions and talk about Walcott signified the importance of being there and walking where he walked. This experience is consistent with Martin Rudwick's suggestion that as sacred sites are approached by pilgrim or geologist, there is a progressively heightened sense of expectation and receptivity to new understandings.[20] Tolsoe's "seeing is believing" and Jerry's "I learned a hell of a lot today" comments regarding visiting the Burgess Shale quarries illustrate field trip participants' receptiveness to new learnings.

Taking something home. Souvenirs and artifacts represent cultural ideals[21] and as tokens of the experience, keep it present in the mind of the pilgrim.[22] Souvenirs in the way of post cards, t-shirts, and field guides were purchased throughout the field trip, particularly at the information centres in Jasper and Field as well as at the Frank Slide and the Royal Tyrell Museum. Artifacts were collected in two ways. First, where possible, at the Tanglefoot Creek trilobite beds and at the Ammonite mine near Magrath, everyone on the field trip collected fossils. As noted in the previous chapter, Hans alone collected over 130 trilobite specimens at Tanglefoot Creek. Second, where fossil collecting was prohibited, everyone took pictures of specimens found at the Mount Stephen fossil beds and the Burgess Shale quarries. The photographing of fossils had a ritualistic quality about it in that placing a reference coin beside the specimen being photographed was a cross-cultural behavior. Individuals from Asia, Europe, and North America all engaged in this habit. Paul's story of the spray-lacquered specimens he contemplated at home also illustrates how artifacts can be used not only to keep the field experience in mind but to assist in the creation of knowledge about them.

Difficulty of access. Difficulty of access to a site not only increases the "magnetism of a sacred site,[23] but is also symbolic of the inner journey of the pilgrim.[24]

During pilgrimage the outer journey is from the comforts of everyday life to exposure to the trials and perils of the vastness of the world.[25] Or from Han's experience

> **Hans:** *[Field adventures] are essentially the moments when you prove to have escaped from the normal life and the ordinary job. . . . They indicate the moments that a normal tourist would hardly experience or, even better, 'survive.'*

It is this exposure to unfamiliar experiences, this experiential and spatial separation from every day community occurring during pilgrimage or geological field trip, that provides both pilgrims and geologists access to new and deeper understandings of reality, "deeper than can be found by remaining within the 'structure' of everyday experience."[26] In other words, the outer journey creates the environment in which the inner journey takes place.

In terms of inaccessibility of sites visited, the pre-conference field trip was unlike most other field trips associated with conferences in that it was much more physical than usual for this type of trip. In that sense the field trip was typical of pilgrimages involving long walks to reach their intended goal. On three separate occasions during the field trip we walked for hours along narrow mountain trails, up creek beds or through the bush to various fossil localities. Each hike contained its own set of difficulties. The two hour climb to the Mount Stephen fossil beds entailed hiking along a very wet and slippery trail, one of the steepest in the area. The only accident that occurred during the trip happened as we made our way to these fossil beds. Several members of the group were stung by wasps, the effects of which remained with both Levi and Carl for several days afterward. The next day we visited the Burgess Shale quarries. This nine hour trek involved climbing over two thousand feet in elevation and descending over three thousand feet of elevation. It was the hike down from the quarries more than the hike up to it that proved problematic. Carl lost of a couple of toe nails and several others experienced

blistered feet and sore muscles which caused some grief during the following day's hike. The third and final day of hiking, an arduous twenty kilometer round trip excursion to the Tanglefoot Creek fossil beds, included six kilometers of very difficult bushwhacking. While there were no real complaints about the difficulty of these hikes, Janet and others assured me that this was totally unlike any field trip they had ever been on.

The value of shared hardships encountered in gaining access to sacred sites is, as Victor Turner suggests, that it binds various groups of people together.[27] This most certainly was the case during the field trip as students, amateurs, and professional geologists jointly suffered the intensity of foul weather, the strains and stresses of steep climbs and descents, and the accumulated effects of three long days of mountain hiking. During these times, as Carl points out, "people tend to break up into twos or threes and talk as they walk. And I think that's good too." Examples of this include, Janet, a professor of geology, hiking back from the Burgess Shale with Patrick, a paleontology student, then the next day hiking to Tanglefoot Creek with Levi an amateur paleontologist, and later Patrick and Levi, student and amateur, hiking back from Tanglefoot Creek together.

In addition to developing interpersonal bonds, the hardships associated with the long treks into the sites created a sense of accomplishment as well as providing people with time to reflect as is evident in Sam's comments about hiking to the Burgess Shale:

> **Sam:** *I think that the fact that you have to hike up there, makes you appreciate it more than just driving up to it and getting out of the car. You have to actually work to get there. And you get time to think while you're going up.*

Given the geological complexity of the Rocky Mountains, it would have been quite easy to plan a field trip that didn't involve these hardships. However, not only had

Carl and Paul designed the trip to include some very important fossil localities, but they intentionally designed it to be quite physical:

> **Carl:** *I understand that in eastern Canada they ran a very different sort of trip where everything was choreographed. They had a large number of localities to get to each day. Basically, everybody poured out of the bus and heard a five minute speech and then poured back into the bus. I think people would be sick of it after a few days. We tried not to run a trip of that sort. . . . I personally like strong physical sides to field trips.*

The physical nature of this field trip in conjunction with the sacredness or "sense of presence" of the sites visited are key factors in distinguishing it as a pilgrimage.

People embark upon sacred journeys for many reasons. They include: (1) to see the place where something happened, (2) to draw near to something sacred, (3) to answer a sense of inner calling, (4) to see why others go there, (5) to get outside the normal routine of life, (6) to admire something wondrous, (7) to make a vacation more interesting, or (8) to be among the privileged.[28] While each of these reasons may, to one degree or another, have played a part in individual decisions for joining the pre-conference field trip, "seeing where something happened" and "being near to something sacred" were the two most prevalent reasons. This is apparent in people's desire to visit the Burgess Shale. As a place where something happened, where there is something sacred, the Burgess Shale is unrivaled. Stephen J. Gould explains:

> As its primary fascination, the Burgess Shale teaches us about an amazing difference between past and present life: with far fewer species, the Burgess Shale –one quarry in British Columbia, no longer than a city block–contains a disparity in anatomical design far exceeding the modern range throughout the world! . . . The

> broad anatomical disparity of the Burgess is an exclusive feature of the first explosion of multicellular life.[29]

The Burgess Shale, as a site representing the earth's "first explosion of multicellular life," embodies the sacred ideal of the evolution of life, of our connectedness to other life forms, to our connectedness to something beyond ourselves. Here at the Burgess Shale we find our origins in the first known cordate, *Pikaia gracilens,* the first known species of our phylum.[30] To paraphrase Stephen Gould, we are alive because *Pikaia* survived.[31] Hence, the Burgess Shale is a compelling site to visit as is noted in the following comments:

> **Carl:** *I would say at least half the people on the trip were just there primarily to see the Burgess Shale and maybe the Stephen formation. The other half were just generally interested and wanted to go to the Rocky Mountains. We had a couple of very high profile sites to visit. At any time something came up in a discussion about a particular locality, they could say, "Oh ya, I was there."*
>
> **Hans:** *It's a must to have been to the Burgess Shale for someone working more or less officially on certain African problems. Especially where I am working. . . . Others are just eager to have been to a locality that's quite different.*
>
> **Jerry:** *The whole reason I came on the trip was to go to the Burgess Shale. The Mount Stephen fossil beds were important, but I would have come just to go to the Burgess Shale. It's the pilgrimage thing if you will. . . . But just to see the Burgess Shale, . . . I would have crawled to the damn thing.*
>
> **Tolsoe:** *The Burgess Shale is the Jerusalem of paleontology, so I liked going there. Three or four years ago I had a chance to go but I missed it, so the '97 field trip I didn't want to miss. . . . It was a neat experience as a paleontology student. Now I can talk about the Burgess Shale to other students who haven't been there.*

I'm proud of myself for having been there.

Sam: *It [the Burgess Shale] was like an important world site that is really well known, so it is nice having gone to it. It's kind of restricted and hard to get to. Nice to see things like that.*

The focus of these remarks is on seeing the site, on the experience of being there. Accounts from pilgrims about traditional pilgrimages have much the same focus. According to Alan Morinis, "sacred journeys tend not to be intellectual quests. It is the experience that counts."[32] Moreover, while the external behavior between tourist and pilgrim is often indistinguishable,[33] the pilgrim's ability to relate the pilgrimage experience to a larger framework of meaning is one of the key factors in distinguishing the pilgrim from the tourist.[34] In the case of the field trip, the participants' knowledge of geology and paleontology provided "a larger framework of meaning" for them in the same way as pilgrims' knowledge of religion. Field trip participants at all levels, professional, amateur, and student possessed this larger framework as affirmed by the following comments:

Janet: *We've probably all seen films and photos and all that and descriptions and everything else, so I doubt that anybody was really surprised at what they saw today [at the Burgess Shale].*

Jerry: *I've read a lot about it [the Burgess Shale]. I've seen most of the specimens in the Smithsonian.*

Tolsoe: *All the species in the Burgess Shale, I've already seen from text books and from some specimens in museums.*

A second distinction between tourist and pilgrim is that tourists typically travel away from the center toward an elective periphery of their society whereas pilgrims are on a quest toward the center of their culture.[35] Said differently, pilgrimage is structured

and has set destinations whereas this is not necessarily the case for tourism. In this regard, the pre-conference field trip headed directly for the center not once but on five different occasions. Each of the fossil sites, Mount Stephen, Burgess Shale, Tanglefoot Creek, and the Ammonite mine as well as the Royal Tyrell Museum represent centers embodying the cultural ideals and values of paleontology. By its very nature then, the field trip, as a quest directed toward the center of geological culture, functioned as a pilgrimage.

Another factor differentiating pilgrim and tourist is that for the pilgrim the group of fellow travelers is part of the ambience of the experience, while for the tourist the group has no culturally defined significance.[36] For the field trip participants, the composition of the group was definitely an important aspect of the experience as can be seen from their comments:

> **Carl:** *My own personal view of such trips is that they are most useful for scientists getting to know each other. . . . But the reason I go on these kind of field trips is to meet people. The contacts made on field trips are usually much stronger than those made at a meeting where people mainly attend talks.*
>
> **Tolsoe:** *I think all of us [Kildong and Mongryong] are here to meet trilobite people. . . . There's the personal thing, you know–the political things. Also we are here to meet trilobite people, hear trilobite people and to get useful information.*

Besides providing personal experiences for individual pilgrims, pilgrimage plays an important role in developing and maintaining communities.[37] Through the pilgrimage process, disparate social groups are fused together forming what Victor Turner identifies as *communitas*. He explains the process:

> When one goes on a pilgrimage . . . one is also moving away from a social life in

> which one has an institutionalized social status, plays a set of expected roles, and belongs to such social groups as family. . . . One is moving into a different kind of social atmosphere, one in principle (if not always in practice) stripped of status, role-playing attributes, corporate group affiliations, and the like.[38]

In other words, a communitas serves as a social structure in which individuals can step out of their status-role way of relating to others and relate to each other in non-status-role manners. As such, it provides the individual with release from the structural obligations and necessities of everyday life.[39] The social structure of the pre-conference field trip was that of a communitas. Throughout the course of the field trip professionals, amateurs, and students interacted with each other based on their "peopleness" rather than their status or role. Thus, professionals didn't have to stand on a pedestal nor did amateurs and students have to look up to them. They could and did interact in non-hierarchical manners as Sam's comments illustrate:

> **Sam:** *I walked with Carl for a while and we talked about things besides paleontology, like mushrooms and stuff like that other than just what he is actually studying. . . .*
>
> *I enjoyed talking to and sitting down drinking with the paleontologists on the trip. . . .*
>
> *I was the youngest. I didn't feel like I was disrespected or anything. They realized I did have an understanding of what was going on.*

Further support for the field trip group being a communitas is revealed by a close examination of Appendix G. It shows that fifteen of the sixteen field trip participants shared a van seat, room, or meal with individuals from all status groups. Cross-culturally, Hans from Germany and Phelim from China shared a van seat, room, or meal with

fourteen individuals each while the Koreans (Kildong, Mongryong, and Tolsoe) did the same with eight, seven, and nine others respectively. Carl's post-field trip contacts with Jerry, Andy, Hans, and Phelim as well as Tolsoe's contacts with Jerry, Andy, Paul, Janet, Henry, and Mongryong give further indication of the cross-status and cross-cultural nature of the relationships built during the field trip. In addition to this, the interactions were also cross-disciplinary. Based on previous field experiences, Carl elaborates on the value of cross-disciplinary interactions:

> **Carl:** *I ran a first year field school for a number of years. I ran it with a different faculty member, and I found very often that the best mix was to go with somebody with a totally different background. So, if I headed off with a granite specialist with my fossil and sediment background, the students actually got a lot more out of it because we were constantly cutting at the rocks from totally different angles. So when we would be looking at a bunch of sediments, he'd be interested in the minerals that were in the sediments and where their origins were and so on. If we were looking at a bunch of metamorphic rocks, he'd be interested in the metamorphic minerals and the heat pressure, and I'd be looking at whether these things were once sediments and whether we could see any signs of the old sedimentary structures whereas he was interested in the metamorphic environments and the mountain building which may have taken place hundreds of millions of years later. I generally found that people with totally different backgrounds at least in introductory field experiences of that sort provided far more knowledge to students than if you had two specialists who were rather close in which case they would probably spend time either agreeing with each other or arguing about minutiae which would be of no possible interest to the students at*

that level.

This mixing of disciplines, ethnic cultures, and levels of status serves to reduce the fragmentation of knowledge between individuals within the same field of study.

Not all interactions between field trip participants were non-hierarchical. As noted in a previous chapter, Patrick made Paul's lunches and Sam was called upon to do "the donkey work" as Carl described it. However, in both these situations there was compensation. Paul funded Patrick's participation in the trip as well as his graduate research. Sam was being paid to work as Carl's summer assistant. Both Patrick and Sam spoke highly of their supervisors. Such relationships do not negate the ideal of communitas. As Victor Turner explains, "while the pilgrimage situation does not eliminate structural divisions, it attenuates them, removes their sting."[40]

Stories, told as tales, legends, and history, are also an essential aspect of the pilgrimage process.[41] As discussed in the previous two chapters, stories were a significant part of the sensemaking process of the field trip. They ranged from descriptions of geological history of the sites visited to the exploits of geologists past and present. Veterans of numerous field expeditions, like Carl, Paul, Hans, and Andy, narrated tales of personal field adventures. Other less experienced members of the group, Patrick, Henry, and Sam, focused on relating the legends of Andrews, Cope, Marsh, and other historic paleontological icons. On our treks to the Mount Stephen and Burgess Shale fossil beds, Peter relayed the local history, and whenever Charles Walcott's name arose in a conversation, Jerry recounted his accomplishments. Not only did these stories provide individuals with a sense of identity within the community of geologists and paleontologists as discussed in the previous chapter, but they also linked the pilgrimage sites to the cultural field. That is to say, they helped establish the cultural values and

beliefs embedded within the sites visited. They established the "sacredness" of the sites.

Not all stories influencing the field experience were ones told during the trip. Most notably, Stephen J. Gould's *Wonderful Life* was instrumental in bringing the Burgess Shale to the attention of the public in general as well as to many of the members of the field trip.

> **Peter:** *Wonderful Life by Stephen Gould was the entire Burgess Shale literature except for things in journals. He was the reference point, the one everyone talked about. When you watched any documentary that's the story you got.*

The exposure the Burgess Shale received from Stephen Gould' book added tremendously to its magnetism as a sacred site. Not only was *Wonderful Life* key in motivating people to visit the Burgess Shale, it was what motivated Patrick to leave a career in the navy and return to university to study paleontology.

In addition to the stories heard before and during the pilgrimage, pilgrims come away from the pilgrimage with their own story of the place and the meaning it has for them[42]–stories which, along with souvenirs and artifacts, "serve to reconstruct the journey in the imagination."[43] It is through the retelling of these personal stories that pilgrim and geological traveler alike integrate back into their home community. Through their stories they bring a renewed and intensified energy for the shared values and beliefs encountered during the shared experience of the journey. Thus, they return home having created a new relationship with values and beliefs that are of individual and collective importance.[44]

Up to this point in our discussion the comparison between the pre-conference field trip and traditional pilgrimage has focused primarily on their external similarities. We have examined the nature of geological sites as sacred sites, the five stages common to

both geological travel and religious travel, the characteristic features common to the field trip and pilgrimage, various reasons for embarking on journeys including the distinctions between tourists and pilgrims, how both have a similar social structure referred to as communitas, and finally the comparable role of story in each. From a social-cultural perspective, the commonalities between the field trip and pilgrimage support the argument that indeed, the pre-conference field trip was functionally a pilgrimage. However, a pilgrimage is an inner experience as well as an outer experience. While I can not speak with any authority about the inner experience of the other members of the field trip, other than from what they have told me, I can speak with authority about my inner experience of the field trip as a pilgrimage. It is from this perspective that I continue the discussion of the pre-conference field trip as a pilgrimage.

An Inside View

In conducting this case study, I have learned that part of what is required to make a field trip a pilgrimage is a desire to travel to a sacred site, a desire to stand in its presence. Second, there must be an expectation that the act of being there will somehow make a difference in one's life. When Bryant Griffith first suggested I consider a research project involving the Burgess Shale, I had no idea of its significance. Even after arranging to participate in the field trip, I had no sense of the field trip's potential as a transformational experience. I imagined the trip as an intellectual endeavor from which I would gain insight into the sensemaking process occurring during a geological field trip. Initially, I was going along to learn about sensemaking, not geology. It never crossed my mind that the field trip would entail a quest for connecting with that "something else

that's going on." Hence, at the onset of the project, I lacked both the desire and the expectation associated with traditional pilgrimage.

In preparing myself for my role as ethnographic observer engaging in field research, I read *Fieldnotes* by Roger Sanjek and *Writing Ethnographic Fieldnotes* by Emerson, Fretz, and Shaw prior to embarking on the trip. In addition, to prepare myself for my role as field trip participant, I read *Wonderful Life* by Stephen J. Gould. Reading this book, I was totally enthralled with Stephen Gould's descriptions of the fossil animals found at the Burgess Shale and his interpretation of the meaning of the great diversity occurring among them. I had not been so excited about evolution since reading *The Naked Ape* by Desmond Morris thirty years earlier. Through the study of evolution as an undergraduate wildlife biology student, I had come to understand the connectedness between all forms of life. Over the years, this understanding has been one of the fundamental principles informing my sense of spirituality.

As I read *Wonderful Life*, I began to realize that "something wondrous had happened" at the Burgess Shale. The more I read, the more curious I became as to what that wondrous something was all about. However, unlike Martin, who upon hearing that the field trip was scheduled to visit the Burgess Shale immediately signed on as a participant, or Jerry, who would have "crawled" to it, my curiosity about it had not yet fully materialize into desire and expectation. This did not occur until after the start of the field trip.

Throughout the first two days of the field trip, immersed in geology and paleontology talk, I started becoming familiar with the language of the group and thus developing a basic understanding of what this talk was about. Through the stories told, I learned about who the participants were as individuals and as a group. Through

conversations about the Burgess Shale, Charles Walcott, and Stephen Gould, whose interpretations most on the trip participants seemed to disagree with, I came to comprehend that within the paleontological community there was tension surrounding the differences in Walcott's and Gould's interpretations of the Burgess Shale fossils. This tension piqued my curiosity. Whose interpretation was most accurate? Were there other possibilities? What was the significance of the Burgess Shale? As Janet said,

> *A lot of times you hear two stories, and they're incompatible. You have no a priori knowledge–both sets of arguments sound possible. You don't necessarily favor anything, and how can you if you don't go out there and actually see it for yourself.*

And I wanted to it see for myself, to make my own interpretation–to determine whose story I thought was most plausible or if there were other possibilities neither had considered. From conversations throughout the trip, it became apparent that this tension between interpretations was one of the factors that enhanced the magnetism of the Burgess Shale as a sacred site not only for me but for others as well.

Another factor that increased my desire to visit the Burgess Shale was the trip to the Mount Stephen fossil beds. This was my first experience seeing some of the same fossils present at the Burgess Shale. Finding an *Anomalocaris* claw was a turning point for me; it made what I had read, in addition to what I had heard from the participants, become real. It was at this point that I became excited about going to the Burgess Shale. I was beginning to feel a sense of expectation. Although I could not have verbalized it at the time, the Mount Stephen fossil beds served as a minor sacred site that intensified my desire to visit the major sacred site, the Burgess Shale. I was going there to have my own experience, not just to observe and record the experience of others.

What is significant about this series of events is that my inner experience of

pilgrimage evolved over time; it was neither spontaneous nor intentional. I had not entered into the field trip with the expectation of having any sort of personal transformation nor of participating in a pilgrimage. Even though the realization of the pilgrimage process did not come until much later, the process was what was happening during the field trip. This lack of awareness of the pilgrimage process is not uncommon. In fact it is common for a person to start out on a journey as a tourist and end up as a pilgrim,[45] which is exactly what happened for me.

Although a major portion of my energy on the trek up to the Burgess Shale was spent as an observer listening to and recording the stories told by various participants, I also had time to contemplate what being at the Burgess Shale quarries would mean. I was filled with excitement. I looked forward to seeing the site first hand, to being there in the midst of the mountains, and to standing there in front of the quarry experiencing it as others had. I wanted to connect with the significance of this geologically and biologically historic site through body and spirit as well as through mind. Yet, I was also apprehensive. I had no clear sense of what my response would be once we arrived. Given that pilgrims' expectation of "rapture and exaltation" often fail,[46] I was concerned that I might not have any significant response at all. There might not be any sense of transformation–no "ah ha's."

Upon arriving at the Burgess Shale, both excitement and apprehension gave way to "awe." As is common in this type of circumstance, it is difficult to articulate the inner experience.[47] I precede with that in mind. It was not the quarries themselves that created a sense of awe; rather it was the vastness and magnificence of the surrounding mountains in combination with the knowledge that buried within this site was the record of the origins of multicellular life, the record of our connection to something beyond ourselves as

human beings–the record linking Nature and Human Nature together. Over 500 million years ago, life forms, which gave rise to the phylum *Chordata,* were enshrined in the rocks of what are now the slopes of the Burgess Shale. Being there in the presence of these ancient artifacts was staggering. In addition to observing and photographing the activities of the other field trip participants, I wandered around the lower and middle quarries examining the banded layers of rock exposed by years of quarry activity, touching fossils embedded in pieces of shale, and gazing out at the mountain vistas. I was thoroughly enthralled and totally aware that I was in a sacred place. It was the only time during the field trip that I requested to have my picture taken with my camera. This one picture of me standing beside Carl with the Walcott quarry in the background became evidence of my having been there. This photograph serves as one of several souvenirs I use to reconstruct the Burgess Shale experience.

Returning from the Burgess Shale was more of a beginning than an ending. Having been there, now more than ever, I looked forward to the rest of our journey and the sites we would visit along the way. Each subsequent site served to reinforce and enhance the Burgess experience. The relevance of having been to the Burgess Shale became more significant as I learned more about the big picture context surrounding it. To repeat Clift and Clift's words, through expanding my "ability to relate the experience to a larger framework of meaning,"[48] I developed a deeper understanding of the experience as well as of life itself.

As we journeyed from site to site, my feeling as field trip participant steadily increased. For example, at Tanglefoot Creek, I combed the hillsides searching for fossil trilobites like everyone else. In addition to the photographs taken there, I returned with a complete trilobite specimen, which, like the Burgess Shale photograph, became a symbol

of my experience and the beliefs I held regarding the evolution of life. As discussed in chapter three, by the time we visited the Frank Slide, I was feeling very much like a member of the group and, like several others on the trip, purchased a copy of Ben Gadd's *Handbook of the Canadian Rockies*. I had a need to know more, to make a deeper connection. The geological history of the Rocky Mountains was about more than the history of life; it was about the history of the planet from which life sprang. By the time we reached the Royal Tyrell Museum, I was also becoming more and more aware of the significance of the entire field trip as a pilgrimage as opposed to just the Burgess Shale visit. That is to say, through the combination of visiting all the various sites along with traveling in the company of others over an extended period of time and distance, I came to experience the field trip as a pilgrimage. This field trip, like Victor Turner describes pilgrimage, was about moving from idea to experience; it was about getting closer to the "belief" roots of a culture.[49]

Returning home, I immediately shared my experience of the field trip with my wife. While looking at the photographs of the trip, I described the details of everything we had done. I also shared my stories of the field trip with friends and colleagues. As I told my stories and contemplated my experience of the trip, I became aware of subtle changes within myself. For example, shortly after the field trip I made the following journal entry:

> *Colleen and I went cycling with Ted, Maureen, and Eli on August 30th from Goat Creek to Banff and back to Canmore via the highway. As I cycled along I frequently realized that I was looking at and appreciating the mountains in a much more intimate way than ever before. I was quite struck by this new relationship I have with them.*

Not only did I relate differently to the mountains, I also incorporated pilgrimage as part of my learning process. During one of my university courses we viewed Fritjof Capra's film *Mindwalk* which was shot on location at Mont-St.-Michel in France. This film significantly influenced my thinking regarding the interconnectedness of life. Knowing that I would be going on a business trip to France, I made plans to go on a pilgrimage to Mont-St.-Michel. While I do not need to discuss the details of the trip here, it suffices to say that it was a wonderful experience in that it solidified my understanding of Capra's notions of the web of life as well as expanded my understanding of pilgrimage. Thus, as a result of the pre-conference field trip experience, I engaged in a pilgrimage as a way of making sense, as a way of knowing.

The significance of the cycling insight and the Mont-St.-Michel pilgrimage is that I returned home from the Rocky Mountain field trip a different person from the one who left. This experience of transformation is what classifies the field trip experience as one of pilgrimage. According to Clift and Clift,

> going on the pilgrimage makes one into a different person. Then we can come back to the place where we began and know it for the first time because the person who comes back is, in truth, different from the person who left.[50]

On August 19th, 1997 the last night of the field trip, I recorded a similar observation in my field journal:

> *Our trip is a journey in space (miles traveled and heights climbed) and time (current and past). It would appear that we will return to where we started, but not so.*

Through (1) contact with geological sites–*being there*, (2) the field trip communitas–*living together*, and (3) engaging in conversation with field trip participants–

storytelling, I have come to understand the Rocky Mountain pre-conference field trip as a case of sensemaking on two very different levels. At one level, the participants have engaged in a scientific injunction which has provided them with insights concerning the exterior domain of geologic and paleontologic reality as well as the external social reality of their community. At another and perhaps more subtle level, the field trip, functioning as a pilgrimage, included insights into their interior world both individually and collectively, that is, the "I" and "We" domains of experience. As such, the above account of my inner experience as a field trip participant in conjunction with the account of the exterior experiences of the other field trip participants constitutes a "modest beginning of an ethnography"[51] for exploring the nature of a geological field trip as an instance of sensemaking and as an instance of pilgrimage.

Research Issues and Questions

One of the initial research issues arising during the field trip was that of establishing rapport with the field trip participants, none of whom I had met prior to the trip other than one brief meeting with Carl. Establishing rapport was of particular importance because a case study as ethnographic research "is characterized by the intense nature of relationships that are established between researcher and researched."[52] Hence, the quality of the data collected during and after the field trip was dependent upon the quality of relationships established.[53] As an observer participant not only did I have to establish myself as a human science researcher, I also needed to establish myself as an actual field trip participant. To be an effective researcher it was necessary for me to create a balance between these two roles. In other words, I had to be aware that "close

observation involves an attitude of assuming a relation that is as close as possible while retaining a hermeneutic alertness to situations that allows us to constantly step back and reflect on the meaning of those situations."[54] To achieve this end, I spent the first two days of the field trip concentrating on meeting as many of the participants as possible by engaging them in conversations about their personal and work lives. In this way I got to know something about most of the other participants, and they got to know something about me.

Also, because it is important to "show a willingness to enter into the way they see the world,"[55] being familiar with Stephen J. Gould's work and being an avid outdoorsman went a long way in establishing my role as field trip participant. This was augmented by my genuine interest in the scientific content of the trip which I demonstrated by asking questions and initiating discussions about the local geology and paleontology. The success of my efforts to build rapport were evident the evening we returned to Edmonton when Carl made unsolicited comments regarding my being accepted by everyone and fitting in well with the group. Andy, Hans, and Phelim echoed his sentiments. To ensure a balance between the observer and participant roles, each evening of the field trip prior to retiring I spent an hour or so transcribing field notes, reflecting upon the day's events, and preparing for the next day's research.

A second research concern was my impact as a researcher on the behaviors of those being researched. How much did my presence influence the dynamics of the group's interactions and as such bias the data collected? The answer to this question is directly related to my ability to develop rapport with the other participants. Because I was able to gain the trust and confidence of the group, I believe I was able to minimize the impact my presence had on the group. In an effort to reduce my impact as a researcher, I

made a point of being as unobtrusive as possible, though not secretive, by recording field notes in a brief mind map format and by only using the tape recorder during interviews. Also, knowing that I would be conducting post-field trip interviews, I kept the field trip interviews to a minimum. My influence as researcher was most obvious in that I initiated conversations about topics that might not have normally been discussed in the context of the field trip. An example of this would be the discussions with various participants concerning how they made sense of different geological concepts. However, because I was for the most part just another listener within a group of listeners, I think my presence had little effect on the conversations and stories occurring during the field trip. Thus, I am confident that the conversational data collected are representative of public interactions that would have normally occurred had I not been present.

A third research issue surfacing in this ethnographic case study is that of collecting and recording data. One of the strengths of an ethnographic case study is that the researcher enters into the case without a preconceived interpretation of what the observed behaviors mean. The ethnographer does not enter into research to prove a hypothesis but rather to uncover the meaning structures associated with the behaviors related to the research question.[56] Because lived experience is complex and "there will always be too many 'variables' for the number of observations to be made,"[57] the ethnographer must select which behaviors to pay attention to and subsequently record. While "the field researcher watches for the sorts of things that are meaningful to those studied,"[58] it is inevitable that some activities and events are emphasized while others are omitted or trivialized[59] Hence, "fieldnotes provide the ethnographer's, not the members', accounts of the later's experiences, meanings, and concerns."[60] The implication of this is that ethnographies are based on the set of assumptions ethnographers bring to the

research as well as the on the lived experiences of those being researched. In this regard, the fieldnotes used to develop the sensemaking themes emerging from the activities and events of the field trip, while capturing the significance of the field trip participants' experiences based on their meanings and interpretations, are deeply grounded in the basic assumptions I hold.

The most significant assumption influencing my interpretation of the data collected is that sensemaking is a socially constructed process which evolves through ongoing interactions between participants in the context of the physical world. Given that different assumptions lead to different perceptions and interpretations, this means that the themes emerging from the field trip experience constitute one possible interpretation of the meaning structures people used to make sense of the field trip. Consequently, the validity of the interpretations and descriptions of the field trip experience as outlined in this thesis, while not exclusive of other possible interpretations and descriptions, lies in their ability "to identify those dimensions critical to our understanding of human social behavior"[61] and to harmonize with the experiences of those who have had similar experiences, that is, those who have performed similar injunctions.

A final consideration emerging from this case study concerns the possibilities for further research. While the themes emerging from this case study have illuminated the nature of sensemaking occurring during this one particular geological field trip, they have also raised a number of other questions requiring additional investigation. From a general outlook, there is a need to examine the applicability of these themes to other field trips of a similar nature. In what ways do they hold true or not true for other geological field trips or for field trips engaged in by other scientific disciplines? Under what conditions do these themes present themselves? Or how do these themes differ when the

composition of the participants of the field trip differs? For example, does a university field school composed of a teacher and students or a team of professional researchers exploring new sites display the same sensemaking processes? If so, how are they similar or different from those observed in this case study; if not, what other sensemaking processes emerge? In other words, what are the critical factors influencing the emergence of the sensemaking processes described in this case study and how applicable are they to other situations?

Issues arising from each of the sensemaking themes also present interesting possibilities for further exploration. For example, several field trip participants indicated that *being there*, seeing the geological features and fossils in their natural context, made what they had learned from textbooks more real, more meaningful. This gives rise to questions regarding the relationship between text and field learning and knowing. What is the interrelationship between these two approaches? How can these two approaches be integrated to maximize learning and knowing? Does the field experience coming after the text learning change previous learning (expand it, clarify it) or does it simply reinforce what is already known? What are the critical factors involved in *being there* that make this type of contextual learning effective?

The notion of communitas as the social structure developed during the field trip also furnishes possibilities for extended research. Typically the social structure of a scientific community involving professional, amateur, and student researchers is by its very nature hierarchical. However, while *living together* during the pre-conference field trip there appeared to be a temporary suspension of power and domination between participants. This occurred despite the fact that some members of the field trip had, to use Andy's words, "gained recognition and credibility through publishing significant

monographs," while others had not. The range of recognition and credibility within the group extended on one hand from Hans, who, besides being a well published university professor, holds an official position on a subcommittee of the International Union of Geological Sciences, to Sam on the other hand, who was a third year undergraduate student. This change in social structure from the everyday work setting to the temporary field trip setting is wide open for investigation. One area of particular interest is the role and nature of *storytelling* in a communitas compared to that of hierarchical social structures commonly found in work or university settings.

Of all the possibilities for further research evolving from this case study, the ones with the greatest potential for new understandings of social behavior related to scientific sensemaking are those involving geological field trips as pilgrimage. By describing the pre-conference field trip as a pilgrimage in the traditional religious sense, this thesis has created an awareness of pilgrimage, as an archetypical behavior, i.e., as a "universal pattern in human behavior,"[62] manifesting itself in the scientific world in the form of the geological field trip. To determine the extent of this manifestation more research integrating scientific and religious perspectives is required. Given that this area of study is virtually untouched, the possibilities for research are endless. While some researchers have examined secular sites[63] including museums,[64] none mention specific scientific field sites as "sacred sites." In light of the thinking of Fritjof Capra, who compares Western science with Eastern mysticism,[65] and Ken Wilber, who proposes a common ground for determining valid scientific and religious experience,[66] studying scientists as pilgrims, as people seeking connections with something beyond the self, would seem quite timely. Although scientific expeditions have been metaphorically described as pilgrimages, that is, as long journeys, there is still need to study them as transformational undertakings.

Final Thoughts

In this thesis, I have argued that the Rocky Mountain pre-conference field trip was an instance of sensemaking as evident through the emergence of three discernible sensemaking patterns or meaning structures, *being there*, *storytelling*, and *living together*. Furthermore, I have argued that the field trip, because of certain unique features and characteristics, was functionally a pilgrimage. Although these claims are grounded in the voices and actions of the participants and the events of the field trip as well as my experience as observer participant and as author of this ethnography, the ultimate test of the validity of these claims rests with the informed reader as a member of a community of knowers. If the claims made in this thesis resonate with the reader's experience, then to that person it will serve as a natural basis for generalization[67] and have served its purpose. However, there are broader implications arising from this case study than those of understanding the field trip as an instance of sensemaking or as an instance of pilgrimage.

It is to these broader implications that I now direct my comments. In doing so, "I will plunge in with a Popperian 'bold conjecture'"[68] that has been percolating through my consciousness as a consequence of this case study. My hypothesis is this. A *scientific-field-trip-as-pilgrimage* (scientific-pilgrimage) represents the integration of the subjective ("I"), intersubjective ("We"), and objective ("It") dimensions of reality at the body, mind, and soul levels of Being without the reduction of one dimension or level to another.

Throughout history the world's great wisdom traditions have perceived reality as the Great Chain of Being, as "a rich tapestry of interwoven levels, *reaching from matter to body to mind to soul to spirit.*"[69] While scientific-pilgrimages may integrate knowledge at all levels, the focus of this discussion will be limited to body (sensorimotor

perception), mind, and soul (one's connection to the ultimate however that is defined). Structurally, the integration of knowledge associated with scientific-pilgrimage consists of a vertical component, the Great Chain of Being, and a horizontal component, the cultural value spheres. Each level on the vertical plane contains the three dimensions of the horizontal plane. That is to say, the sensorimotor level has an "I," "We," and "It" dimensions associated with it as do each of the other levels. Because each level transcends and includes its predecessor and exists as a consequence of its three dimensions, each level, in conjunction with the three strands of valid knowing (injunction, illumination, and falsification), can generate valid knowledge claims within its own domain.[70] Thus, there is a natural basis for the integration of objective, subjective, and intersubjective knowledge. Before examining how scientific-pilgrimage achieves this integration of knowledge, we must first define scientific-pilgrimage.

By scientific-pilgrimage I am referring to those, and only those, field trips that exhibit both external and internal aspects of pilgrimage. To qualify as a pilgrimage, a scientific field trip must be composed of as many of the core features (external aspects) of a pilgrimage as is required to evoke transformational or liminal experiences (internal aspects). The external features may include: (1) a journey to a "place of centrality with respect to the great tradition"[71] of the community, (2) a community sanctioned search for shared or "sacred" ideals, (3) a "communitas" social structure, (4) a journey of extended length in both time and distance, and (5) difficulty of access to the site or sites involved. Internal transformational experiences, which can be experienced as a personal act on a number of different levels: ego, cultural, social, or meta,[72] may include (1) transformation of one's inner state and outer status, (2) subtle changes in norms, values, and behaviors, (3) a deeper understanding of the community's shared ideals, (4) reinforcement of "the

human bond within the particular cultural group,"[73] and (5) a connection with something beyond one's self. The internal aspect of scientific-pilgrimage can also be understood from Martin Rudwuck's description of the liminal experience:

> Liminality is that which raises the interaction between trained experience and unfamiliar features above the level of 'everyday' reality. It gives the unfamiliar a 'sacred' aura, in which its deeper significance may more readily be perceived. In this *limen* a new scientific insight may be born and may grow.[74]

The final test of scientific-pilgrimage is the acknowledgement of such by its participants. Unfortunately, because it is difficult to articulate the experience of pilgrimage[75] and because the language of objective science has yet to incorporate to any significant degree the language of subjective personal and cultural lived experience, the acknowledgement of scientific-pilgrimage is as of yet not part of the typical scientist's consciousness. Perhaps, as the work of Fritjof Capra, Max van Manen, Humberto Maturana, Martin Rudwick, Ken Wilber, and others permeates the world of objective science, the compulsion to engage in field trip or pilgrimage will be seen as one and the same, as different manifestations of a single archetypical behavior.

Scientific-pilgrimage, as an integrative approach for unifying knowledge, not only has the potential to combine content knowledge from different disciplines but also has the potential to integrate interior knowing ("I" and "We" domains) with exterior knowing ("It" domain) at various levels of being. The pre-conference field trip, as a particular case of scientific-pilgrimage, can be used to illustrate what is meant by an integrative approach for unifying knowledge.

At the sensorimotor level of being, participants of the pre-conference field trip concentrated their attention on direct sensory-based observations of the geological and

paleontological features encountered during the field trip. By standing face to face with the physical features of the environment, by taking photographs of geological features and fossils, and by collecting fossils, the field trip participants sought observable, representational truth and as such focused on the exterior or "It" domain at the sensory level. Through interacting and conversing with each other over a period of six days about the geology and paleontology of the areas visited, the field trip participants developed a sense of shared experience, that is, a sense of shared interiors or "I" and "We" domains of the sensory realm. Or as Carl suggests,

> *you do develop a level of trust that you won't have necessarily just from an interaction at a conference.*

In the lived experience of the field trip, the three domains at the sensory level come together as one. Even though I speak of them as if they occur independently and separately from each other, they do not. In real-time lived experience, people mingling with each other and with the natural environment generate knowledge at the sensory level in all domains simultaneously.

At the mental level of being, the "It" domain is intimately linked with the "I" domain. This is illustrated in a number of remarks made by several field trip participants. In reference to the slow pace of walking to the Burgess Shale, Sam remarked that

> *you get time to think while you're going up.*

For Janet knowing only the "It" domain of an observation is not enough. She seeks out the meaning of what is observed:

> **Janet:** *You don't want just dry facts. Dry facts are "The quarry is x meters high and this is where we found fossils A, B, and C." You want to know what that means. That's the story.*

And for Paul, prolonged contact with a physical object is a stimulus for contemplation:

> **Paul:** *Anyway, for me this is something I do myself a lot if I'm contemplating something, a model or theory. I'll put stuff out so that I can look it, a lot of people don't do that, but it works for me. It keeps me thinking because for me I like to deal with ideas a lot not just documentation, and if you have reminders, it keeps you thinking so that a thought might come to you in an unusual way. You're reading a book on the john or you're cooking or something or walking to school or whatever, and then an idea pops into your head because the question has been circulating in your mind. I think most people probably do that if they are concerned about ideas and connections.*

The commonality of all three of these remarks lies in the creation of meaning, that is, understanding at the mental level of being. Not only is this creation of meaning connected to the physical world, but by telling stories of the meanings they have made, the participants' "I" experiences become public and thus incorporated into the "We" domain at the mental level. In the same manner "We" experiences are incorporated into the "I" domain of the mental realm.

Through a sharing of experiences at the sensorimotor level and meanings at the mental level, a sense of community was built among the participants. This is most apparent in Tolsoe's comments:

> *Also we [Kildong, Mongryong, and I] are here to meet trilobite people, hear trilobite people and to get useful information . . .*
>
> *After the field trip, it was certain to me that I know more people in the trilobite field. . . . I feel like I'm in the trilobite field.*

This focus on making connections with people at both the sensorimotor and the mental

levels is a critical factor in a scientific field trip functioning as a pilgrimage.

In the context of the scientific field trip, the soul level of Being is the realm of transpersonal awareness through contact with the physical world. Given that this level takes as its content illuminations and archetypal forms,[76] and hence incorporates the "We" domain, it is the most difficult to apprehend. A person's transpersonal awareness as an interior state of being is visible in the exterior domain through comments of expectation and awe. It also takes on metaphorical expression as seen in field trip participants' comments about the trip to the Burgess Shale being a pilgrimage, or the Burgess Shale itself being the "Jerusalem of paleontology" as Tolsoe remarked.

It is this sense of expectation of experiencing a transformational moment that is the essence of pilgrimage. However, as Eric Cohen explains, that expectation of rapture and exaltation, that expectation of connection with the ultimate, is seldom realized.[77] Ultimately then, what is important is not the realization of a transformational experience but the expectation of it. It is this expectation of a liminal experience that solidifies the scientific field trip as a pilgrimage.

To summarize my hypothesis, if, as Ken Wilber argues, in order to bring depth and meaning to knowledge, there is a need to integrate the disassociated cultural value spheres,[78] then scientific-pilgrimage, as outlined above, is one injunction for advancing toward that goal. When scientists set out on a field trip acknowledging that all phenomena are composed of subjective and intersubjective dimensions as well as objective dimensions and with the intention of integrating those dimensions across the sensorimotor, mental, and soul realms of being, they will be engaging in pilgrimage as well as scientific field trip. Hence, the significance of the scientific-pilgrimage injunction is that it has the potential to bring forth a transformation of consciousness from a rational to

a vision-logic perspective which constitutes an advancement in the evolution of what counts as knowledge. The Rocky Mountain pre-conference field trip, as a specific case of scientific-pilgrimage, illustrates one possibility of how this evolution of consciousness can manifest itself in the world of lived experience. Generalizing from this one case, scientific-pilgrimage can be seen as one avenue along which the evolution of what counts as knowledge can travel.

While the theoretical constructs upon which my hypothesis is based may appear esoteric or complicated, scientific-pilgrimage itself is neither a complex nor a sophisticated process in that it is a universal behavior engaged in by ordinary people. It is a process in which pilgrim-scientists as ordinary people are experientially and spatially separated from every day community life and exposed to unfamiliar experiences from which they can generate new and deeper understandings of their world when they return home. Like other pilgrims who have come before them, pilgrim-scientists' concerns are both of a profound and of a mundane nature. In Martin Rudwick's words,

> This quasi-sacred character of the geologist's goal is perfectly compatible with his more mundane concerns to make accurate and reliable observations, to collect adequate specimens of rocks and fossils, and so on. For in the same way the sacred character of the pilgrimage site is perfectly compatible with the simultaneous conduct of secular business, making useful contacts and just enjoying oneself: in terms of mediaeval Western pilgrimage, the Communion and the Fair were equally 'in place' within the pilgrimage experience. Indeed the route from home towards sacred site can be seen not only as a gradient of increasingly sacralized experience, but equally as a gradient of increasingly mundane character, in the sense that the pilgrim is liberated from the taken-for-granted constraints of

> his local environment, and his experience becomes progressively more cosmopolitan as he meets individuals and groups from other contrasting environments.[79]

So it was with the participants of the Rocky Mountain pre-conference field trip. And in this regard, they, as pilgrim-scientists, were no different today than the pilgrims of Chaucer's time:

> When *everyone* was making a pilgrimage, the vast crowds were not composed of burning zealots, but of ordinary human beings, who turned naturally to mirth and jollity, who relished their food and drink, who enjoyed the company of their fellows who found delight in travel.[80]

I thank them, my fellow travelers, for being who they are and for allowing me to join them.

NOTES

[1] Stake, 1978, p. 6.
[2] Rudwick, 1996, p. 150.
[3] Coleman & Elsner, 1995, p. 6.

Field Trip as Pilgrimage

[4] Turnbull, 1992.
[5] Bhardwaj & Rinschede, 1988.
[6] Bhardwaj & Rinschede, 1990.
[7] Preston, 1992, p. 4.
[8] Clift & Clift, 1996, p. 19.
[9] Clift & Clift, 1996, p. 24.
[10] Coleman & Elsner, 1995, p. 219.
[11] Coleman & Elsner, 1995; Morinis, 1992; and Turnbull, 1992.
[12] Tanaka, 1988.
[13] Morinis, 1992, p. 1.
[14] Clift & Clift, 1996, p. 83.
[15] Rudwick, 1996, p. 143.
[16] Cohen, 1992.
[17] Preston, 1992.
[18] Clift & Clift, 1996.
[19] Clift & Clift, 1996.
[20] Rudwick, 1996.
[21] Morinis, 1992.
[22] Clift & Clift, 1996.
[23] Preston, 1990.
[24] Clift & Clift, 1996.
[25] Niebuhr, 1984.
[26] Rudwick, 1996, p. 151.
[27] Turner, 1974.
[28] Clift & Clift, 1996.
[29] Gould, 1989, pp. 62-63.
[30] Gould, 1989.
[31] Gould, 1989.
[32] Morinis, 1992, p. 21.
[33] Cohen, 1992.
[34] Clift & Clift, 1996.
[35] Cohen, 1992.
[36] Cohen, 1992.
[37] Tanaka, 1988.

[38] Turner, 1974, pp. 306-307.
[39] Turner, 1974.
[40] Turner, 1974, p. 316.
[41] Morinis, 1992.
[42] Clift & Clift, 1996.
[43] Coleman & Elsner, 1995, p. 6.
[44] Clift & Clift, 1996.

An Inside View

[45] Clift & Clift, 1996.
[46] Cohen, 1992.
[47] Clift & Clift, 1996.
[48] Clift & Clift, 1996, p. 75.
[49] Turner, 1974.
[50] Clift & Clift, 1996, p. 168.
[51] Wolcott, 1987, p. 50.

Research Issues and Questions

[52] Burgess, 1985, p. 79.
[53] Measor, 1985.
[54] van Manen, 1990, p. 69.
[55] Measor, 1985, p. 62.
[56] van Manen, 1990.
[57] Yin, 1981, p. 59.
[58] Emerson et al., 1995, p. 28.
[59] Emerson et al., 1995.
[60] Emerson et al., 1995, p. 13.
[61] Wolcott, 1988, p. 202.
[62] Clift & Clift, 1996, p. 9.
[63] Bhardwaj & Rinschede, 1990, and Preston, 1990.
[64] Coleman & Elsner, 1995.
[65] Capra, 1982.
[66] Wilber, 1998.

Final Thoughts

[67] Stake, 1978.
[68] Rudwick, 1996, p. 147.
[69] Wilber, 1998, p. 6. Author's italics.
[70] Wilber, 1998.

[71] Preston, 1992, p. 39.
[72] Morinis, 1992.
[73] Tanaka, 1988, p. 21.
[74] Rudwick, 1996, p. 157.
[75] Clift & Clift, 1996.
[76] Wilber, 1998.
[77] Cohen, 1992.
[78] Wilber, 1995, 1996, 1998.
[79] Rudwick, 1996, p. 151.
[80] Muriel Bowden as cited in Turner, 1974, p. 309. Author's italics.

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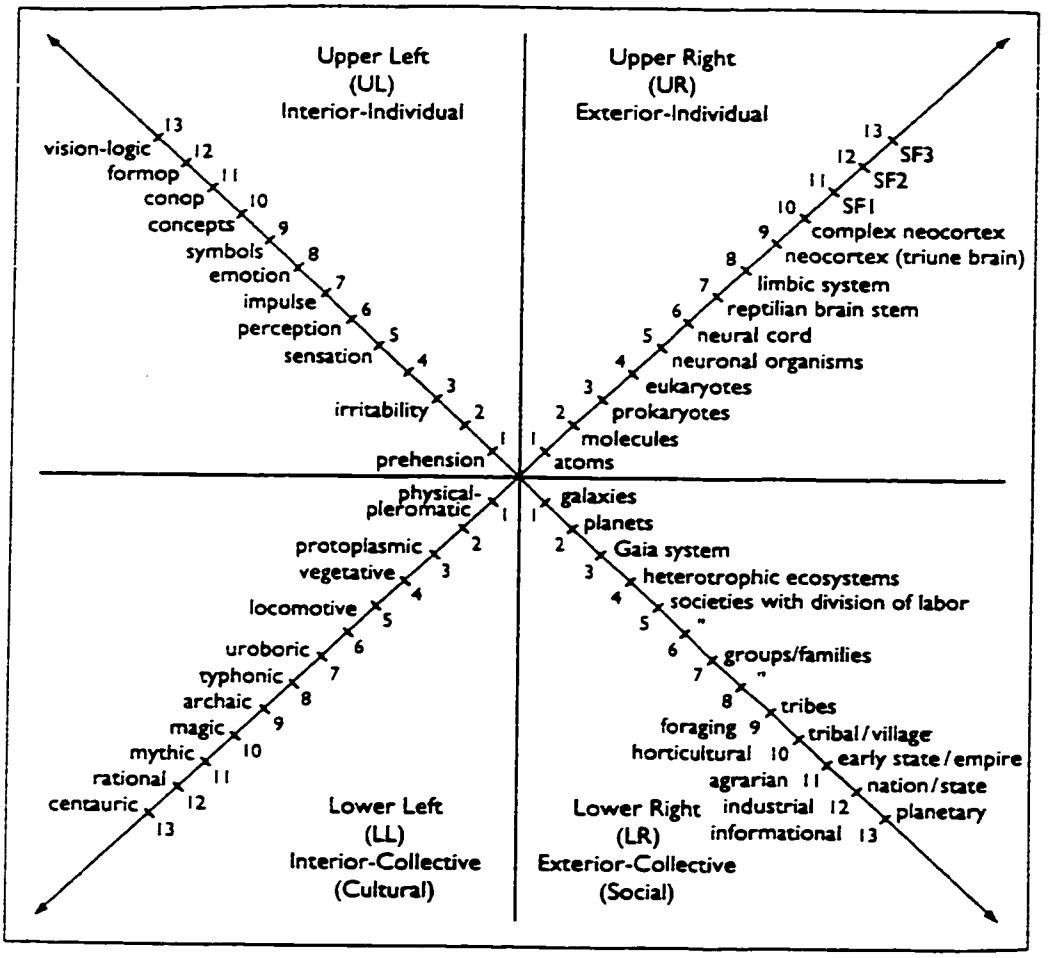
Appendix A: The Four Quadrants



from Wilber, 1996, p. 74.

Appendix B: Letter to Participants

The purpose of this letter is to inform you of a research project that I am proposing to conduct as part of my doctoral studies in education. The study, "The Process of Developing Shared Understanding of Scientific Concepts: A Case Study," is to be conducted in conjunction with this pre-conference Canadian Rocky Mountain Field Trip.

Initial consent for this project to proceed is dependent upon registrant approval. In this regard, I request that you read this letter and the accompanying "Declaration of Informed Consent: in order to gain an understanding of the nature of the project. Your decision to accept the project as part of the conference does not necessitate your participation in the research. Independent of your decision to participate in this research project, indicate to the field trip organizer by June 1st your approval for me to conduct this project as part of the conference.

Given the assumption that scientific knowledge is socially constructed through the interactions of the various members of scientific communities, the purpose of my study is to examine the interactions between scientists, science teachers, and science graduate students within the context of the conference, and to investigate how such interactions influence the development of shared-in-common understandings of scientific concepts.

This project will be conducted as a case study in which I, the researcher, will be both participant and observer throughout the field trip and the conference sessions. As a participant-observer, I will take note of those interactions relating to the project purpose, tape record participant conversations, conduct informal interviews regarding the processes used to gain shared understandings, and review any participant field notes

made available to me. While interviews will be informal and in-the-moment in nature, they will be built around understanding how participants construct knowledge. Examples of the type of questions that may be asked include, but will not be limited to, the following:

a. How have you come to understand . . . *such and such*?
b. How similar or different is *this* process of understanding to your normal process?
c. How have your prior ideas changed in light of . . . *such and such* . . . new information?
d. How have you gone about selecting and fitting new information in with previous information?
e. What connections have you made between . . . *such and such* . . . conversation and the current conversation?
f. What's important here about . . . *such and such*?

The process of data analysis will proceed as follows: I will transcribe and interpret the data collected, have the participants review those transcriptions and interpretations to ensure that they accurately reflect the participants' understandings of what occurred and to provide an opportunity for the participants to decide the extent to which personal data will be included. I will then refine my interpretations and send them back to the participants for verification and clarification.

Confidentiality and anonymity will be maintained as outlined in the enclosed "Declaration of Informed Consent."

Appendix C: Declaration of Informed Consent

This form confirms the consent of _____

(name of participant)

to participate in the research project titled "The Process of Developing Shared Understandings of Scientific Concepts: A Case Study" conducted during the pre-conference field trip.

The research will be conducted by Jim Force under the supervision of Dr. Garth Benson of the Graduate Division of Educational Research at the University of Calgary.

The purpose of this study is to examine the social interactions within a scientific community that influence the development of shared-in-common meanings of scientific concepts.

I have been informed via the attached information letter about the purpose and methodology of this research project and the nature of my involvement.

I understand and agree that:

a. My participation is voluntary and I have the right to withdraw from any or all aspects of this research at any time without consequence to my participation in other aspects of the field trip.

b. I will be informed of any tape recording of my conversations with the researcher or with my colleagues prior to each and every such conversation.

c. All data collected as part of this project will be kept in a secure place inaccessible to others.

d. Disposition of data will be carried out in the following manner: papers shredded and tapes erased when the project is completed or within 5 years.

e. Confidentiality and anonymity will be assured in the following manner:

- access to all raw data will be limited to the researcher and supervising professors
- individual identities will remain anonymous and will be presented in the form of pseudonyms and/or category, i.e. scientist, teacher, student
- conference identity will be presented as "an international science conference held in Canada"

f. Participants will be able to read the research report in the following manner:

- review transcripts of pertinent tape recordings
- review drafts of pertinent section, chapter or report
- as a final published work

g. The results of this research project will be used for professional and educational publications and presentations.

A duplicate copy of this consent form is provided for your records.

I have read the consent form and I understand the nature of the project and my involvement.

I agree to participate within the above stated parameters.

Name: _____

Signature: _____

Date: _____

Please return a copy of the signed form by July 1st to Jim Force.

Appendix D: Van Seating Arrangements

15 August 1997

am: luggage van		am: passenger van			
Tolsoe	Mongryong	unrecorded			front
Jim	Jerry				back

pm: luggage van		pm: passenger van			
Tolsoe	Mongryong	Carl		Paul	front
Hans	Jerry	Andy		Phelim	
		Levi		Martin	
		Janet	Jim	Kildong	
		Sam	Henry	Patrick	back

16 August 1997

luggage van	passenger van			
order unknown	Carl		Janet	front
Tolsoe (driver)	Levi		Martin	
Paul, Mongryong, Andy,	Sam		Kildong	
Hans, Jerry, Phelim	Patrick	Henry	Jim	back

17 August 1997

unrecorded

18 August 1997

luggage van			passenger van			
Tolsoe	Paul		Carl		Hans	front
Jerry	Mongryong	Andy	Sam	Jim	Phelim	
			Martin		Levi	
			Kildong		Janet	
			Henry		Patrick	back

19 August 1997

unrecorded

20 August 1997

luggage van		passenger van		
Tolsoe	Mongryong	Carl	Hans	front
Andy	Jerry	Sam	Phelim	
		Martin	Levi	
		Janet	Kildong	
		Henry	Jim	back

Appendix E: Accommodation Roommates

15 August 1997: David Thompson Inn

Carl - Paul
Patrick - Jerry
Henry - Sam
Jim - Martin
Andy - Phelim
Tolsoe - Hans
Kildong - Mongryong
Janet
Levi

16-17 August 1997: Lake Louise Hostel

Kildong - Mongryong - Tolsoe - Jim
Janet - Hans - Jerry - Henry
Phelim - Sam - Patrick
Carl - Paul - Martin - Andy
Levi stayed at a near-by hotel

18 August 1997: Cranbrook, B.C.

Sam - Hans
Jerry - Patrick
Martin - Andy
Henry - Jim
Kildong - Mongryong - Tolsoe
All others roomed by themselves

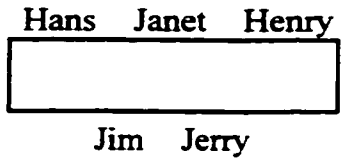
19 August 1997: Drumheller, AB

Martin - Andy
Jim - Henry
Kildong - Mongryong
Tolsoe - Phelim
Jerry - Sam
Janet
Levi
Carl
Hans
Paul and Patrick had returned home

Appendix F: Seating Arrangements During Meals

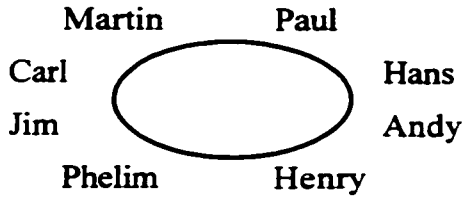
17 August 1997

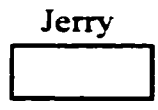
Dinner Interview at Lake Louise Hostel Restaurant:



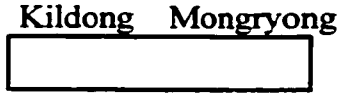
19 August 1997

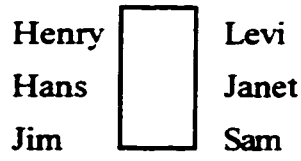
Breakfast at the donut shop in Cranbrook:

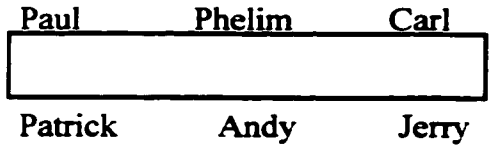




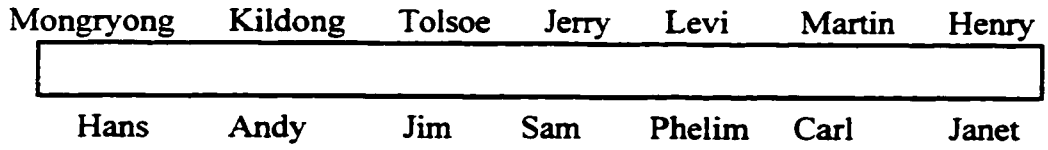
Lunch at the Subway:





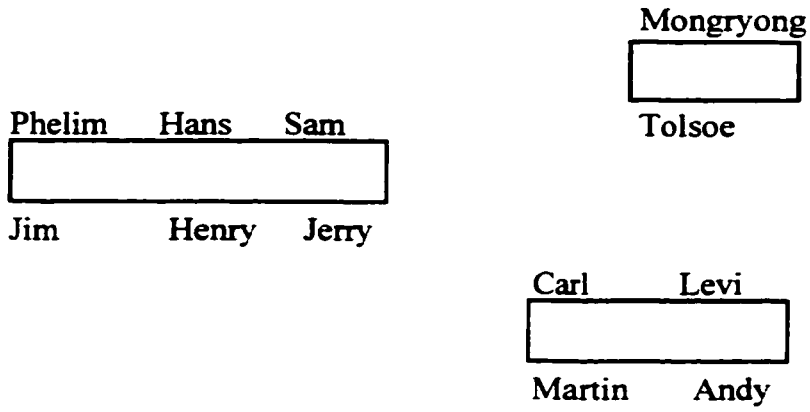


Dinner at Earl's in Calgary:

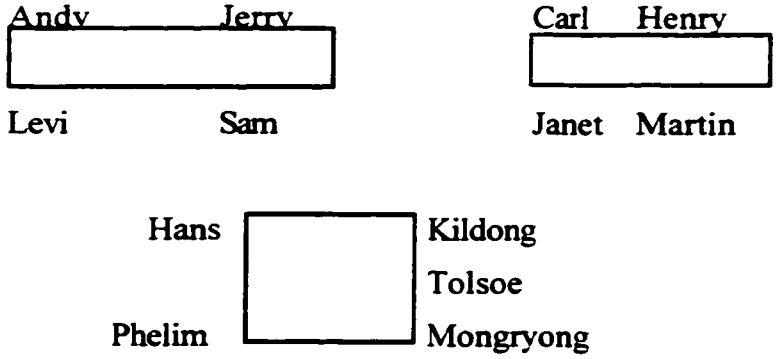


20 August 1997

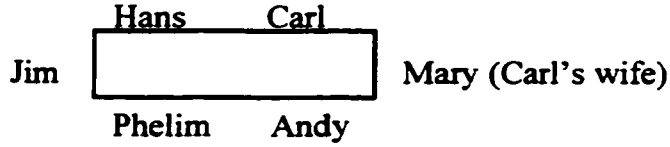
Breakfast in Drumheller:



Lunch at Subway in Stettler:



Coffee at Carl's:



Appendix G: Summary of Appendices D, E, and F

Based on the data collected, the following table indicates who each participant, on at least one occasion during the course of the field trip, shared a seat in the van with (from Appendix D), shared a room with (from Appendix E) or shared a meal with (from Appendix F).

	Shared a seat in the Van with	**Shared a Room with**	**Shared a Meal with**	**Total**
Andy	Jerry,Phelim, Mongryong	Phelim, Carl, Paul, Martin	Hans, Paul, Henry, Tolsoe, Jim, Jerry, Martin, Phelim, Patrick, Kildong, Mongryong, Carl Levi, Sam	14 / 15 93%
Carl	Paul, Janet, Hans,	Paul, Martin, Andy	Martin, Jim, Phelim, Paul, Henry, Andy, Hans, Jerry, Patrick, Janet, Levi	11 / 15 73%
Hans	Carl, Jerry	Tolsoe, Janet, Jerry, Henry, Sam	Janet, Henry, Jerry, Jim, Andy, Phelim, Carl, Martin, Paul, Sam, Levi, Kildong, Mongryong, Tolsoe	14 / 15 93%
Henry	Patrick, Sam, Jim	Janet, Hans, Jerry Sam, Jim	Hans, Janet, Jerry, Jim, Phelim, Martin, Carl, Paul, Andy, Levi, Sam,	12 / 15 80%
Janet	Carl, Jim, Kildong	Hans, Henry, Jerry	Henry, Hans, Jerry, Jim, Levi, Sam, Carl, Martin	9 / 15 60%
Jerry	Andy, Jim, Hans Mongryong,	Hans, Henry, Janet Patrick, Sam	Henry, Hans, Janet, Jim, Patrick, Phelim, Andy, Paul, Carl, Sam, Levi, Tolsoe	13 / 15 87%

	Shared a seat in the Van with	Shared a Room with	Shared a Meal with	Total
Jim	Janet, Jerry, Phelim Kildong, Sam, Henry	Henry, Martin, Kildong, Tolsoe, Mongryong	Hans, Jerry, Janet, Henry, Carl, Paul, Phelim, Martin, Andy, Sam, Levi, Kildong, Tolsoe, Mongryong	14 / 15 93%
Kildong	Janet, Jim, Sam	Jim, Mongryong, Tolsoe,	Mongryong, Hans, Tolsoe, Jim, Andy, Phelim	8 / 15 53%
Levi	Martin,	----------	Henry, Hans, Sam, Janet, Jim, Jerry, Phelim, Martin, Carl, Andy	10 / 15 67%
Martin	Levi,	Carl, Paul, Andy, Jim	Paul, Hans, Henry, Andy, Phelim, Jim, Carl, Levi, Janet	9 / 15 60%
Mongryong	Andy, Jerry, Tolsoe	Jim, Tolsoe, Kildong	Kildong, Tolsoe, Hans, Andy, Jim Phelim	7 / 15 47%
Patrick	Henry,	Jerry, Sam, Phelim	Jerry, Paul, Phelim, Andy, Carl	7 / 15 47%
Paul	Carl, Tolsoe	Carl, Andy, Martin	Hans, Andy, Jim, Phelim, Henry, Carl, Martin Patrick, Jerry	10 / 15 67%
Phelim	Andy, Jim, Sam	Andy, Patrick, Sam Tolsoe	Jim, Carl,Martin, Paul, Hans, Henry, Andy, Patrick, Sam Jerry, Levi, Tolsoe, Mongryong, Kildong	14 / 15 93%

	Shared a seat in the Van with	Shared a Room with	Shared a Meal with	Total
Sam	Henry, Jim, Kildong, Phelim	Hans, Henry, Jerry Patrick, Phelim	Henry, Hans, Jim, Levi, Janet, Jerry, Phelim, Tolsoe, Andy	11 / 15 73%
Tolsoe	Mongryong, Paul	Hans, Mongryong, Kildong, Jim, Phelim	Mongryong, Jim, Kildong, Jerry, Andy, Sam, Hans, Phelim	9 / 15 60%