Inaugural Essay:

"The Definition and Relevance of Astrosociology in the Twenty-First Century"

(Part Two: Relevance of Astrosociology as a New Subfield of Sociology) [1, 2]

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by

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Introduction: Addressing Two Fundamental Issues

This essay as a whole, considering *Part One* and *Part Two* together, provides a small glimpse of the potential of astrosociology as a new subfield of sociology. As the first comprehensive treatment of this subfield, it is not possible to foresee all topics or predict which directions it will take in the future. This essay can only offer cursory treatments of areas predicted to be important under the purview of astrosociology. Therefore, while the areas covered here do not represent an entire listing of all possible issues, they do indicate a good initial overview of the *types* of issues argued to be astrosociological.

Before moving on to address the various issues supportive of the basic argument that astrosociology is indeed a relevant new subfield, it is important to restate (1) the

meaning of a fundamental concept and (2) the importance of an organized sociological approach. The following section presents moderately brief introductions to specific astrosociological areas of concentration. Three areas receive the greatest attention while several others merit reference as additional important elements of a list. The final section offers a concluding argument in favor of the relevancy of astrosociology in the twenty-first century and the consequential need to develop it as a new subdiscipline.

Further Clarification of a Vital Definition. It is important to clarify the meaning of a fundamental concept due to its vital role in placing boundaries around the types of social and cultural patterns appropriately falling under the purview of astrosociology. A proper definition of this concept remains vital for a basic understanding of how astrosociology ties all similar social phenomena together. Currently, the discipline of sociology tends to consider the various elements covered by this proposed single substantive area as disconnected topics of study; certainly not viewed as elements of a single subfield.

The concept in question is ***astrosocial phenomena***. It relates to all types of associations, either direct or indirect, between social or cultural patterns and space (beyond Earth). The link between space and society is the key to the definition of *astrosocial phenomena*. Any other expression associated with the root term, *astrosocial*, refines the focus of an astrosocial phenomenon in a specific way; and it thereby reflects a more precise topic or issue. Examples include *astrosocial group*, *astrosocial education*, and *astrosocial sector*.

Astrosocial phenomena comprise a subset of all *social* phenomena that embody the very heart of sociological inquiry. Again, astrosocial phenomena relate to human social patterns characterized by some type of a relationship to space. Examples include conducting space science (e.g., astronomy, SETI, astrobiology), spaceflight operations, planetary geology, and robotic missions to other bodies in space. Astrosocial phenomena also include engineers and scholars working on projects related to the space program within the aerospace industry. In contrast, non-astrosocial phenomena consist of social phenomena unrelated to the space within a particular society.

No reason exists to redefine other well-accepted terms associated with space. Examples include space law, space policy, space program, spaceflight, and space science. As explained above, however, all such social phenomena represent astrosocial phenomena; and therefore, they fall within the proposed scope of astrosociology.

The distinction between non-astrosocial and astrosocial phenomena is vital to give astrosociology its unique focus. Moreover, the two subcategories of social phenomena possess a relationship to one another. Indeed, recognition of the connection between these two dimensions of social life remains an ongoing concern in order to determine the effects of astrosocial phenomena on parts of a given society not related to space. Otherwise, how is it possible to determine the specific effects of astrosocial phenomena? In the reverse direction, it remains important to understand how non-astrosocial phenomena affect various aspects of the space program, including

its focus, direction, and relevance in society. The overall astrosociological approach includes both considerations.

The significance of astrosocial phenomena is further demonstrated when comparing it to non-astrosocial phenomenon, such as what may be termed ***space phenomena***. When considering space phenomena, the focus is on characteristics of the physical properties of objects and processes in space *without human interaction*. As such, space phenomena are not inherently social phenomena and thus not astrosocial phenomena. Space phenomena remain important, of course. However, they are not the specific focus of astrosociology unless a particular space phenomenon becomes linked to human beings in some way. For example, an asteroid on a collision course with Earth is, by itself, a space phenomenon. However, when discovered by human beings, studied, and perhaps even redirected off its collision course, each of these social patterns represents an astrosocial phenomenon. Astrosocial phenomena, in this context, refer to humans interacting with one another as they relate in some way with space phenomena. Thus, there is an important relationship between astrosocial phenomena and non-social phenomena reflecting, in part, how humans conduct space sciences and where their efforts fit in the overall social structure and culture of a particular society.

Thus, astrosociology places a strong emphasis upon the scrutiny of *human involvement* in space and the effects this involvement has on society. Furthermore, astrosociology is only partially interested in space scientists making discoveries, sending robotic probes to the planets, or astronauts going into space. It is also

dedicated to understanding how these behaviors impact upon society in terms of social change and cultural change, and how such changes transform social systems into the future. The overall character of a particular society represents an important focus, then – but so do its various components including the attributes of social interactions, subcultures, social groups, and institutions (analyzed from both a cross-sectional and a longitudinal perspective).

Bringing Sociology In. The rationale for this two-part essay is to demonstrate the overdue nature of applying the sociological perspective to the examination of (1) astrosocial phenomena and (2) the interrelationships between astrosocial phenomena and other facets of a specific society. Bringing sociology into this area of inquiry is largely unrealized despite the irrefutably significant effects of astrosocial phenomena. Therefore, the application of the *sociological imagination* (Mills, 1959) to understanding the relationship between the typical citizen and astrosocial phenomena remains vital due to its ongoing, and arguably increasing, relevance. Presently, the implications of astrosocial phenomena for the individual at the micro and middle levels of social reality are largely unexplored even as they remain critical to understand.

The promise of sociology resides in its potential capacity to recognize the connections between individuals and both the social structures and the cultural communities comprising their society (Mills, 1959). This fundamental application of the sociological imagination seems obvious when considering the historical development of the discipline, and its attention to “normal” social phenomena. However, the ongoing

failure to apply the sociological imagination to an understanding of astrosocial phenomena demands special consideration of astrosociological issues. Modern human activities in space and related to space, characterizing the *space age*, have been taking place since the 1950s, yet their impact on society over the years is largely unknown due to a significant level of sociological indifference and perhaps even a certain level of contempt. The establishment of astrosociology serves to end this failure.

Typical members of space capable societies know of the existence of their space program, remain updated about many of its successes and failures, and even support it on a general level. However, most of them do not see how it affects their everyday lives or living conditions, or what they can do to contribute to changes in space policy. Sociologists are only modestly more enlightened. Thus, even most sociologists are not in strong possession of the *sociological* imagination as it relates to astrosocial phenomena.

How else can one explain the absence of astrosociology or something like it? As an adjunct, where is the astrosociological literature? The "selected bibliography" section of *Part Two* of this essay includes references that analyze space issues from the perspectives of other disciplines and occupations, though very few from the sociological perspective. However, this indifference is not a universal attribute characteristic of all sociologists. B.J. Bluth (1983), for example, advocated the study of space issues from a sociological perspective long ago. Bainbridge (1991) made an important observation about sociology's indifference. Part of his argument involved the recognition that in the face of a substantial interest in space on a societal scale (among

citizens and space scientists), sociologists are less well prepared to deal with it compared to the scientists in the so-called "hard sciences." Rudoff (1996:75), in considering the importance of astrosocial issues, asked a simple though very revealing question: "And where is sociology?" A simple conclusion thus presents itself. Bluth, Bainbridge, Rudoff, along with Tough (1998) and many others, have long recognized the potential value of the "sociology of space" to the discipline and to society. Proponents of astrosociology continue to marvel at its absence in the face of this untapped potential.

In one attempt to change these circumstances, a group of ASA members attempted to create a new section on "exo-sociology" a few years ago without success.[3] While this subdiscipline is renamed based on reasons explained in *Part One* of this essay (Pass 2004), the focus of astrosociology is much the same as called for by others in the past. Indeed, while success for the current effort represents a difficult challenge, the rationale for it is well established.

Historically, many areas of social life benefitted from the application of the sociological imagination. However, a central theme of this essay relates to the ongoing failure of applying the sociological imagination to astrosocial (social) structures, or to the ideas and values constituting the astrosocial subcultures, which exist within the astrosocial sector. While sociology possesses a strong tradition of studying *social* space, the same remains untrue about studying human behavior in *outer* space. In summary, then, the issues falling under the purview of astrosociology have not benefited from the invocation of the sociological imagination in a consistent, systematic

manner. As such, the influences of astrosocial phenomena on individuals, subcultures, and social structures – as well as influences in the reverse direction – remain largely unknown despite the fact that they have influenced industrial and post-industrial societies since the beginning of the space age.

It is best to view sociological inattention to astrosociological issues in relative terms. Individual studies do indeed focus on NASA's subculture, safety, or on various elements of the space program. In fact, however, these efforts are uncommon in mainstream sociology. Moreover, sociological works touching on various astrosociological issues become lost, not only among the ever-growing volume of sociological works, but also among the greater quantity of non-sociological and unscientific approaches. In contrast, the other social sciences, particularly social anthropology and psychology, remain far ahead of sociology in terms of their focus on *interpersonal relationships* related to space (Harrison 2001). History and journalism address astrosociological issues much more frequently as well.

The issues related directly to astrosociology constitute a wide-ranging set of areas of concentration purely by themselves (Pass 2004). This recognition is necessary to allow for the possibility of organizing all of these areas in a purposeful manner as various aspects of a single sociological subfield called *astrosociology*, rather than allowing the status quo to continue in which they remain as "unrelated" approaches. As there is no obvious coordinated effort to build a single unified literature, this essay represents a starting point intended to emphasize an area of social life historically ignored, or at least undervalued, by sociology for far too long.

The fact that sociologists have yet to establish a specific astrosociological literature comprising a single subfield is unlikely a reflection upon the importance or relevance of astrosociological issues. Arguably, the absence of astrosociology is due in large measure to the momentum of indifference carried forth within the discipline year after year. Whether biases exist against the study of astrosocial phenomena, or it does reflect a simple historical indifference, or even some sort of combination of both, such conditions serve to counteract the establishment of astrosociology. Overcoming such a social reality requires challenging the status quo in an overt and forceful manner. To do so, one must demonstrate its merits as a substantive area and its positive impact on the discipline in order to ensure its acceptance and allow for progress thereafter.

Because so little research exists from a sociological perspective, the number of possible topics of study, including historical analyses of the space age itself, remains wide open. As such, those who choose to pursue astrosociology can follow their interests with the certainty of providing unique contributions to the subfield as well as to the discipline that continues to ignore it. Meanwhile, this potential to produce unpredictable, yet groundbreaking findings awaits fulfillment.

Astrosociology: Reviewing Major Areas of Concentration

Astrosociology, as proposed here, is the sociological study of astrosocial phenomena at its core. An understanding of astrosocial phenomena, while vitally

important in itself, also provides the capability of comparing them to other social phenomena as well as allowing recognition of their interactive effects. *Figure One* found in *Part One* of this essay (Pass, 2004), depicting what may be considered the first iteration of the *General Model*, reflects this as one of the two important elements that tie this discussion together. The other major element, related to the general model, consists of the five themes of astrosociology. The five themes, when considered together, comprise the initial astrosociological framework in conjunction with the *General Model*.

It is important to reiterate that the discussions of critical astrosociological issues to follow serve to demonstrate their relevance to human societies and consequently to the discipline of sociology. The overall discussion represents more of a framework than anything approaching a comprehensive treatment of this proposed substantive area. The purpose is to provide a general orientation from which astrosociological theory and research can proceed in the future.

Astrosocial Phenomena and Culture. In the *General Model*, the culture plays a crucial part in determining overall change in a particular society. The culture reflects the relative importance of astrosocial phenomena at any given point in time, and thus shifting cultural patterns contribute to re-shape the character of astrosocial phenomena into the future. Cultural patterns at all levels of social reality command ongoing attention as they all contribute to this change.

The organization of this brief discussion revolves around Bierstedt's (1970) three

major dimensions of culture (i.e., values and other types of ideas, norms, and material culture) as they directly relate to astrosocial phenomena. Together, these elements strongly influence the character and direction of a particular society in conjunction with its social structures. In this context, the culture consists of social patterns that both favor and disfavor astrosocial phenomena. Accordingly, an ongoing assessment of how various subcultures, as well as the public at large, regard space issues contributes to the determination if a particular society is moving toward a greater or lesser level of integration of astrosocial phenomena into everyday social life.

In general, ideas expressing the lure of, and a connection to, the cosmos become important components of the cultures of all societies. Upon looking into the night sky, certain questions inevitably arise. Who are we? Where did we come from? How do we fit in the overall scheme of things? What is out there? Is there life beyond Earth? Should we go into space to find out? How much risk is acceptable versus intolerable? Is there a limit to "acceptable" loses of equipment and especially human lives? How much of a priority is the exploration of space? The answers to such questions define whether a culture is closer to an *Earthcentric* or what may be termed *spacecentric*. In the United States, for example, a potentially tenuous foundation of public support (68%) currently exists in a strongly Earthcentric environment as demonstrated once again in the July 2004 Gallup Poll (Carlson 2004). An important focus of astrosociological research involves the continual assessment of where a society falls along this continuum between these two extremes. A particular society answers these questions in its own unique ways as it moves through history.

Astrosociologists should focus on the types of values and general ideas that both favor and disfavor astrosocial phenomena, in addition to the value conflict generated. As one example, how do the distinctive values of various religious groups influence a society's movement toward, or away from, greater adoption of space activities? What is the nature of value conflict among religious groups? How would the various religious groups react to the discovery of extraterrestrial life and how would this affect their dogmas? As a second example, how strongly do economic values contribute to the level of astrosocial phenomena as corporations pursue profits? Third, should we solve Earth-bound social problems, such as poverty and terrorism, before spending resources devoted to pursuing the exploration of space? Value conflict is inevitable in any complex society, and consequently its changing dynamics require an ongoing assessment of both endogenous and exogenous forces that contribute to it.

A society's norms support and protect values. If astrosocial phenomena are unimportant or underdeveloped, the norms regulating them tend to be absent or weak. Resistive rules may even exist. Supportive policies and even laws develop as astrosocial phenomena become more widespread. For example, when corporations determine that space operations can increase their dwindling levels of profits, they will lobby for the formalization of social norms consistent with this pursuit. A contemporary example of this may soon play out in the area of space tourism with Virgin Galactic suborbital flights.[4] Consequently, the development of health and safety regulations for the infant space tourism industry becomes a new priority as this new set of astrosocial phenomena begin to affect other institutions and groups.

When considering the culture of a particular society, its material culture should demand substantial attention. Indeed, its importance lies in the fact that it reflects the culture in physical form. In the context of astrosociology, the material culture consists of the physical manifestations of the social patterns related to human involvement in space, currently mostly a reflection of the state's space program. Current examples include spaceports, rockets, space shuttles, a space station, robotic probes, formal space laws and space policies, and spacesuits. In the future, new examples will likely include Moon and Mars bases, a truly private commercialization of space, space tourism including space hotels, and long-duration spacecraft. Based on relevant social values, the rules for the use of these various physical cultural elements regulate behavior in the astrosocial sector. An ongoing evaluation of the material culture specifically dedicated to astrosocial phenomena represents an important measure of its relative importance and influence within a particular society. Astrosociologists should watch for the growth and influence of space law and space policy, as well as the construction of new space infrastructure in the material culture.

If a society is to move to the spacefaring phase of subsistence, cultural elements must support it. Commonly shared norms and values strongly supporting astrosocial phenomena, within both the astrosocial and non-astrosocial sectors, can forge strong connections to various subcultures and social structures that encourage the establishment of a higher level of commitment to space. On the other hand, an absence of strong norms and values favorable to astrosocial phenomena, or indifference, result in a space program and future in space characterized by much less

integration within the overall social system. Astrosociological research dedicated to the relationship between a society's culture and the relative extent of human activities in space represents an important area of concentration on a longitudinal basis. In any society, culture, in conjunction with its social structures, combine in a complex interactive manner to shape a society's future direction and character.

Finally, two areas related to culture require attention. The first is science fiction and its impact on culture and other aspects of a society. Science fiction is a literature of change (Landon 1995) and thus affects ideas in the general culture as well as in the sciences. Its relationship to astrosocial phenomena continues to represent an important consideration. The second area is the more controversial category of cultural ideas related to alien life allegedly already on Earth (including UFOs, and topics such as alien abductions, cattle mutilations, and crop circles).[5] A critical distinction exists between astrobiology (including SETI) and present-day claims of alien detection on Earth, as only the former belong to the mainstream space sciences. Determining the authenticity of claims of contact with alien life on Earth lies outside the scope of astrosociological research. However, these ideas exist in the culture to an extensive extent. Consequently, their connection to astrosocial phenomena on that basis may be cause for further exploration.

Considering a Spacefaring Future. While the *General Model* does not directly predict a spacefaring future, the model does imply such an outcome as a strong possibility based on the growth and influence of the astrosocial sector. As a contrast, a ***space capable society*** is defined here as one that can reach space on its own accord

(e.g., the United States, Russia, Japan, France, China, and the ESA as a consortium of nations). However, a *space capable* society is not necessarily a ***spacefaring* society**. The latter represents a significant hypothetical outcome worthy as a major area of concentration under the scope of this new subfield.

Astrosociologists should be careful in their use of the concept *spacefaring society*, refraining from the further application of this term to space capable societies. This distinction has no bearing on the terms *spacefaring* and *spacefarer* when used to reflect going into space in general terms and humans exploring space (e.g., astronauts, cosmonauts), respectively. However, if a high level of confusion is generated, it should trigger a reassessment of this position. In contrast, all social scientists should reserve the label of *spacefaring society* for properly characterizing the transformation of an entire social system that reaches a threshold in which a specific set of social and cultural conditions exist.

Why recommend this approach? Consider the rough comparison of a contemporary space-capable nation's level of space exploration to that of a European nation at a similar stage of sea exploration (long preceding its glory days of discovery). Such a nation would be floating in slow leaky boats near the shoreline where it is relatively safe and assistance remains readily available.[6] It is not a seafaring society because its crude technologies, inadequate resources, and underdeveloped sailing skills make it extremely hazardous to move further out into the vast unknown oceans. Until substantially improving such conditions, land-based social phenomena dominate everyday life. Similarly, space capable societies possess only a rudimentary space

exploration capability. Earth-based social phenomena dominate as the hazards of space travel currently overwhelm our abilities to move very far away from *our* shores (i.e., the Earth).

If a spacefaring society is one of the possible outcomes of socioeconomic organization for a particular post-industrial, then it is important to understand the social forces and conditions that both contribute to this outcome and those that provide countervailing pressures against it. Benefits of astrosocial phenomena to space capable societies are well documented elsewhere as *spinoffs*,[7] technology transfers, and applicable findings from NASA research programs (see, for example, Harrison 2001; Hardersen 1997; Lewis 1997). Although not currently recognized perhaps by most citizens, leaders of post-industrial societies will potentially recognize such advantages, especially as the Earth's finite resources become exhausted.

Conversely, countervailing pressures include numerous possibilities such as political turmoil, simple neglect of space issues, anthropocentrism resulting in deliberate isolation, and chaos due to a variety of social forces. A space capable society would have to avoid tragic negative trends that could result in a dystopia in which all major areas of social life became harsh and spacefaring objectives became unimportant compared to survival objectives.[8] Overwhelming social problems could escalate to levels capable of derailing a society's course toward a spacefaring future. Astrosocial phenomena would become relatively unimportant under these circumstances. Astrosociologists must study the social conditions and forces contributing to a spacefaring future as well as those delaying or even denying such a future.

Despite various social forces that may operate against its development, the spacefaring *mode of production* (Marx and Engels 1976) – or more generally, the spacefaring *mode of subsistence* – remains a serious possibility for the *moderate to distant* future. Hence, construction of a new model is required to characterize the stages of development along a continuum starting from the simplest societies (Earthcentric forms) to an end point characterized by one or more categories of spacefaring societies (spacecentric forms). Additionally, potential alternative outcomes deserve strong consideration. Such a model could also focus mainly on the dimension of *astrosocial phenomena* in single society over time in terms of its own changing characteristics in addition to its relationships to other cultural and social structures. This type of exercise not only allows for the determination of astrosocial development in the past and during the present (on a short scale), but it also permits an extrapolation of changes into the future.

Of more immediate concern, however, is the development of the definition of *spacefaring society* as a concept that is acceptable within the astrosociological community. Such a task deserves greater attention than can be provided here. Even so, general parameters provide an initial insight that a spacefaring society possesses a fundamental character different from anything witnessed in the past. That is, a unique set of social conditions typify a spacefaring society. Every major institution is highly involved in some way with carrying out space policy as a high priority, and thus space law is well developed. A space-based economy flourishes, for example. Astrosocial phenomena are highly pervasive and vital for the society's survival. Space issues are

intertwined in a multitude of ways into the everyday social interactions taking place in subcultures, social groups, organizations, and institutions. The larger culture reflects the importance of astrosocial phenomena through their incorporation as highly important values, strong norms protecting them, and their omnipresence in a space-dominated material culture. With that said, it is important to emphasize that a *spacefaring* society is not equivalent to a *utopian* society. For example, military or corporate authoritarian regimes are potentially compatible with a spacefaring infrastructure.

Even the most sophisticated contemporary space programs, capable of sending its spacefarers only to low Earth orbit on a sustained basis, possess only the crudest social conditions necessary for their long-term transformation into a spacefaring society. Such a space program remains characterized by too much compartmentalization within its society to consider it a spacefaring infrastructure. A spacefaring society consists of a much broader expansion of this infrastructure in the private sector; and, in fact, all parts of that society and its culture.

Still, the establishment of a spacefaring society is indeed one of the likely hypothetical outcomes that may occur. Any particular post-industrial society has the seeds of its transformation into a spacefaring society embedded into its overall social structure. Much has to occur for this transformation to develop as described. Moreover, the long course toward a spacefaring society is unlikely to be smooth or straightforward; or even certain.

One final question deserves contemplation when addressing a possible

spacefaring future. Is it likely that human activities in space will increase in terms of importance and scope? Although it is a simple question, the answer to it has important ramifications for both society and sociology. An affirmative reply to this question alone speaks to the relevance of astrosociology and its necessity as a new subfield. Even a negative reply would merit more sociological attention than is currently the case. It is important to study the decline of human involvement in space and the probable cyclical patterns, just as it is important to study its increase. Although a spacefaring future remains only a distant possibility, and by no means a certainty, it warrants study so recognition of changing social patterns related to astrosocial phenomena are neither missed nor misinterpreted.

A large measure of astrosociology's relevance lies in the understanding of the changing nature of societies and how part of that change is traceable to astrosocial phenomena. Working in space and exploring its properties remain unarguably expensive. However, the benefits of knowledge, inspiration, and economic returns are difficult to duplicate by other means in the long term. Thus, the possibility of a spacefaring future exemplifies a rational extrapolation of past and current conditions rather than a "far out" dream.

The Social Impact of the Space Sciences. Fundamental to the general astrosociological approach is the direct examination of how the space sciences affect a particular society. The study of space phenomena, including the Earth from space, represents something greater than simply the immediate focus on the findings of a

given project. That is, while seemingly non-sociological on the surface, incorporated into the study of space phenomena are social (including cultural) implications for human beings, their social groups, and their societies. Thus, human scientific activities related to space, an important category of astrosocial phenomena, are of central importance and worthy of deliberate scrutiny. Scientific discoveries do not represent primary concerns in themselves. Astrosociology does involve the study of how space scientists make discoveries in the course of conducting their research and developing their theories, but more important is how these very efforts affect the various elements of human societies and contribute to change.

In fact, however, the relationship between astrosociology and the space sciences is twofold based on the two-way interactions between astrosocial and non-astrosocial phenomena on a more general level. The reciprocal influences involve: (1) the impact of the space sciences on society based both on their promises and their deliveries of scientific findings and technical innovations and (2) the effects in the reverse direction in which private and public support (and other non-astrosocial forces) shape the character and direction of the space sciences. Anything relevant to any particular society, perhaps especially to a space capable society, is relevant to sociology as well, even as the discipline currently fails to recognize it. As such, the growing significance of the space sciences is yet another indication of astrosociology's increasing relevance as we venture further into the twenty-first century.

Science and technology are necessary for the development of industrial and post-industrial societies into more sophisticated socioeconomic forms. This reality

continues when moving beyond the post-industrial mode of production, potentially toward a spacefaring future. In such a scenario, the focus of scientific and technological efforts turns increasingly away from the Earth and toward the cosmos. The branch of space medicine is an example of a traditional discipline expanding to incorporate space issues. An increased shift from the terrestrial sciences to the space sciences is due in part to the various types of incentives that space promises.

The wonders of science and the comforts of technology provide important additional reasons to continue along this course. Moreover, the discoveries of astronomical research can be inspiring to the public as well as to the scientific community. Positive public responses to Mars missions such as Pathfinder and the Mars Rovers, quantifiable as huge increases of visitors to NASA websites, attest to the public's perception of the space sciences as significant contributions to their disciplines and to their society. Consider the public outcry when NASA announced its plan to decommission the Hubble Space Telescope. Based on the public's reaction (along with advocacy groups and space scientists), NASA was pressured into considering a robotic rescue mission.

Two related branches of science serve as good examples of how the astrosociological perspective is relevant in the twenty-first century. The relatively new branch of astrobiology focuses on the search for life beyond the Earth. The discovery of alien life, whether intelligent or not, would represent a great scientific accomplishment from biological and astronomical standpoints. Furthermore, it would also exhibit extremely important social ramifications (Tough 1998). Even the potential

of finding evidence of past life on Mars continues to fascinate the public. The MER rovers are simply searching for evidence of past surface water on Mars, and not directly for life, yet public interest remains high due to the relationship between water and even the *possibility* of life.

The Search for Extraterrestrial Intelligence (SETI), essentially on its own until adopted by astrobiology, also receives considerable support from the public. The fact that over five million users participate in *SETI@home*[9] demonstrates a solid level of public interest in astrosociological issues. SETI research has also resulted in collaboration between space scientists and humanists (including many social scientists), which is an important development considering neither category of scientists traditionally trusts the other (Harrison 1997). Such interdisciplinary collaboration is vital for a greater understanding of SETI and all astrosociological issues. Accordingly, Harrison et al. (1998) provide encouragement and strategies for social scientists to develop a larger role in SETI research.

Recognition of the social implications of the successful detection of a signal by a SETI project resulted in the creation of a *Declaration of Principles* (*Acta Astronautica* 1990) to verify and react to a claim of detection in an organized manner. Its organized approach partially seeks to avoid monumental announcement errors due to false detections and even potential panics among populations around the world. A successful detection of ET life, especially intelligent life, would undoubtedly transform human societies (see, for example, Vakoch and Lee 2000; Tough 1998; Harrison 1997). Discovering that we are not alone in the universe is one thing; but learning that

we are not the most intelligent creatures is something else. The latter situation shatters any justification of anthropocentrism, indeed Earthcentrism, and requires innumerable psychological and social adaptations. Thus, sociology must place itself in the position to study such an event based on familiarity and not simply as a blind reaction.

Therefore, beyond the obvious biological and astronomical implications, additional consequences exist that are of a social, and thus astrosocial, nature. Astrosocial phenomena related to the possible discovery of extraterrestrial life bring sociology even more firmly into realm of space. Among other concerns, there are cultural (Tough 1998) and religious (Vakoch 2000) issues related to finding life in the cosmos. The search itself, even without success, possesses astrosociological relevance due to its ongoing effects on social patterns. The fact that so many people *believe* that extraterrestrial life exists, in itself, creates social consequences. While this example deals specifically with extraterrestrial life, all work conducted by space scientists involves *social* repercussions beyond its specific focus on the study of space phenomena.

The long-term possibility of the establishment of a spacefaring society can only come about by contending with contemporary societal realities. That is, the transformation into a spacefaring society, while certainly possible, remains dependent to a significant extent upon the success of the space sciences to solve Earth-based social problems and inspire the population to support their advancement. Therefore, incentives exist for social groups within the astrosocial sector to strongly publicize their

contributions to their societies. Astrosociologists should study such efforts (of astrosocial education) and their various effects.

The space sciences can offer unique solutions to many social problems, and that assists their cause. (This argument bears repeating in the current context because it remains generally unrecognized). As one example, the finite resources on Earth make it attractive to consider the mining of space-based resources (Hardersen 1997; Lewis 1996). Space represents a new economic frontier with untapped potential that inevitably draws greater attention. As Earth-bound natural resources decline, the shift to space resources represents a logical new focus for economic activity. At some point, the benefits outweigh the costs as science and technology continue to advance. Space exploration serves as a second example. Assisted by the space sciences and aerospace engineering, the exploration of space can provide a long-term solution to the problem of overpopulation. It remains important for astrosociology to examine the space sciences in this social context.

The solutions to numerous social problems come from the space sciences in less obvious ways even under current conditions. That is, individuals and societies benefit from the space sciences even though the average citizen fails to recognize it. For example, the indirect effects of operating in space include the creation and now common use of satellites, GPS systems, the development of medical technologies such as MRI and CAT-Scan machines, and greater airline safety.[10] As another example, limited experiments aboard the International Space Station (ISS) will likely yield significant findings for wide-ranging applications on Earth as well as in space.[11] In the

United States, NASA-led research and the related technology transfer, with in collaboration with corporate and academic organizations, contributes most strongly in this area because the current era predates the significant expansion into space by private organizations seeking to take advantage of space-related opportunities.

The space sciences serve to both solve Earth-based problems and inspire the human spirit in ways other sciences cannot offer. The public is fascinated by robotic expeditions to other planets and bodies in our solar system. Even simple photographs depicting distant space phenomena produce inspired reactions. Whether a society actually takes advantage of the potentials offered by the space sciences is never a foregone conclusion although the social conditions they produce arguably support such a direction. The value of astrosociology in this regard remains based on seeking an understanding of the relationships between the space sciences and societies around the world. As a particular society moves toward its next socioeconomic phase, perhaps toward a spacefaring one, the importance of comprehending these connections increases due in large measure to the growing impact of the space sciences.

Additional Areas of Concentration. Many other astrosociological areas deserve recognition as well. The fact that the areas in the list below receive only brief treatment here reflects nothing about their significance within the proposed subfield of astrosociology. Only the limited room here prevents even a modest discussion. Moreover, while the list provided below is by no means exhaustive, it serves to (1) demonstrate the great diversity of astrosociological issues and (2) propose additional

avenues of astrosociological inquiry. The establishment of this new subdiscipline is warranted even if only to tie all of these diverse areas together as an effort to produce a single coherent body of knowledge and related literature. The list below reflects the monumental nature of a long-term process that is long overdue.

- The characteristics and influences of the **astrosocial sector** (as briefly discussed in *Part One* of this essay) require ongoing examination.

- The **astrosocial sector in developing countries** must be viewed as an important concern as these societies develop along side space capable societies.

- The **role of the state in the astrosocial sector** represents a central area of concentration; including the relationship between the state's control of the national program (e.g., NASA in the U.S.) and other private and public organizations that contribute to it.

- The **relationship between the state and private enterprise** continues to change, including the effects related to the privatization of space.

- **Impact of other institutions** (e.g., religion, politics, economy) on astro-social phenomena and the astrosocial sector represents a high priority.

- **Space policy** and **space law** require study, as societies make deliberate decisions based on endogenous and exogenous forces; this focus includes efforts at the domestic as well as international levels.

- **Astrosocial education** is defined as imparting knowledge regarding human behavior associated with space; in all types of societies; it occurs, for example, in the forms of advocacy and activism.

- The **military** has historical strong ties to space programs of space capable nations; military objectives may align with space exploration objectives, may oppose them, or may include contradictory objectives.
- **Cooperation in space** and **conflict in space** each take place among societies forming complex and often contradictory social patterns; the United Nations advocates the use of space for peaceful purposes on a global scale, and this represents an ongoing consideration.

- **Practical astrosociology** involves astrosociologists interacting directly

with astrosocial phenomena in some manner (e.g., designing social environments in space, participating in crew selections, and conducting research in conjunction with social groups within the astrosocial sector); **public astrosociology** is a related and important consideration.

! The **characteristics of astrosocial phenomena in the future** require prediction and planning as they change from contemporary forms to new ones (e.g., space communities, bases, tourism, commercialization); the space sciences alone account for much of the capacity to change.

! The ***process* of astrosocial change**, both social and cultural, requires ongoing attention as it affects societies in complex ways over time.

! **"Interplanetary" relations** between Earth-based societies and space-based societies populated by humans and/or ETIs will develop into an important consideration in the future at some point even though it may seem a farfetched concern in contemporary societies.

While several aspects of these areas of concentration were included in various ways in the preceding discussions, each deserves strong attention in its own right. Furthermore, the large quantity of the astrosociological topics presented throughout this essay, and the diversity of their foci, both contribute persuasively toward the demonstration of astrosociology as a highly relevant subdiscipline.

Conclusions: Substantiating the Relevance of a New Subfield

In closing, it seems appropriate to consider the grand picture depicting astrosocial phenomena as long-term influences on human societies in the form of two general points. First, astrosocial phenomena existed within social groups from the time

humankind first incorporated them in various ways into their social and cultural patterns. Second, the continuing development of the space age promises the potential to produce changing social and cultural patterns that emphasize astrosocial phenomena as never before witnessed by humanity.

With a focus on the second point, *Part Two* of this essay concludes with an argument implied throughout: astrosociology will become progressively more relevant as we move further into the twenty-first century. Bringing sociology into the study of astrosocial phenomena therefore becomes critical. Unless humanity is knocked back to the Stone Age by some massively destructive event, or social problems become overwhelmingly disruptive, it is apparent that the relevance of astrosocial phenomena will increase in the future. Human civilizations will incorporate, benefit, and become more dependent on the space sciences and space exploration technologies. Discovery of extraterrestrial life would add additional influences to already changing social patterns. With or without such a discovery, human groups are likely destined to expand outward, as they have in the past. In the process, all members of a given society, including sociologists, become more likely to further develop their sociological imaginations in terms of understanding their relationships to astrosocial phenomena.

Thus, the relevance of astrosociology increases in human societies because of at least three reasons extrapolated from the present: (1) pure scientific understanding continues to drive human beings, (2) applied science and technological change each improves living conditions, and (3) exploration continues to inspire and thereby lure individuals and their social groups into the unknown. These three interactive forces

increasingly make astrosociology more relevant to societies because space represents the last great frontier, arguably at least as important in the grand scheme of things as the vast unexplored oceans of Earth. It is important to study the process of the growing intrusiveness and influence of astrosocial phenomena on human societies simply because it exists.

Sociology must adapt and renew itself in order to keep pace with this constant change. Since the establishment of the space age, sociology most characteristically ignored social patterns related to space. With its focus precisely on astrosocial phenomena, astrosociology provides an obvious opportunity for the discipline to correct its longstanding error. The relevance of astrosociology is rooted in both the significance of astrosocial phenomena and the discipline's need to remedy its attention deficit. Sociologists pursuing this new subfield will pioneer new work in a wide-open, long-neglected dimension of social life. As a result, heretofore untapped groundbreaking and exciting results will emerge simply due to the foray into unexplored areas of sociological inquiry.

In the end, the attempt to establish a new subdiscipline is not an easy task, and one not guaranteed to succeed. The sociological community must decide whether or not the establishment of astrosociology represents a good development for the discipline. The underlying argument presented in this essay is that sociology is better off by uniting the disparate astrosociological issues under a single subfield rather than staying on a course in which they remain lost and separated with no hope of developing

a single literature. Development of a unified literature is only possible with the development of a community of devoted astrosociologists.

The acceptance or rejection of this argument is a decision that demands an objective consideration of all the facts involved. While the relevance of astrosociology arguably received adequate substantiation in the course of this essay, the failure of the discipline to focus on astrosocial phenomena remains a reality. The discipline faces the irony of, once presented with the prospect of establishing astrosociology, continuing to favor its ignorance of astrosociological issues even while astrosocial phenomena become ever more influential over time. In such circumstances, a particular society becomes less well understood overall. A complete break from the past is necessary to change this paradox.

Such drastic change within the sociological subculture requires the consideration of several important questions. Is sociology better off with the establishment of astrosociology? Is astrosociology truly more relevant in the twenty-first century than it was in the twentieth century, or earlier? Conversely, is the status quo more desirable? As sociologists seek to answer such questions, the debate will undoubtedly intensify; but such a development is ultimately good for the discipline because it forces a needed reassessment of its ***own*** relevance as the future unfolds.

Notes:

01. Dr. Marilyn Dudley-Rowley and Thomas E. Gangale of *Ops-Alaska.com* (cited below) deserve special recognition for their feedback and support during the preparation of *Part Two* of this essay.

02. This is the second part of the two-part *Inaugural Essay*. *Part Two* was presented on October 16, 2004 as part of a special dedicated session, entitled *Astrosociology: The Establishment of a New Subfield*, at the California Sociological Association (CSA) conference in Riverside, CA .

03. Dr. Andrew A. Beveridge, Professor of Sociology at Queens College/CUNY deserves credit for recounting, in an email message, a historical account of the failed attempt to establish ***exo-sociology*** as a new section within the ASA.

04. Information about Virgin Galactic is available at their website (cited below). See the web-site for Scaled Composites as well (cited below), as it is the winner of the Ansari X Prize and contractor to build the Virgin space tourism fleet.

05. Dr. Albert A. Harrison provided valuable feedback in response to *Part One* of this essay. One of his suggestions is to directly confront the topics of UFOs and the pseudosciences, and to make an unambiguous distinction between them and the proposed subfield of astrosociology. His encouragement and support are greatly appreciated.

06. Thomas E. Gangle deserves the credit for the basic idea behind this great analogy.

07. Information about spinoffs is available at NASA's *Spinoff Online* website (cited below).

08. Dr. William Kornblum, Professor of Sociology at Queens College/CUNY related in an insightful observation as part of his reaction to Part One of this essay. Any particular society, indeed our entire species, would have to avoid destroying itself if it ever expected to survive long enough to establish a spacefaring society.

09. The *SETI@Home* website (cited below) provides user statistics, a mission statement, and a wealth of useful information related to the project.

10. See note # 07.

11. Information regarding the International Space Station (ISS) can be found at NASA's dedicated website, cited below.

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* Note: When possible and where appropriate, the specialty areas/fields are included inside brackets following the authors' names. Notice the dearth of contributions by sociologists.

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