INTERNATIONAL BOUNDARIES: THE NEXT GENERATION

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INTRODUCTION

Barring some apocalyptic calamity of cataclysmic proportions, international boundaries will continue (through the next century, the next millennium, the next decade of the *Boundary and Security Bulletin*) to evolve in incremental, often spasmodic ways as empires dissolve, economic communities coalesce, ethnic and religious rivalries rupture carefully crafted compromises, and states find new ways of sharing – or monopolising – the world's natural resources. The study of international boundaries will inch forward as well, as scientists, politicians, and scholars discover techniques for ever more accurate delimitation, invent new justifications for enclosing resources or tightening existing boundaries, and reconsider the validity of even such basic conceptions as national sovereignty. This much seems obvious.

What could confound so facile and banal a prediction? What form could such a cataclysm take? Perhaps a thermonuclear war, that wipes out much of the planet's infrastructure and ruling elites, forcing a fundamental reorganisation of domestic and global political systems as well as an earnest re-examination of the attitudes and policies that led to such a juncture. Or perhaps, reminiscent of recent Hollywood epics, a natural catastrophe – such as earthquakes on a global scale or a collision with a meteor – that inflicts thermonuclear-like political and economic consequences but without the recriminations. Or how about an alien invasion from outer space?

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Sudden exposure to extraterrestrial beings – particularly powerful, hostile ones – has the potential to radically reshape human attitudes towards other nationalities and races, including the longstanding practice of allocating territory and resources along national lines. After all, a we/they mindset is likely to change abruptly when the *old* they are replaced by a *new* they so alien in form that the old *they* begin to look a lot like *us*. André Maurois, in *The War against the Moon*, even suggested fabricating an imminent threat from outer space as a way of securing peace and cooperation on earth.

The possibility of contact with intelligent, extraterrestrial life forms is, of course, not limited to invasion from outer space. It is just as likely (based on our nearly complete ignorance as to the presence or character of other technologically advanced life in the universe, of which more later) that *we* could 'discover' the other life forms on *their* turf, making *us* the invaders, or that the two species would encounter one another on 'neutral ground', while both are out exploring, exploiting, or colonising.

While the contingency of extraterrestrial life endows speculation of this sort with an added spice or sense of urgency (to those who take it seriously – more of that later, too), outer space itself, not just its possible inhabitants, raises interesting boundary issues. Outer space, of course, has been there forever (give or take a big bang), but now that we have gained access to it, it gives rise to all-too familiar boundary and resource-sharing issues even in the absence of extraterrestrial competitors. The solar system is large, the galaxy enormous, and the universe (though apparently not infinite) vast beyond human imagination. Nevertheless it is not, and surely never will be, totally accessible.

In human terms, resources and territory (perhaps 'space' is the better word?) must be viewed in terms of what is attainable and what will do the job, not just what is 'out there'. For example, if we were to discover on Pluto vast amounts of frozen water that would assist in the settlement of the solar system's outer reaches or allow the

construction of a launching platform for intragalactic expeditions, that discovery is unlikely, at least in the short term, to reduce the value of, and competition for, the water already thought to exist on earth's moon, for the simple reason that we already have the potential (should we care to develop and employ the technology) to exploit the lunar water, and it is likely to be a long time indeed before we begin tapping the natural resources of Pluto. Similarly, large as the galaxy is, the region of it – just above the earth's equator – that will support geosynchronous telecommunications satellites is very limited and already subject to intense and often acrimonious competition. Even when there appears to be enough space to go around, sometimes only the right place will do. As real estate agents like to say, the only three things that matter are location, location, and location. Think of the Golan Heights.

This paper will consider, briefly and in very general terms, two broad themes: first, the international law of outer space as it has developed in regard to issues of international boundaries, national sovereignty, and the allocation of natural resources found in outer space; second, in a more speculative vein, issues that humanity may face should we encounter intelligent extraterrestrial life either here, or there, or somewhere in between.

EARTH LAW IN OUTER SPACE

The international law of outer space may apply to exotic locales, but it is part and parcel of the law of nations and has its roots in the familiar international law of the sea and the well-established Antarctic Treaty System.

THE INNER LIMIT OF OUTER SPACE

One of the first space-related boundary issues to face mankind was the question of where outer space begins – a geocentric question if ever there was one. In simpler days, when the earth was flat and the law of gravity still in effect, it was sufficient to declare that c*ujus est solum, ejus est usque ad coelum,* whoever owns the soil, owns it up to the sky (and to the depths, *et ad infernos).* While Copernicus, Galileo, Magellan, and, perhaps, even Darwin undermined the physical, philosophical, and theological underpinnings of the maxim, it was the dawn of aviation that demanded its formal reconsideration. Even then, however, the prospect of foreign aeroplanes plying once sovereign airspace was too much for many states, even potential air powers, and in 1944 the Convention on International Civil Aviation explicitly retained the concept in international law (Chicago Convention, 1944, Articles 1, 5, and 6).

The Outer Space Treaty of 1967 adopted instead the concept of freedom of outer space…

Usque ad coelum – derived from ancient Roman law and adopted generally by the common law, the civil law, and the law of nations – may have been venerable and durable enough to withstand the onslaught of mere aeroplanes, but rockets and satellites proved too much for it. The Outer Space Treaty of 1967 adopted instead the concept of freedom of outer space (Article 1(2)), analogous in many ways to the freedom of the high seas long recognised in customary international law and incorporated into the 1983 United Nations Convention of the Law of the Sea (LOSC, 1983: Article 87). Freedom of outer space was reinforced in the 1979 Moon Treaty (Article 11(1)), but by their very terms, the two space treaties restricted the new freedom to outer space itself. On earth and in its adjacent air space, *usque ad coelum* would still apply. Hence the need for a boundary to outer space, a line (actually a surface, more or less spherical in shape) defining where air space ends and outer space begins.

Does it really matter in practical terms? The answer to that is more problematic than one might expect. From a spatialist perspective, the answer is yes. International law recognises the right of states to control their own air space and to exclude – or, in extreme circumstances, bring down – unauthorised aircraft. It also recognises that Brazil, for example, does not have the right to shoot down the geosynchronous telecommunications satellites that hover over it and every other equatorial state.

Somewhere between the U-2 spy planes and the geosynchronous satellites must lie the frontier.

Another school of thought, however, holds that jurisdictional questions regarding outer space should be defined functionally rather than spatially or geographically (Gál, 1997). This is quite true of some provisions of space law. The Rescue Convention, for example, applies to astronauts lost on earth as well as in outer space. The Liability Convention, likewise, allocates liability for damage caused by space objects regardless of where the damage occurs; what triggers liability is that damage was caused by an object launched, or attempted to be launched, into outer space. This stands to reason, as the greatest risk from space objects may not be in space, where successfully orbited satellites may threaten to collide with other space objects, but here on earth where unsuccessful launches threaten grievous bodily harm to those unfortunate enough to be in their way. Even successfully launched objects eventually come down, and while terms like 'up' and 'down' may have little significance in outer space, they hold a great deal of meaning for anyone standing under a re-entering satellite fragment.

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The fact that the international community, four decades after the Soviet Sputnik began circling above most of the world's nations, cannot agree on a boundary – or even on the appropriate parameters or principles for calculating one, if one is needed at all – suggests the difficulty inherent in resolving the still-hypothetical boundary issues posed in the remainder of this paper (See Goedhart, 1996 for a discussion of the scientific, legal, and policy issues involved).

The absence of an international treaty does not, in and of itself, establish that there is no international law on the subject. Each of the spacefaring states, and possibly others in anticipation, have enacted domestic legislation governing its and its nationals' activities in and relating to outer space and establishing jurisdiction over its own satellites and other space objects. The United States, for example, in the National Aeronautics and Space Act of 1958, does not explicitly define outer space, but it comes close by appearing to distinguish between aeronautical activities and space activities on the basis of whether they occur within or outside the earth's atmosphere. If the line is to be drawn at the outer edge of the atmosphere, as the United States legislation suggests, this would create a more-or-less distinct borderline 80km to 100km above the earth's surface (Von der Dunk, 1998: 257). Russian law, too, implies a distinction between terrestrial and outer space legal regimes, by applying the protections of intellectual property law to a *"physical product created in outer space"* but to an *"information product created as a result of space activities"* (Russian Space Law, 1993, Article 27(2)). Nevertheless, it makes no effort to define outer space, despite the oft-repeated insistence of the Soviet Union that a distinct borderline was necessary. South Africa appears to be the only spacefaring nation to have formally defined outer space in national legislation. In the Space Affairs Act, outer space is defined as *"the space above the surface of the earth from a height at which it is in practice possible to operate an object in an orbit around the earth"* (1993, Section 1(15)). This implies a boundary between 100km and 120km above the earth's surface (Von der Dunk, 1998: 260). In his survey of the space laws of spacefaring states, Von der Dunk (1998) concludes that national space legislation, by acknowledging the special legal status of outer space, calls for a definition and a delimitation but so far provides little indication as to what or where they should be (see also Gál, 1998).

INTERNATIONAL LAW IN OUTER SPACE

International law entered the space age in December 1958, when the United Nations General Assembly adopted a resolution on the peaceful uses of outer space. The resolution affirmed the sovereign equality of states in regard to outer space and space activities and recognised the need for international cooperation in matters relating to outer space (UNGA Resolution 1348, 1958). The basic framework of the

international law of outer space is found in five international conventions drafted by the United Nations Committee on the Peaceful Uses of Outer Space (COPUOS). Three, though very important, are quite limited in scope, dealing with the rescue and return of astronauts (Rescue Convention, 1968), liability for damage caused by space objects (Liability Convention, 1972), and the registration of objects launched into outer space (Registration Convention, 1974). The others – the Outer Space Treaty and the Moon Treaty – are much broader in scope and attempt to create a framework within which the development of the international law of outer space may continue. An earlier agreement, the 1963 Nuclear Test Ban Treaty, which was not drafted by COPUOS, reaffirmed the 1958 UN resolution on peaceful use by prohibiting nuclear testing in space and the placing of nuclear weapons and other instruments of mass destruction in orbit.

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The development of the international law of outer space owes a great deal to two bodies of terrestrial international law – the law of the sea and the Antarctic Treaty System (ATS). While at first glance these three regions – the seas, the Antarctic, and outer space – seem to have little in common, there are basic similarities (some physical, some juridical) that justify – even cry out for – analogous treatment in international law.

All three areas are *res communis*, communal property belonging to no state (though national claims have been made on Antarctica); all three are remote from centres of human population and have extreme environmental conditions that make human habitation difficult or impossible without extensive and costly artificial environments; all three appear to possess vast quantities of potential wealth in the form of natural resources, but in all three cases the extreme conditions and remoteness render the extraction of the resources expensive, often prohibitively so. Further, all three regions are the subject of intense environmental concern, and we know from experience that at least two of them are particularly sensitive to environmental degradation, critically important to the health of the earth's biosphere, and often very slow to recover from abuse. Several themes run in common through all three bodies of law, as reflected in the LOSC, the Antarctic Treaty System, and the Outer Space and Moon Treaties, and the comparisons are worth noting.

Freedom of exploration and use

The Outer Space Treaty provides that outer space, including the moon, and other celestial bodies, shall be the province of all mankind (Article 1(1)) and shall be free for exploration and use by all states (Article 1(2)). This reflects Article 87 of the LOSC: *"The high seas are open to all States, whether coastal or landlocked."* The freedoms guaranteed specifically include navigation, fishing, and scientific research, among others. The Antarctic Treaty guarantees freedom of scientific investigation in Antarctica, but does not go much further, given that the purpose of the treaty is to protect Antarctica, not to encourage its use.

Prohibition of sovereignty claims

The LOSC prohibits claims of sovereignty over the high seas by defining the limits of sovereignty as extending, beyond land territory and internal waters, to the territorial sea (and its bed and subsoil and the air above it) (Article 2). The Outer Space Treaty prohibits sovereignty claims more directly:

> *Outer space, including the moon and other celestial bodies, is not subject to national appropriation by claim of sovereignty, by means of use or occupation, or by any other means.* (Article 2)

The Antarctic situation is somewhat more complicated as a number of states had made, or announced a basis for, sovereignty claims before the Antarctic Treaty was adopted. Some of the claims overlap, and it is not clear that any have been recognised by the international community. Nevertheless, the Antarctic Treaty essentially freezes all sovereignty claims, providing that nothing in the treaty shall be

interpreted as a renunciation or diminution of a claim, and that no act while the treaty is in force will constitute a basis for asserting, supporting, or denying a claim (Article 4).

Peaceful uses

The peaceful uses provisions of the Outer Space and Moon Treaties are drawn from the LOSC and the Antarctic Treaty. In some sense they go further than the LOSC, in the outright prohibition of nuclear weapons and other weapons of mass destruction in orbit, and in the prohibition of military activity on the moon and other celestial bodies (Article 4), but the latter prohibition does not extend to outer space itself. The LOSC provides that the high seas shall be reserved for peaceful purposes (Article 88), but this does not prohibit military activity, such as naval manoeuvres or the presence of nuclear weapons on the high seas. Antarctica, on the other hand, *"shall be used for peaceful purposes only"* (Article 1). All military activity is prohibited, but both the Antarctic Treaty (Article 1(2)) and the Outer Space Treaty (Article 4) permit the use of military personnel for scientific research and other peaceful purposes.

Common heritage of mankind

The Moon Treaty also finds its inspiration in the law of the sea, but in a much different strain of it. Rather than reinforcing the freedom-of-exploration themes of the high seas and outer space, the Moon Treaty declared the moon and its natural resources to be the *"common heritage of mankind"* (Article 11), reflecting the treatment of the deep seabed in the LOSC (Article 136) Perhaps the most controversial aspect of the Moon Treaty is its requirement, once the exploitation of lunar resources becomes feasible, of an international regime, analogous to the International Sea-Bed Authority (ISA) envisaged by LOSC, to regulate the exploitation of the resources. Not surprisingly, international response has echoed the reaction to the common-heritage provisions of LOSC, which was not ratified by the United States and other major maritime powers until the amendment of the ISA provisions. The treaty has been in force since 1984, after the fifth ratification, but it is binding only upon the parties, which are not, by and large, the spacefaring nations. The United Nations resolution adopting it, while unanimous, is at best soft international law. It seems unlikely that while space research and exploration are dominated by the developed nations of North America and Europe (though, of course, Brazil, China, India, Pakistan, South Africa, and other non-Western states do engage in outer space activity), the Moon Treaty and its emphasis on the common heritage of mankind will define, or even have a major impact on, the development of international space law (eee generally, Christol, 1997). There have been efforts to bring Antarctica within the common heritage regime, but so far the Antarctic Treaty Consultative Parties, which administer the ATS, have resisted this, on the grounds that there are sovereignty claims extant (if frozen) and that the ATS has been an effective governance system (Rothwell, 1996: 106-107).

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A principal reason for the lack of agreement on the moon's minerals regime may be that the issues are still hypothetical. There is little incentive to reach a difficult agreement before one is absolutely necessary, for a variety of reasons. Until an actual situation arises, it is difficult to calculate the stakes involved or even to identify all the affected parties. In Antarctica, there is a moratorium on the exploitation of minerals, so the question of sharing does not arise. While the moratorium is controversial, it was successful at least in part because mineral extraction in Antarctica is difficult and costly, and it is doubtful that current market prices would justify mining operations there. At some future time, it is quite possible that improvements in technology or higher market prices could make Antarctic mineral exploitation economically feasible, and it is not at all certain that the moratorium would survive that for long.

As to lunar and asteroidal mining rights, it would probably be a mistake to dismiss the importance of resolving the issue soon, as industrial nations and their

corporations are unlikely to invest the effort and capital in exploring, prospecting, and exploiting outer space without a reasonably stable legal regime in place, any more than companies are willing to incur heavy costs in developing oil fields in disputed areas of the continental shelf.

INTER-PLANETARY CONFRONTATION

Is there any point at all in discussing the impact of extraterrestrial competition on terrestrial space law and practice? We do not know, of course, whether there are living beings on other worlds in this Milky Way galaxy. We may never know. We can, however, attempt to calculate the likelihood of other intelligent life, to help inform an assessment of whether it is worthwhile spending time and money on the search for extraterrestrial life and other enterprises such as writing (and even reading) this paper.

THE DRAKE EQUATION

Speculation about extraterrestrial life is hardly new. Lucretius in the first century B.C.E. (Before Common Era) wrote of *"other worlds, other beings, and other men."* Giordano Bruno in the 16th century wrote of innumerable earths revolving around innumerable suns, and living beings inhabiting those worlds. What is new is the attempt to put the speculation on a scientific basis. The currently favoured technique for estimating the number of communicating civilizations in the galaxy is the Drake equation, formulated in 1961 by the astronomer Frank Drake. There are several versions abroad, but they all seek to identify several factors relevant to the likelihood of the existence at any given time of such a civilization. One common variation of the formula is $N=R^*f_pn_ef_lf_if_cL$, where N is the number of communicating civilizations, R* is the rate of development of sun-like stars), f_p is the fraction of those stars with planets, n_e is the number of earth-like worlds per planetary system, f_l is the fraction of earth-like planets where life develops, f_i is the fraction of life-bearing planets where intelligence develops, f_c is the fraction of communicating planets (where electromagnetic communication develops), and L represents the lifetime of communicating civilizations (inasmuch as a civilization that dies out before its signal reaches other communicating civilizations cannot be regarded as highly communicative).

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While the formula itself appears to be highly regarded in the scientific community, nearly every number that needs to be plugged into it is contentious . The only factor for which there is any hard evidence is the number of stars in the galaxy, and reputable estimates for that range from 10 thousand million (10^{10}) to 500 thousand million ($5x10^{11}$). On the others, agreement does not come so easily. It is not surprising then that estimates of the number of communicating civilizations range from one or even zero to millions. Perhaps more disturbing than the softness of the numbers are its *"shaky underfooting"* and *"illusion of precision"*, effectively demonstrated by the Dartmouth psychologist and mathematician John Baird (1987: 63-84). Reliable or not, to be useful for the purposes of this paper, the Drake equation would have to be modified to estimate the number of exploring civilizations, taking into consideration the vastness of the galaxy and the time required to traverse it. The number of exploring civilizations could probably be expressed as a fraction of the number of communicating civilizations.

However wildly varied the estimates may be, and however small the likelihood of exploring civilizations appears, the possibility nevertheless exists, and so long as it exists, it is not entirely unreasonable to speculate, perhaps even to plan. As three of the early theorists of space law justified their seminal policy analysis:

> *When imaginatively conducted, the act of projecting the future is a salutary challenge to rigid images or to intellectual smugness. 'Outrageous hypotheses' clear dust out of the mind and contribute to insight and understanding.*
> (McDougal, Lasswell, and Vlasic 1963: 975).

IF WE SHOULD MEET

Upon encountering extraterrestrial life-forms, we would face two crucial questions straightaway: How will we treat them and, perhaps more important from our perspective, how will they treat us? One formidable problem is that we may not recognise extraterrestrial life when we see it, or that we may not even see it in the first place. There is no reason to believe that all life forms in the galaxy will have paralleled our evolutionary development or even share our carbon-based biology. If we were to encounter a creature whose biological systems were based on silicon or chlorine instead of carbon (a common sci-fi motif), could we distinguish it from a rock or an inert gas? If its physical manifestation were largely gaseous or evanescent, would we even know it was there? Another potential problem is that what we find may be circumscribed by our expectations.

Deep-seated assumptions about the nature of alien life [may determine and limit] the types of experiments considered worth doing in the search for extraterrestrial life. The Viking Lander's tests for indications of life on Mars were directed at primitive life forms in the soil with little effort directed at the analysis of pictures that might have offered further clues to the existence of more active life-forms (Baird, 1987: 99; Cooper, 1980; Macvey, 1977: ch. 8).

HUMAN RIGHTS FOR THEM?

If we do encounter *and* recognise more advanced life-forms – we are more likely to recognise them if they attempt to impede our outer space activities – how shall we treat them? This depends to a large extent on how highly we respect the life-form they represent and on the level of their ability to resist the force that has been the instrument of contested human exploration and expansion on this planet and on which human beings will no doubt continue to rely. To some extent, the two factors are interdependent. McDougal, Lasswell, and Vlasic posit three broad contingency assumptions, based upon the level of science and technology attained by the aliens and discuss the appropriateness of various strategies when dealing with strangers whose technological capabilities are inferior, similar, and superior to our own (1963: 980-1,016). Much of their commentary on relations with inferior and similar races is based on human experience in this world, reflecting colonialism, slavery, balance of power, the cold war, detente and other phases of the history of international relations (*Ibid.:* 976-977). There is little experience to draw on when it comes to dealing with superior powers, other than reversing the picture and recalling early European treatment of less technologically advanced peoples from their point of view.

If we do encounter and recognise more advanced life-forms …how shall we treat them?

McDougal's is a somewhat pragmatic classification, identifying those with whom we must deal (technologically similar), those with whom we may hope to deal (superior), and those whom we can blast out of the way should it suit our purposes, as it well may. The third category, at least, and probably the others as well, raise an ethical issue: What life-forms are entitled to respect, to what we have come to call 'human rights'? Surely not only human beings, but just as surely, not every form of extraterrestrial life. If the Polar Lander, still out of contact with earth as I write, were to identify microbial life in the Martian soil, is it likely that NASA would close up shop and leave Mars to its microbes? No more likely than we are now to negotiate with 'our own' microbes over an allocation of terrestrial territory and resources. Or 'our own' gorillas, eagles, crocodiles, salmon, and whales, for that matter. As C.S. Lewis put it:

> *There would be no sense in offering to a creature, however clever or amiable, a gift which that creature was, by its nature incapable of desiring or receiving. We teach our sons to read but not our dogs. The dogs prefer bones* (1967).

Even assuming that an ability to make, understand, and respect an agreement is a prerequisite for a right to negotiate and to expect the bargain to be kept, it is not necessarily sufficient. Recall the treatment by Europeans of their native colonial

subjects, by white settlers of the indigenous peoples who preceded them, by the United States of slaves and their descendants. It is evident that human nature does not require respect for all sentient beings, even those that look much like us. The less they look like us, I suspect, the greater the temptation to refuse them 'human rights'.

It is, of course, possible to respect life-forms without negotiating with them or granting them rights. It is certainly possible to grant them rights without believing that it is necessary to negotiate; the animal rights movement of today takes this position, arguing in one of its manifestations that life *per se* is entitled to respect (see generally Singer, 1977 and 1985). While our treatment of the environment and the millions of species that inhabit it has arguably improved in recent years, the legal and diplomatic mechanisms of this improved state of affairs do not seem to be impelled by a respect for life itself. Most national laws and international agreements protecting the environment appear to be instrumentally based: saving the world because environmentalism, in the long run, is efficient, cost-effective, better for mankind, better for us.

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The question of who, or what, is entitled to rights or respect is inextricably entwined with the concept of personhood. Human legal systems in general attribute (or grant) rights only to persons, not to animals or inanimate objects, and there seems to be a (usually unarticulated) understanding that 'person' means 'human being'. Nevertheless, this is not always the case. Corporations are not human beings, but they may be persons within the meaning of the law and entitled to many of the same rights attributed to human beings or 'natural persons' (Midgely, 1985: 53-54). The converse, by the way, is also false: Human beings are not always persons. The unborn child of a human mother is not a person in United States constitutional law, even when fully viable and perhaps only a few moments from being born alive and healthy.

The distinction between 'man' as a biological animal and 'person' as an entity deserving rights or respect is hardly new. John Locke distinguished the concepts clearly, defining 'man' as a particular species of living organism *"wherein the identity of the same man consists...in nothing but a participation of the same continued life, by constantly fleeting particles of matter, in succession vitally united to the same organised body"* (Locke, 1690: ch. 27(6)). A person, on the other hand, is:

> *a thinking intelligent being, that has reason and reflection, and can consider itself as itself, the same thinking thing, in different times and places; which it does only by that consciousness which is inseparable from thinking, and, as it seems to me, essential to it: it being impossible for any one to perceive without perceiving that he does perceive.*
> (Ibid., ch. 27(9))

Personal identity, then, relates more to consciousness than to the body it inhabits.

ALIEN RIGHTS FOR US?

How will aliens treat us if we fall into *their* first category – technologically inferior. It may well be that if our encounter with alien beings occurs on this planet, if they come to us, their technology will so overpower ours that it will make the encounter between Pizarro and the Incas look like an even match and we will have no say in the matter. Would a superior race recognise us as individuals or treat us as an undifferentiated group, much as a termite exterminator seeks to eradicate the entire colony, never thinking to identify and spare those individuals who may have developed a taste for something other than wood? If the former, would individuals in our group attempt to take advantage. Recall the character in H.G. Wells's *War of the Worlds* who sides with the invaders from Mars on the theory that it is better to survive as a slave than to die fighting. McDougal, Lasswell, and Vlasic discuss the

possibility that a more-powerful invader would offer to make peace with one earth faction in return for assistance in eliminating or subjugating another (1963: 998). More recently, the *Annals of Air and Space Law* published a paper analysing state responsibility for collusion with extraterrestrial aliens in the use of space technology (Abeyratne, 1996).

It is concern about the overpowering superiority of an invader that has impelled a number of respected scientists to warn against the dangers of actively searching for other intelligent life and advertising our presence. *"Should we ever hear the space-phone ringing",* warns the astronomer Zdenik Kopal, *"for God's sake let us not answer, but rather make ourselves as inconspicuous as possible to avoid attracting attention."* Unfortunately, I cannot recall the source of the most vivid warning, that sending out electromagnetic signals in search of intelligent life is like hanging a flashing neon sign on the planet: Eat Here! If so, then Pioneer 10's famous aluminium plaque – now well beyond our solar system and far past retrieving – is an engraved invitation, a road map, and a menu.

Pioneer 10's famous aluminium plaque – now well beyond our solar system and far past retrieving – is an engraved invitation, a road map, and a menu.

Let us assume, though, that these technologically superior aliens are peace-lovers, or vegetarians, or simply allergic to carbon. If they came to earth in search of mass quantities of salt water or fresh ice, would they heed pleas that without the oceans or the polar ice caps we and our planet would die? Would they even hear the pleas? If we mattered to them as the snail darter mattered to the Tellico Dam builders, would they go to the bother of learning our language to find how we thought or felt? One of the recurring themes of science fiction is the all-good, all-powerful super race faced with the question of whether to stamp out this primitive, violence-prone species or to give us time to evolve and join the galactic community. There may be a certain arrogance in wondering what a race of such power and intellect would think of our civilization. Are they likely to notice at all? As the evolutionary geneticist J.B.S. Haldane put it (though with God, not alien beings, in mind):

> *At worst our earth is only a very small septic area in the universe, which could be sterilised without very great trouble, and conceivably is not even worth sterilising* (1928).

THE SHAPE OF INTER-PLANETARY BOUNDARIES

The form that interplanetary boundaries or relations will take is probably the most fanciful and least useful of all these speculations, but also the most entertaining. Fanciful and useless because arrangements of this sort are necessarily *ad hoc*, designed to meet the contingencies of a specific situation, and we can barely imagine the contingencies, much less their solutions. Entertaining because this has been the stuff of science fiction for decades.

It is difficult to conceive of an interplanetary arrangement that has not already been tested in some hypothetical world. Not surprisingly, most seem to reflect human experience on earth. Recall the parallels between the empire in Isaac Asimov's *Foundation* series and the history of Rome, even to their decline and fall; the human colonisation of the galaxy in Clifford Simak's *Time and Again* and the European colonisation of the world in the 18th and 19th centuries; the ostracism of earth in C.S. Lewis's *Out of the Silent Planet* and the embargoes and boycotts of states that fail to meet minimum international standards of behaviour regarding basic human rights and public order. S*tar Trek's* Neutral Zone that separates the United Federation of Planets from the Romulan Empire is reminiscent of the demilitarised zone in Korea, and the three-way feud between the Federation, the Romulans, and the Klingon Empire bears striking resemblances to the Cold War relations of the United States, the Soviet Union, and China. The arrangements that least reflect human history tend to be those involving life forms so alien from our own that the differences themselves form the basis of the initial conflict. In *Star Trek's Devil in*

the Dark, human miners enter into a symbiotic relation with a silicon-based life form that can tunnel through rock as human beings wade through water.

There are probably few direct benefits – other than those inherent in the planning activities themselves – in working out details of interplanetary arrangements before we know at least the nature of the sort of creatures with whom we may be dealing and what their interests may be in the territory and the resources at stake. Nevertheless, those inherent benefits may be substantial, and the ethical lessons learned in speculating about the human rights of non-human beings may invigorate the debate over the treatment of other species here on earth.

CONCLUSION

The Past is Prologue

If we were ever actually to encounter intelligent life-forms with whom we could – or must – deal, it is hard to imagine what form our relationship would take, how lines would be drawn, how resources would be shared. All we have to go on is our history on earth, which cannot help but shape our experience elsewhere but which is unlikely to be the whole story. The more probable scenario, that we will be exploring space on our own (and on our own terms) for generations to come, is easier to forecast, because it is a natural outgrowth of what has come before.

Map makers and boundary negotiators may need to develop some new techniques, but probably not many. They have already been dealing for years with the third dimension, by which space differs most obviously from territory, in air space (*usque ad coelum* and all that) and in the water column and deep seabed in the law of the sea. We have already seen that the law of outer space has grown, rather directly, out of our familiar international law, especially as it concerns the seas and the Antarctic. Moreover, as the Liability and Rescue Conventions find their source in the rules for safety at sea, rescue of persons in distress and state responsibility, so future law governing, say, manned space stations and lunar mining is likely to draw on the regimes of artificial islands and the deep seabed. If the privatisation of space enterprise continues at the pace of the last two decades, space law may well follow sea law and diverge into two separate bodies – the law of the sea, pertaining to sovereignty, jurisdiction and other public issues, and the law maritime, or admiralty law, an outgrowth of commercial law (DeSaussure, 1990).

This is quite possibly a two-way street. Experience in environmental protection or common heritage issues in the asteroid belt may someday offer insights into the protection and use of the deep seabed. We may learn something from the Rescue or Liability Conventions that will improve international cooperation on the high seas. At the very least, the introspection and self-analysis required to prepare the human race to share the galaxy cannot help but teach us something about ourselves and the way we interact with our own biosphere and the other species and human beings with whom we share it.

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