

Michel Serres

Science, Translation and the Logic of the Parasite

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LONG A mainstay of contemporary European poststructuralism, the work of Michel Serres has as yet failed to find an audience amongst British and North American social scientists. This despite the appearance of his name in the opening dedication to Bruno Latour's *The Pasteurization of France*, its recurrence throughout the footnotes and supporting text of Deleuze and Guattari's seminal *A Thousand Plateaus* (1988), and, moreover, his founding influence upon Actor-Network Theory (Callon, 1980; Latour, 1993; Law, 1997). This lamentable situation is compounded by the fact that the two dozen or so books which make up his oeuvre (only half of which have as yet been translated into English) deal in a sustained fashion with one of the most pressing contemporary issues – namely the reformulating of the once great and now weatherworn Enlightenment divisions between self and collective, society and nature, the scientific and the literary, myth and politics. In an age where the rhetoric of interdisciplinarity is commonplace, it still shocks to encounter work where the deliberate crossing (and re-crossing) of disciplinary boundaries is seriously put into practice. A typical Serres text will, for example, move from information theory to myth by way of examples drawn from literature or art. Or else bring the ancient and the modern world into juxtaposition through detailed exegesis of Lucretius or Leibniz. In Serres' work philosophy is made to inhabit hard science as myth is brought to life within social science. Jules Verne intermingles with Plato and Thales. Don Juan and La Fontaine rub shoulders with Descartes.

This may at first sound like the very worst kind of postmodern carnival, yet Serres' border crossings are always rigorously structured. He proceeds from the notion that disciplinary and conceptual divisions, although

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complex and provisional, may be analysed by exploring potential channels or 'passages' that run between them. Communication runs through these passages, but does so only at the risk of potential distortion, in the course of which messages become transformed. Serres understands this transformation as both a necessary risk which must be taken to communicate at all and, more importantly, as a possible source of invention. He dubs the particular division between science and the humanities as the 'Northwest Passage', referring to the twisting and convoluted coastlines that separate the great Atlantic and Pacific Oceans. Serres' point is that such a divide is there to be traversed – it is 'an adventure to be had' (Serres with Latour, 1995: 70) – but this requires undertaking the most testing of journeys, one that will involve much doubling back and complex navigation.

One also requires a range of tools. In his early work, notably the *Hermes* series of books, Serres draws on mathematics and information theory, often liberally, to model the variety of interdisciplinary problems he addresses. His essay on 'The Origin of Language' (in Serres, 1982a), for example, uses a model of the progressive filtering of signals from noise by way of a chain of conversions (or 'rectifications') to explicate not only Freudian repression, but also as a means of understanding Freud's relationship to 19th-century science. Now it is the apparently freewheeling fashion in which Serres generalizes models which has attracted the greatest critical ire (Hayles, 1989, 1990; Sokal and Bricmont, 1997). Such criticisms are, however, often based on a profound misinterpretation of what Serres is actually seeking to achieve. As he puts it in a discussion with Bruno Latour, the utility of the models he draws upon is that they enable a way of conceiving provisional connections between otherwise disparate phenomena:

[M]athematics teaches rapid thought. Whoever writes x can mean simultaneously 1, 2, 3, the infinite, rationals and transcendentals, real and complex numbers, even quaternions – this is an economy of thought. When you reproach me with 'Structure isn't enough; you've got to add all the intermediate steps', this is not a mathematical thought. Philosophers love intermediate inferences; mathematicians gladly dispense with them. An elegant demonstration skips the intermediate steps. Indeed, there is a slowness particular to philosophers that often strikes me as affection and a speed to mathematical thought that plays with amazing shortcuts. (Serres with Latour, 1995: 68)

Here Serres indicates an important aspect of his methodological approach – an approach that he broadly characterizes as 'structural'. However, the kind of structuralism which Serres advances is inspired principally by the algebraic work of the Bourbaki group¹ rather than the more usual structural linguistics or anthropology (see Paulson, 1988). This mathematically grounded understanding of structure derives models by proposing functions which relate a set of elements whose precise composition is not determined in advance:

The notion of structure . . . designates a set of elements whose number and nature are not specified, a set provided with one or more operations, one or more relations which possess well-defined characteristics. If one specifies the number and nature of the elements of the structure and the nature of the operations, then its model becomes evident. (Serres, 1982a: 16)

For example, if one designates three points in turn – A, B, C – on a line which has a definite direction then a relationship of succession and precession thereby obtains. ‘A’ comes before ‘B’, ‘C’ follows ‘B’, ‘A’ precedes ‘B’ and so on. There is a basic ordering relation which defines the elements. Now given this basic ordering relation, any number of further elements might be added, and the properties of each point in relation to one another might be calculated. Thus the positing of the relation makes it possible to extract a model which can be extended beyond the present given elements. Serres uses this basic mathematical principle to identify key ordering relations or ‘operators’ in the most varied of materials. In the poetry of Lucretius, for example, Serres ([1977] 2000) identifies the relation of a minimal deviation from a laminar flow – the ‘clinamen’ – as the operator that enables a model of physical processes which appears to link Roman atomism to the contemporary complexity sciences. In *The Parasite*, the asymmetrical relation of ‘taking without giving’ is the basis for a model of parasitism that applies equally to information theory and the history of human relations (Serres, [1980] 1982b).

Serres begins every time with a relation and then proceeds to a model. Note though that this relation is always specific to a given set of materials, and that the model which is then derived is in the first instance always a description of a local problem. One might say that Serres’ models are ‘ready-mades’ (see Latour, 1988) rather than generalized concepts, since they are invented afresh with each investigation. Furthermore, having identified a model, rather than simply generalize at will, Serres insists upon demonstrating the model through the gradual addition and substitution of new elements. So the model of parasitism, having been initially derived from the fable of *The Town Rat and the Country Rat*, is then demonstrated through a series of other fables by La Fontaine, through the biblical story of Joseph, Molière’s *Tartuffe*, Rousseau’s *Confessions*, Plato’s *Symposium* and so on. Each demonstration puts the model to work in a different way, allowing Serres to forge yet further links with information theory, anthropology, economics and politics. In the course of which a variety of other ‘ready-made’ concepts emerge – ‘jokers’, ‘blank dominos’, ‘quasi-objects’. Whilst these secondary concepts are the elements of Serres’ work most open to appropriation, they too are rigorously grounded in the demonstration of the model. This is one reason why Serres’ work does not lend itself to easy summary or application. As William Paulson puts it, his texts will not furnish a well honed (and worn) problematic to be easily reconstituted elsewhere – ‘Serres is *extracurricular*: you have to read him on your time’ (1997: 22).

Notwithstanding this difficulty, there is a contrary aspect to Serres’

structural method which does crack open his texts. Serres is a 'global thinker'. He may begin with the most local of problems, but his ambition is towards the global, towards a description which may hold for the entire system. In *Angels* ([1993] 1995e), for example, he aims at nothing less than a philosophy fit for the job of explicating the global characteristics of modern communication systems and the way in which we become transformed into 'message-bearers' in its circuits. However, unlike, say, Manuel Castells' (2000) analysis of the networked forms of sociality that accompany the 'new economy', Serres emphasizes that economic or cultural changes need to be understood in terms of deeper problematics – such as that of scapegoating, sacrifice or 'evil' – which have their roots in the sacred as much as the economic. In fact, Serres is often dismissive of the rhetoric of 'the global', which he sees as born of a tendency to begin with a 'monstrously inflated' conception of the local (Serres, [1982] 1995a). What does it matter if some Californians now use stocks as a form of wage payment when set against the way modern information communication systems reformulate the ancient techniques for the exclusion of the impoverished masses, who are reduced to silence in the name of better shoring up an elite collective? In this regard, Serres is much influenced by the comparative human science of George Dumézil and René Girard, two writers who similarly identify a global problematic through systematic examination of comparative empirical materials.

These twin aspects of Serres' structuralism – mathematical demonstration and global problematic – become even more pronounced in his later work. Beginning with *Genesis* ([1982] 1995a), Serres translates the emphasis on demonstration into a formal stylistics. The work attempts to perform the themes it speaks of at the level of its own presentation. Thus *Genesis*, which deals with the founding role of noise and disorder in the production of order, is itself a disorderly and noisy text made up of interleaving examples and discussions which resist singular summary but nevertheless impress upon the reader the very sense of the matter at hand. Similarly *Detachment* ([1983] 1989) takes the reader through a fabulist narrative guided by the notion of interrupting cycles of repetitive activity where the historical time of human relations is, for Serres, seemingly mired. The various meanings of such an interruption become clearer as each successive fable deepens the reader's sense of what is at stake in achieving the detachment prescribed by the title (see Assad, 1999). These later works are then exemplary for their ability to push forward a consistent theme, to which the reader is constantly returned, through a dazzling series of analyses.

One may then identify two phases of Serres' work which bear some resemblance to that of Jacques Derrida. Like Derrida, Serres' work has shifted from a grounding in the exegesis of 'classical' textual sources (e.g. Rousseau, Plato, Zola) towards a more open exploration of key motifs and thematics (e.g. chaos, mixture, nature). On a purely biographical level, both Derrida and Serres have found particular favour with North American audiences in the humanities. There is though an important difference. Serres

has never engaged in the kind of close critique that characterizes Derrida's most well known works (for example, *Writing and Difference* [1978] or *Limited INC* [1988]). Deconstruction – which Latour (1999: 8) marvellously defines as to 'destroy in slow motion' – is entirely antithetical to the spirit of Serres' texts. Serres partakes, he savours the materials he works with. There is demonstration and invention, but very little critique. Which is not to say that Serres is not filled with outrage at the injustices and tyrannies wrought by ideology or governance without reason or war (see the first interview between Serres and Latour, 1995), merely that his ire is properly directed at the world rather than books. This leads Latour (1987a) to describe Serres' 'project' as 'the enlightenment without the critique'.

Given the irony of trying to summarize the work of an author who identifies the tendency to make summaries and other such shortcuts as one of the failings of social science, what follows will focus on a limited number of themes in Serres' work. First, how the notion of 'translation' is derived from information theory. Next, how translation reformulates the epistemological standing of science and contributes to Serres' understanding of the pre-conditions of culture. Following this, the concept of 'parasitism' is explored, along with the extension of this concept into the history of human relations, where it is juxtaposed with René Girard's account of 'scapegoating'. Finally, Serres' work on the crisis in human relations provoked by the relative failure of modern solutions to the twin problems of parasitism and scapegoating is discussed, in particular his turn to the vocabulary of the sacred.

Translation as Communication and Invention

'Translation' is the major theme which dominates Serres' early work, notably the five books which make up the *Hermes* series.² In these books, translation appears as the process of making connections, of forging a passage between two domains, or simply as establishing communication. For example, in a key essay on the paintings of J.M.W. Turner, Serres (1982a) describes how Turner's use of light and colour reproduces the shift in the nature of work that occurred during the Industrial Revolution. This reproduction is more than simply a case of Turner painting what he sees around him, it is rather, Serres claims, a translation of the scientific logic of handling matter into aesthetic practice.³ Very roughly, this corresponds to a shift from classical mechanics to thermodynamics. The very way in which Turner constructs his most famous paintings around two light sources – usually a 'hot' and 'cold' source – surrounded by undulating clouds of 'colour-matter' is a way of articulating the new model of work that thermodynamics ushers in:

What is the industrial revolution? A revolution operating on *matter*. It takes place at the very sources of dynamics, the origins of force. One takes force as it is or one produces it. Descartes and Newton chose the first alternative: force is there given by the biotope, the wind, sea and gravity. . . . With it one

produces motion, work, by using tools. . . . Wind and water were tamed in diagrams. One simply needed to know geometry to know how to draw. Matter was dominated by form. With fire everything changes. . . . Turner no longer looks from the outside; he enters the boiler, the furnace, the firebox. He sees matter transformed by fire. (Serres, 1982a: 56–7)

Turner daubs rather than sketches. He blends rather than calculates. In so doing he directly confronts the changes in how matter and force are understood. But the argument runs somewhat deeper than might be expected when one notes the dates of Turner's work. Turner was active in the 1830s and 1840s. At this time, the science of thermodynamics was in a highly formative state. Serres does not, therefore, argue that Turner is simply informed by extant science of the time. He argues instead that Turner, through his artistic practice, contributes to the development of a model that is at that moment cultural *and* scientific, practical *and* theoretical. Turner acts as a relay point around which homologies in the cultural shift towards industrialism and the scientific shift from 'cold' mechanics to 'hot' thermodynamics coalesce. Turner anticipates the coming science by 'entering the boiler', by staging scenes awash with swarms of light-heat and colour-matter where 'the perception of the stochastic replaces the art of drawing the form' (Serres, 1982a). Now the notion that Turner – an artist – somehow 'anticipates' developments in physics and engineering is an audacious one, and we will turn in a moment to see how this kind of claim fits with Serres' approach to the relation between science and culture.

Translation is, then, an act of invention brought about through combining and mixing varied elements. In Turner's case this is the mixture of issues of technical composition in art with the emerging model of work and matter accompanying the industrial revolution. Michel Callon, one of the founders of actor-network theory, summarizes this version of translation in the following way:

Considered from a very general point of view, this notion [translation] postulates the existence of a single field of significations, concerns and interests, the expression of a shared desire to arrive at the same result. . . . Translation involves creating convergences and homologies by relating things that were previously different. (Callon, 1980: 211)

What Callon emphasizes is the way in which translation takes place on a common site where varied 'significations, concerns and interests' commingle. Artists, engineers and physicists, for example. More precisely, Callon points to a loose structure or 'network' of associations between ideas, things, people and resources (see Callon, 1986; Callon et al., 1986) around which and through which translation processes are enacted. The act of making 'something new', whether that be a discovery of an object or the formulation of a theory, occurs through the forging of novel associations, almost a kind of bricolage (see Latour, 1987b). Not all acts of bricolage are quite as serendipitous, however. John Law (1997) notes that translation can also be

seen as a kind of distortion. To translate is to transform, and in the act of transforming a breaking of fidelity towards the original source is necessarily involved. Law puts the point more strongly – translation (*'traduction'*) is also a kind of betrayal, a treason (*'trahison'*). How is this so?

The best way to grasp this point is treat translation as a form of communication, a message passing between points. Contemporary rhetoric around communication holds the term as an unalloyed good – communication is good, whilst miscommunication is at best an error or at worst a disaster (as in 'communication breakdown'). By contrast, Serres (1982a) studies patterns of communication as equal mixtures of signal and noise, or *interference* produced in the course of transmission. Thus the many and varied patterns of communication between science, art and engineering which occur during Turner's time are characterized as much by noise or misunderstanding as they are by success. These interferences, which form patterns in their own right, are of equal interest to Serres. He argues that they play a formative role in the development of a given set of ideas or theories.

His argument is based on a perverse aspect of information theory first identified by Henri Atlan (1974). Classically, information theory distinguishes between a sender and a receiver, between whom a signal passes. Atlan noted that this scheme places noise or interference in a completely external position, outside the relationship. It is, in a sense, the backdrop against which the communication happens. But this backdrop plays a role, since it is the necessary ground against which the signal stands out as something different. As such, noise is really part of the relationship between sender and receiver. It is an accompaniment to the signal. But this accompaniment looks very different depending on one's position in the communicative relationship. For the sender, noise will always be an obstruction – it gets in the way and must be overcome. But for the receiver, noise need not play this role. It may have its own informational value when interposed with the signal. Think, for instance, of slips of the tongue or unintended deviations from a script – going 'off message'. All this can be of interest for the receiver.

From this technical argument, Serres ([1980] 1982b) concludes that not only can there be no straightforward exchange of messages from one point to another, but that noise is a productive component of all information transmission. Without noise, interference, there could be no communication. The only alternative to this conclusion would be to posit the existence of some ideal form of communication where the signal would be entirely transparent, subject to no form of mediation or transformation whatsoever. For this to happen, there must be no possible equivocation in the reception of the signal. The only logical guarantee of such a state of affairs is an identity between sender and receiver. Such a relationship is, of course, not really a 'relation', but rather the absolute harmony of similarities. Hence:

Systems work because they do not work. Nonfunctioning remains essential for functioning. . . . Given, two stations and a channel. They exchange messages. If the relation succeeds, it is perfect, optimum, and immediate; it disappears as a relation. If it is there, if it exists, that means it has failed. It is only mediation. Relation is nonrelation. . . . The channel carries the flow, but it cannot disappear as a channel, and it brakes (breaks) the flow, more or less. But perfect, successful, optimum communication no longer includes any mediation. And the canal disappears into immediacy. There would be no spaces of transformation anywhere. There are channels, and thus there must be noise. No canal without noise. The real is not rational. The best relation would be no relation. By definition it does not exist; if it exists, it is not observable. (Serres, [1980] 1982b: 79)

In order for there to be any kind of relationship between sender and receiver, some form of noise or interference, that is, an injection of difference, is required. This comes about by the very opening up of a passage, which inevitably exposes the signal to noise, and thus also to potential transformation. Serres then arrives at the interesting paradox that successful communication necessarily involves the risk of failure. Communication may be thwarted or 'betrayed' by the medium through which it passes. But if we take the position 'downstream', at the point of destination rather than departure of the message, we may see this failure, this betrayal, as also the process of invention.

Science and Instruction

The current doxa on scientific 'interdisciplinarity' suggests that value is added by the forging of direct links between academic specialisms. Transparent communication and noise-free exchange of information are the supposed hallmarks of such a practice:

Have you noticed the popularity among scientists of the word *interface* – which supposes that the junction between two sciences or two concepts is perfectly under control? On the contrary, I believe that these spaces *between* are more complicated than one thinks. This is why I have compared them to the Northwest Passage . . . with shores, islands, and fractal ice floes. Between the hard sciences and the so-called human sciences the passage resembles a jagged shore, sprinkled with ice, and variable. . . . It's more fractal than simple. Less a juncture under control than an adventure to be had. (Serres with Latour, 1995: 70)

The error of this doxa, Serres suggests, is that it assumes that the passage between the two sciences is entirely secure, as though one could simply open a door and cross from one place to another (see also Serres, 1982a). In rejecting this assumption, Serres suggests that the spaces between, where messages become transformed in the course of mediation, are of greater interest – we would do better to think of a labyrinth or of the seeming endless Northwest Passage. It is in these spaces that confluences form as messages

intersect with one another. The great inventive power of science is born in these confluences, where heterogeneous projects, social practices and ideas become mixed together. For example, Serres ([1989] 1995c) demonstrates that the science which originated from Paris at the turn of the 18th century is inseparable from revolutionary political thought, which has decisive effects for the way the concept of irreversibility is conceived.

What Serres offers here is a distinctive approach to the history of science. This is not an ‘internalist’ history, since it recognizes the significance and influence of events outside the scientific domain upon the development of a given science. But neither is it an ‘externalist’ history, such is the power accorded to the concepts and methods generated by a particular scientific practice, which, as we have seen in the case of Turner, radiate throughout the entire social field.⁴ Furthermore, Serres does not adhere to the notion that science advances through revolutionary moments or ‘epistemological breaks’ with the past. This position is most closely associated with Gaston Bachelard (Serres’ former doctoral supervisor). The Bachelardian approach to science valorizes scientific practice as the source of rationality. Science is seen as the custodian of the rational, it alone is able to overcome the limitations of common sense and deficiencies in our understanding by radically reconstructing epistemology in revolutionary ruptures. Hence science progresses through its sudden breaks and complete transformations of the previously given. Serres rejects such an approach outright:

Far from tracing a linear development of continuous and cumulative knowledge or a sequence of sudden turning-points, discoveries, inventions and revolutions plunging a suddenly outmoded past instantly into oblivion, the history of science runs backwards and forwards over a complex network of paths which overlap and cross, forming nodes, peaks and crossroads, interchanges which bifurcate into two or several routes. A multiplicity of different times, diverse disciplines, conceptions of science, groups, institutions, capitals, people in agreement or in conflict, machines and objects, predictions and unforeseen dangers, form together a shifting fabric which represents faithfully the complex history of science. (Serres, [1989] 1995b: 6)

There are three key aspects to the alternative model of science that Serres proposes:

1. Science is not a linear process, it is neither gradual accumulation of knowledge nor constant epistemological revolution. The model Serres offers instead is topological, a shifting distribution of points in complex spatial arrangements. Historical developments in science then need to be understood in terms of transformations in the relationships between these arrangements. Hence it is no longer a question of ‘internal’ and ‘external’ factors, but rather ‘What is closed? What is open? What is a connective path? What is a tear? What are the continuous and the discontinuous? What is a threshold, a limit?’ (Serres, 1982a: 44).

2. Science is fundamentally 'impure', it is a mixture of overlapping paths between the varied sets of ideas and practices ('groups, institutions, capitals, people in agreement or in conflict, machines and objects'). Indeed it is principally at these points where science is most impure, when it can be seen to act as a kind of crossroads or point of interchange, that it is at its most developed. For Serres, the criterion for judging the adequacy of science is given by the degree to which it exposes itself to a process of mixing – 'a scientist or scholar has no right to that title unless, ceasing to defend her own disciples or discipline, she stops explaining everything from her discipline's point of view, but admires other disciplines, far and near, and learns from them' (1997a: 9).

3. Science is not the sole custodian of reason. From which it follows that, contrary to the Bachelardian tradition, we cannot as a culture be instructed by science alone. Reason is to be found across the entire fabric of the modern world: 'In a certain way reason is, of all things in the world, the most equally distributed. No domain can have a monopoly of reason, except via abuse' (Serres with Latour, 1995: 112). We find reason by looking to local practices, and particularly local languages. Every language has its own stockpile of wisdom. The problem is not the overcoming of such wisdom by a more superior form of (scientific) reason, but rather of learning how to 'speak all languages' such that one may develop a 'tolerant ethics, of third-instruction, a harmonious middle/milieu, a daughter of two banks, of scientific culture and of knowledge culled from the humanities, of expert erudition and of artistic narrative' (Serres, [1991] 1997b: 164–5).

The Birth of Physics ([1977] 2000), Serres' study of Lucretius, illustrates these three aspects well. The major work by Lucretius, *De rerum natura*, is typically seen as primarily a work of poetry and secondarily an example of classical atomism. Serres suspends this distinction by dramatically claiming that the origins of modern physics can be found in the work. The poem itself describes the emergence of the world from a vortex that is produced when an originary disturbance occurs in laminar flows of atoms falling endlessly in a void. Serres makes his case by noting that what is described here is the passage between three forms of order: the 'zero state' of dead repetition as atoms fall without deviation; the sudden turbulent state ('*turba*') which arises by accident as a small change in direction of a given atom – the '*clinamen*' or minimal deviation – sets up a catastrophic chain of collisions; and the subsequent stabilization of the movement of atoms into a vortex pattern ('*turbo*'). Serres then demonstrates how this description requires an elementary theory of tangents, spirals and hydraulics which are translated from Archimedes. But this translation is mediated by way of a strong religious association. The poem is a 'hymn of praise' to Venus, goddess of love and voluptuousness. Venus is opposed to Mars, god of warfare and death. What these two figures symbolize, Serres suggests, is two different ways of communicating with nature, two different 'contracts' ('*foedera*')

between the world of human affairs and the natural world, which map on to the principal forms of order found in the poem.

Mars presides over the falling atoms in the void. These streams of atoms are invariant, and hence eminently calculable by geometric means. In such a world, effect follows cause without cease. Destiny is predetermined and unchanging. Our relationship to the world is then governed by '*foedera fati*' – a blood contract – where control is given as the price of absolute determination. But Venus ushers in a different kind of world, beginning with the minimal deviation, where calculation can no longer dominate. This world is fluid, turbulent. The relationship between causes and effects is no longer readily apparent, it can only be ascertained in a probabilistic or stochastic fashion. A kind of freedom or '*foedera naturae*' results:

The angle [*clinamen*] . . . breaks the chain of violence, interrupts the reign of the same, invents the new reason and the new law, *foedera naturae*, engenders nature, as it really is. The minimal angle of turbulence produces, here and there, the first spirals. It is literally the revolution. Or the first evolution towards something other than the same. Turbulence disturbs the chain. It troubles the flow of the identical, just as Venus disturbs Mars. (Serres, [1977] 2000: 110)

The *foedera naturae*, the new laws of nature, hold that we cannot predict in advance what will unfold. We must experience it for ourselves, that is, communicate directly with nature as participants in its unfolding. For Serres, science – from geometry to Newtonian mechanics – has consistently chosen the path of Mars, seeking control and determinism. Only recently, with the 'rediscovery' of fluid mechanics and the new understanding of turbulence and emergence provided by the complexity sciences, has Venus returned along with the possibility of a different kind of contract (the return of *foedera naturae* in the form of a 'natural contract' is taken up in Serres' later work, which we will turn to in the concluding section).

In this way, Lucretius becomes our contemporary. It is as though time were folded back on itself, such that what was previously unimaginably distant is brought within the same proximity. Serres offers a variety of metaphors to think this process, such as the work of a baker who rolls out dough then folds it back on itself before rolling out again (Serres, [1991] 1997b). Or else, noting the use of *temps* in French for both time and weather, that we should think of time as 'aleatory mixtures of the temperaments, of intemperate weather, of tempests and temperature' (Serres, 1997a: 7) which 'percolates' rather than 'flows'. Subject to such percolation, modern science recovers its own hybrid, mixed foundations in the struggle between *foedera fati* and *foedera naturae*. Science itself finds instruction from another source: from the sacred and from myth.

What does it mean to find instruction in texts such as *De rerum natura*, in myth and ancient religion? For Serres it means a recognition that knowledge is in tatters, rather like Harlequin's coat assembled from an infinite

number of rags (Serres, [1991]1997b). To seek knowledge is then to embark on the task of journeying between these tatters and in the course of so doing to weave out connections between them. The image is itself mythic, derived from the Greek legend of Penelope – she who weaves space together, who connects the fragments. Indeed, it is a mythic figure – Hermes, the god of communication – who acts as Serres' avatar in his early work. Hermes is the messenger of the Gods, often depicted with his winged hat. But Hermes, as son of Zeus and Maia (daughter of Atlas, one of the Titans over whom Zeus triumphed), is much more than this. He is also a thief and trickster, responsible for the theft of Apollo's herd, and the inventor of the lyre, from which both music and technology follow. Moreover, Hermes is god of commerce, the inventor of weights and measures, as well as the protector of boundaries and the guide of travellers. As such he embodies Serres' sense of the inseparability of the political and the economic from science and myth. Following Hermes' travels becomes Serres' way of tracking and weaving connections between the tattered divisions in knowledge.

Let us draw up a brief balance sheet accrued so far. Serres' project is understanding communication between forms of knowledge, with a special concern for the sciences. Such communication is noisy, it is a mixture of messages subject to transformation. What Serres then describes are the connections, the translations that occur as part of the distribution of knowledges. Serres then advances a particular view of wisdom as that which is garnered by occupying the middle position, right in the midst of the confluences and mediations. We should seek our instruction neither from science alone, nor the sacred, nor any singular form of understanding, but should rather seek to occupy the spaces of transformation which lie between – neither one nor the other but the 'third space'. Hence Serres ([1991] 1997b) gives the name 'third-instructed' (*tiers-instruit*) to him or her who is able to give up the comforts of disciplinary specialism and risk putting themselves into perpetual translation.

But this provisional summary makes Serres sound like a formal epistemologist. Nothing could be less accurate:

The rationalists of the generation before my own had the same relation to the rational as old bigots have to virtue. It was more morality than research, more a social strategy than an intellectual one. I think it was a certain relation with cleanliness; but where do we put the dirt? (Serres, [1980] 1982b: 13)

Serres, unlike many other writers who have been concerned with 'information', does not see invention as following from a 'better' (or 'cleaner') systemization of knowledge (on which see Day, 2001). It is not a matter of shuffling the stuff of the world around into different or ever finer epistemological categories. Translation, for Serres, is the very condition of culture. It is what affords relations between humans, perhaps even the very conditions for human existence itself. More is at stake than epistemology. This becomes clearer when we follow Serres' account of origins and foundations.

Origins: Multiplicity

Origins are unproblematic for a science under the sway of the *foedera fati*, since causes and effects are interchangeable under the iron laws of determinism. Recognition of the *foedera naturae* complicates all of this. Causes and conditions are no longer directly associated with effects on a given thing. Which means that 'we can always go from the thing produced to its conditions but never from the latter to the former' (Serres, [1977] 2000: 115). How then are we to understand the emergence of something new in the world? By beginning to trace the chain of translations that underpins this emergence. Serres compares this to a journey upstream from the unity of a river at the point where it meets the ocean to its initial sources:

The downstream course, the worn-out path, the slope, the chreod, run, from upstream confluences to downstream confluences, toward synthesis and the unitary. The upstream course, double doubt wavering to begin with, multiplies its bifurcations like a seven armed candelabrum, like a full bouquet, a bush, an arborescence, an head of hair, a refined network of veins and fibrils, an endless network of doubts, anxieties. (Serres, [1982] 1995a: 17)

Pushing upstream, we find that the river is actually the result of a network of bifurcations and junctures, where multiple tributaries are gradually brought together. The further upstream we move, the more it becomes clear that the singularity of the river is an exception to the general confusion of cross-cutting streams. The lesson Serres learns from this journey is that order is made gradually through a series of transformations of disorder linked one to another. What is this original confusion out of which unity arises? Here Serres finds his bearings in ordinary language. The French equivalent of noise is *bruit*, but there is a far older usage of the word *noise* which denotes clamour and dispute (*chercher noise* – look for a fight). Serres adopts this archaic term to name the 'pure multiplicity' or founding disorder into which the chain of translations ascends as we follow it upstream. 'Noise' is unlocalizable, it is the clamour which surrounds an endless trading of place, where it becomes impossible to clearly differentiate one thing from another. There is only a continual movement which seems to overrun place, take up and confuse space. Serres refers to this 'noise' as 'black multiplicity'.

Such a multiplicity is, however, difficult to think because of our reliance on the visual as the primary medium for conceptual analysis (on which see Crary, 1992; Jay, 1993). Vision, by its very nature, involves the perception of clear forms, that is, differentiation. There can be 'no vision without division', as Bob Cooper (1997) puts it. Hence 'black multiplicity' – we cannot adequately visualize this disorder. But if vision is not well suited to thinking multiplicity, then the auditory is perfectly so, since we hear without distinct boundaries between signals:

I hear without clear frontiers, without divining an isolated source, hearing is better at integrating than analyzing, the ear knows how to lose track. By the

ear, of course, I hear: temple, drum, pavilion, but also my entire body and whole of my skin. We are immersed in sound just as we are immersed in air and light, we are caught up willy-nilly in its hurly-burly. (Serres, [1982] 1995a: 7)

This fluid description of an undifferentiated multiplicity sounds similar to Lucretian turbulence, but for Serres it is the 'chaos-cloud' of the laminar flow that acts as founding noise. But surely the laminar flow is order *par excellence*, absolute determinism – how can it be an instance of background noise? The identification of absolute order with absolute noise comes by way of an old insight of information theory. In Shannon and Weaver's (1949) classic formulation, information is measured in a curvilinear function against the degree of equivocation present in a message or the extent to which a message is ambiguous (i.e. a bell shape with information on the vertical axis and equivocation on the horizontal axis). Zero equivocation is a situation of absolute clarity between sender and receiver. There is no interference, perfect transparency. And thus no information whatsoever, since for such a circumstance to occur there must be absolute identity between the two parties, rather like the complete reversibility of cause and effect in Newtonian mechanics. Communication is, properly speaking, unnecessary. At the other extreme, maximum possible equivocation, no message can be detected under the barrage of interference. Here also there is no information, since it cannot be distinguished from background noise. Considered from an informational point of view, the two circumstances are as one – zero equivocation and maximum equivocation are equally lacking in information, equally 'noisy' in Serres' sense of undifferentiation.

What then is opposed to black multiplicity? In *Genesis*, Serres discusses a pivotal moment in Balzac's novella *The Unknown Masterpiece* where the once great artist Frenhofer unveils his masterpiece to his disciples. He reveals a canvas daubed with a 'delirious chaos of colors, shades and forms, a disorder with nothing to be seen or understood in it' (Serres, [1982] 1995a: 27). The painting – *La Belle Noiseuse* – is pure noise, black multiplicity. Recovering from his shock, one of the disciples examines the canvas more closely and eventually detects what looks like a foot. The discovery of this form changes everything, since it provides a point around which viewing of the painting can be oriented. And from this perspective it is indeed a masterpiece. The foot is the tiny differentiation – like the clinamen which initiates turbulence – that turns noise into putative order. Serres names this state 'white multiplicity' or 'blankness'. It is order in its virtual state, where all the possibilities are present. White multiplicity, like turbulence, requires a minimal differentiation in order to arise from noise. But it does not (yet) approach a clearly ordered form. It is a kind of in-between state, neither pure noise nor pure order, a third position ranged between the two. This is also precisely the point where Shannon and Weaver (1949) identify maximum informational value, at the peak of curvilinear

function which is midway between the two extremes of equivocation, where noise and signal are equally mixed.

Parasite Logic

Let us turn back to the question of human relations. Are they similarly derived from a founding disorder by way of a minor differentiation? In *The Parasite*, Serres identifies this differentiation as a kind of interruption. He illustrates this by noting the three meanings which ordinary French confers upon *le parasite*. The first of these is as static or noise, that is, interference or interruption. A fable from La Fontaine demonstrates this meaning. The town rat invites his cousin, the country rat, to dine with him in the house of a tax farmer. The two cousins feast on leftovers on the carpet in the farmer's dining room, while the farmer sleeps upstairs. Suddenly, their feast is interrupted by noise outside the door. The two cousins flee. They await the abating of the noise. The farmer, who had been roused by the rats' carousing, returns to his slumbers. The town rat urges his cousin to return to the feast. But the poor thing cannot bear it: 'Let's go to the country where we eat only soup, but quietly and without interruption' (p. 3).

The feast takes place in the house of a tax farmer: he produces nothing, the fine food on offer is acquired by levy. Everything that occurs in the fable is a form of theft, or better, a kind of interruption in the usual flow of things. The tax farmer parasites the producer. The town rat then parasites the farmer. The invitation to the country cousin makes space for a third act of parasitism. So we have a kind of chain of parasites, which forms a clear sequence where each in turn takes from the former – 'the parasite parasitises the parasites' (Serres, [1980] 1982b: 55). We might imagine such a chain stretching on without end. But it does end. With the knock at the door, a noise from outside which causes the chain to fall apart. But only temporarily. The town rat returns, the parasites come back. The game they play is to always come last, to be in the last position in the parasitic chain. And thus to stand, open mouthed, ready to absorb all of what flows down the chain. The last in line collects all.

Second meaning – the parasite as a biological organism which preys upon a host. Or tiny irritants from which there is no let up. Parasitism is one of the most basic survival strategies adopted across the living world. Humans adopt this strategy, Serres claims, when we domesticate animals as a kind of living raw material to be consumed or turned into clothing. We clothe ourselves in animals the same way other parasites burrow into the skin of their hosts. Here we also see the fundamental dependence of host and parasite, how one cannot exist without the other. Serres illustrates this with another fable. A paralysed man crawls on his hands and knees. He spies a blind man. The blind man stumbles over every obstacle and seems in all likelihood to be liable to injure or kill himself by accident. The paralysed man offers him a deal: carry me on your shoulders and I will be your guide. Together, Serres states, the two make a new kind of whole. The

paralysed man provides information, the blind man provides force. Each parasite is then highly specific, dependent upon a particular kind of host.

Taken together these two meanings of the parasite suggest a way of considering human relations as a parasitic chain which interrupts or parasitizes other kinds of relations (that is those of other animals, or the natural world itself). The essence of such parasitism is taking without giving. It is an asymmetrical, one-way relationship. This leads to the third and final meaning – the ‘uninvited guest’ or ‘social loafer’ who charms their way on to a host’s dinner table and eats for free. Or rather, who makes an unequal exchange, paying for their roast beef with tall stories. This sounds like the absolute antithesis of human relations, but, by way of another fable, Serres is able to illustrate how human relations may depend upon just such an unequal exchange. A poor man is starving with an empty belly. He approaches the kitchen door of a restaurant and smells the fine food inside, which sates his hunger somewhat. An angry kitchen hand comes out and demands that the poor man pay for the services rendered. An argument ensues. A third man arrives and offers to settle the matter:

Give me a coin, he said. The wretch did so, frowning. He put the coin down on the sidewalk and with the heel of his shoe made it ring a bit. This noise, he said, giving his decision, is pay enough for the aroma of the tasty dishes. (Serres, [1980] 1982b: 34–5)

This new arrival makes a link between two different forms of social order, one where coins are exchanged for food, and another where sounds are exchanged for smells. No exchange nor communication was thought possible between these two systems. The action of the parasite – the third man of the fable – is to open up a channel where a new kind of exchange is possible, where coins are transformed into sounds which are exchanged with food transformed into smell. Communication becomes possible. This is something new, this is a transformation of the relationship between the two social orders:

The parasite invents something new. Since he does not eat like everyone else he invents a new logic. He crosses the exchange, makes it into a diagonal. He does not barter; he exchanges money. He wants to give his voice for matter, (hot) air for solid. (Serres, [1980] 1982b: 35)

In informational terms, the parasite provokes a new form of complexity, it engineers a kind of difference by intercepting relations. All three meanings then coincide to form a ‘parasite logic’ – *analyse* (take but do not give), *paralyse* (interrupt usual functioning), *catalyse* (force the host to act differently). This parasite, through its interruption, is a catalyst for complexity. It does this by impelling the parties it parasitizes to act in one of two ways. Either they incorporate the parasite into their midst – and thereby accept the new form of communication the parasite inaugurates – or they

act together to expel the parasite and transform their own social practices in the course of doing so. The diners collude to expel the uninvited guest. The farmer wakes in the middle of the night hearing rats eating. The host interrupts the parasite and it all starts over again. But not exactly in the same way. Here then is the origin of human relations: the struggle to incorporate or expel the parasite.

‘Rome is Built on a Graveyard’

Serres calls *The Parasite* the ‘book of evil’ ([1980] 1982b: 253). This with good cause. He asserts that life is founded on a one-way relation of taking without giving or ‘abuse value’. This, for Serres, is the primary form of value, before use or exchange value. Labour and economics come much later. Human relations are parasitic chains and must necessarily be so, since their transformation, their very history, depends on parasites. This is a truly demonic argument. How then is living together possible? How is it that we appear to be able to tame our parasites, to live together in the company of parasites with one another?

The point is best put by considering the Hobbesian degree zero of social relations: the war of all against all. Here the social contract, the coming together of the people as Leviathan around the figurehead is what holds the war of all against all in check. Serres claims instead that war is not a generalized state. We are not engaged in a fight to the death with one another. Rather, war is specified, directed against one person in particular: she or he whom we identify as the parasite. This makes it ludicrous to talk of war, this is murder. Or rather expulsion, sacrifice. Here the influence of René Girard’s (1978) account of the mimetic structure of desire is clear. In brief, Girard argues that desire takes the form of a mimesis, that we mould our desires according to those of whoever stands as our model. We take on whatever appears to us to be the object of that desire. But in so doing the model then becomes our rival, since we are now competing for the same desired object. Hence rivalries become endemic. The solution to the proliferation of rivals is through the nomination of scapegoats. The scapegoat will be excluded, sacrificed. They will act as the generalized model whose destruction will supposedly free up the collective objects of desire. But of course the sacrifice of the scapegoat as generalized model means that we will now be bound together in our collective guilt at being party to the murder of him or her who was the basis of our desires. Serres locates Girard’s argument within a state of generalized parasitism:

History hides the fact that man is the universal parasite, that everything and everyone around him is a hospitable space. Plants and animals are always his hosts; man is always necessarily their guest. Always taking, never giving. He bends the logic of exchange and of giving in his favour when he is dealing with nature as a whole. When he is dealing with his kind, he continues to do so; he wants to be the parasite of man as well. And his kind want to be so too. Hence rivalry. (Serres, [1980] 1982b: 24)

Parasites will inevitably become rivals since mimetic relations of parasitism abound. We parasitize nature and when dealing with our fellow humans seek to parasitize them also. So we become models for one another. But if we follow the logic of Girard's argument, then this likely war of all against all becomes the war of all against one. The collective will turn towards the scapegoat who must be expelled, murdered. But who will be nominated? Who will be 'it'?

In *Rome: The Book of Foundations* ([1983] 1991), Serres describes how the conjunction of parasitism with scapegoating is the engine of Roman history. Serres draws extensively on Livy's classical account of the foundation of Rome, or rather of the multiple and successive re-foundations. Serres points to a common pattern across the foundation myths, where the founding moment occurs through a conjunction of murder, the sacred and the possibility of collective violence. Before Rome is founded, on the same spot, the shepherd Cacus is murdered by Heracles. The murder is occasioned by a dispute over stolen oxen. Heracles initially steals a herd of oxen from Geryon. He drives them across the river Alba to cover their hoofprints. While he rests, Cacus steals the oxen in turn. He forces them to walk backwards into a cave, so hiding them by inverting their tracks. Heracles is confused by the trail, but is then alerted by the lowing of the oxen from within the cave. He enters and murders Cacus in the midst of his fury. It is now Cacus who calls out with his dying breath, which summons his fellow shepherds. Another murder looks inevitable. This lynching is, however, prevented by the arrival of a local dignitary, Evander, who hails Heracles as the son of Zeus. Since no one may readily kill a god, the scene is transformed into one of worship. In a matter of moments, Heracles passes from being a thief to a victim, and then from a murderer to a god. At the same time, Cacus similarly shifts through the roles of thief and victim, and the crowd of shepherds move from vengeance to reverence. It is as though everyone passed through a number of values.

A number of points are worth making about this scene. It is played out between parasites. Heracles steals from Geryon, Cacus steals from Heracles, who steals the herd back in turn. Perhaps the summoned shepherds have yet more theft in mind. A parasitic chain then emerges. But this chain is broken when the identities of all the parties involved start to circulate. The chain reverts into a kind of white multiplicity – not exactly chaos, but not orderly either. At the moment when Heracles, soaked in Cacus' blood, stands before the vengeful shepherds a new form of order emerges in the parasitic chain, one where it is no longer possible to differentiate the actions of one parasite from another:

Who changed the tracks? The oxen? Certainly, for these are their very steps, made by their hooves. Cacus? Assuredly, for he pulled them by their tail. Evander? Yes, it is he who lied, calling a common murderer a god. Hercules? He crossed the river to erase the tracks. In other words, who lied? Everyone. And in what sense? In every sense. (Serres, [1983] 1991: 17)

The emergence of white multiplicity – the noise of disorder mixed with all the possibilities, the maximum value of information – breaks the cycle of parasitism. And from this Rome will eventually be founded. But with a caveat, Heracles has a privileged position in this founding. ‘Only Hercules is blank’, Serres notes, ‘the others are on the way to being so’ ([1983] 1991: 33). In other words, it is Heracles who most embodies the white multiplicity, the ability to take on all the values at once (thief, murderer, god).

Another foundation story, taking place on the same site. Romulus and Remus, twin brothers suckled by the she-wolf, have risen to positions of authority. A conflict breaks out between them. They face off with one another, surrounded by their followers. Something happens, nobody knows what, but suddenly Remus lies dead. Perhaps killed by Romulus. Maybe lynched by the crowd themselves. Whatever, in any case the mob turns to Romulus. The scene is ugly. But, again, it is resolved when Romulus is hailed by a group of elders as a god. A god-king, founder of Rome. The founding moment comes in the midst of murder and divinity. Romulus and Remus, like Heracles and Cacus, pass through all the values – bastard children of wolves, heroes, murderers, victims, gods. As before, the murder scene results in a new form of order. Someone is accused, but they escape punishment. Someone else dies. There has been a sacrifice, and the collective forms itself anew.

The same pattern occurs in a yet further foundation story. Romulus reviews an assembly at the swamp of Capra. Suddenly a storm breaks loose. The crowd scatter. When they return Romulus has disappeared. Has he been murdered? Has he simply fled? Nobody knows. In his absence, Romulus is hailed a god. He has clearly ascended to his rightful place in the heavens. Later on, a rumour gets around:

It is murmured, very low, as if a great mystery, that the twin has been torn to pieces by the [city] Fathers, with their own hands. Every one of them, the story goes, hid a piece of him in the folds of their robes and carried it away. Division of power, division of the corpse. (Serres, [1983] 1991: 89)

Three foundation stories, each describing a murder, a Girardian sacrifice where someone is expelled from the collective. They are made a scapegoat. Following the murder, the expulsion of the scapegoat, the collective reformulates itself in a different way. Serres assigns a name to each of these reformulations – ‘trampled multiplicity’, ‘fragmented multiplicity’ and so on. At the point of murder, however, all the collective movements appear as ‘white multiplicities’, mixtures of noise and possibility. Serres recalls that there was once another city – Alba (‘the white’) – which stood where Rome came to be built. In its moments of foundation, Rome reverts to an ‘Alba’ state. The history of Rome is made by the collective movement from one form of multiplicity to the ‘collective furore’ of black multiplicity, hence the white multiplicity of the sacrificial scene, before the emergence of a new form of order. Rome is built on a graveyard filled with the bones of its scapegoats.

Nevertheless, there is an important historical difference. In the first story the most obvious candidate for murder – Heracles – manages to escape sacrifice. And in the last story, Romulus is not so much expelled as divided into pieces, carried away by the city Fathers. What is the significance of the change between the two sacrifices? In the first, it is Heracles himself who is the source of ‘blankness’. He alone can take on all of the values. Serres reserves a particular name for someone or something who can substitute themselves in this way:

I have given the name *joker*, or blank domino, to a sort of neutral or, rather, multivalent element, undetermined by itself, that can take on any value, identity or determination, depending on the surrounding system that it finds itself inserted in. I can say that the joker is a king, a jack, a queen, or any number. (Serres, [1983] 1991: 93)

The joker (or blank domino) is abstract and blank, like a mobile white space which can be deployed in any position. It can take on all the possible positions. Played in the middle or end, the joker causes the play, the sequence, to bifurcate. Jokes are ‘wild’ in the sense that they are unpredictable – we do not know what will happen when they are put into play. So the joker, as a special kind of parasite, is an engineer of difference, of complexity. It leads relations to go astray. Identifying the joker is an important development in Serres’ thought, since this figure seems capable of breaking the chain of parasitism. It is also able to escape sacrifice, by substituting another for itself (see Serres’ [1980] 1982b reading of the story of Joseph). But what of the last sacrificial scene? Is this a joker gone awry or something else?

Quasi-objects and the ‘Return of Evil’

The principal question in the sacrificial scene is ‘who will be excluded?’ Which of the parasites will be expelled, breaking the chain? Who comes last in line? Who will be ‘it’? Jokers are never ‘it’ because they can always be substituted for something else. But this quality of substitution makes them ideal for another purpose – acting as a token that will enable the selection of a victim. Cacus is identified as the victim because he is the one left with Heracles. He is ‘it’. A wiser man would know to run. Romulus as he stands before the crowd at Capra is not a joker, since he is sacrificed. But something peculiar occurs when his body is dismembered by the city Fathers. He becomes a kind of token. Whoever is caught with a piece of the corpse will most certainly be next in line for sacrifice. Romulus’ dismembered corpse then becomes a kind of marker of relations, a token which must be passed on as quickly as possible. Serres notes that these kind of tokens are fundamental to many forms of games:

We have all played the game of hunt-the-slipper or button, button, who’s got the button. The one who is caught with the *furet* has to pay a forfeit. The *furet*

points him out. One person is marked with the sign of the furet. Condemned, he goes to the center; he's 'it'. (Serres, [1980] 1982b: 225)

The token that circulates is a species of joker. Serres names it 'quasi-object'. The name is misleading, however. Serres has in mind a token which does more than simply keep a game going. This is more than a simple object. It is 'quasi' object since it is undetermined, its particular qualities are unimportant. Its standing comes from the way it moves as a token. And it is the movement that holds together the players:

This quasi-object, when being passed, makes the collective, if it stops, it makes the individual . . . the moving furet weaves the 'we', the collective; if it stops, it marks the 'I'. (Serres, [1980] 1982b: 239)

Consider a game of rugby. The players are oriented around the ball, the token. They act in relation to the token, which is like a little sun around which the players orbit. The players become almost extensions of the token – its attributes. They are the means by which it passes, their movements have the sole aim of maintaining the play, of passing the token between one another. In so doing the token weaves the collective. Which is to say that the relationships between the players are defined by how they position themselves with regard to the token. It is the movement of the token that defines their relations. Now games often have their origins in cruelty and terror. And here is the terrifying aspect. Who will be caught in possession of the token? Who will be left with it when the play stops? She or he will be 'it':

The quasi-object that is a marker of the subject is an astonishing constructor of intersubjectivity. We know, through it, how and when we are subjects and when and how we are no longer subjects. 'We': what does that mean? We are precisely the fluctuating moving back and forth of 'I'. The 'I' in the game is the token exchanged. And this passing, this network of passes, these vicariances of subjects weave the collection. (Serres, [1980] 1982b: 227)

The token is a marker of the subject. She or he who is caught with the token is 'it', a subject. We others form the indivisible mass, we are the mute collective who will turn on the 'I', who is now victim, the excluded. The quasi-object marks out these 'I's, it is the moving back and forth of this marker, these provisional subjects. In this sense Serres refers to the token as equally quasi-subject. But this pointing out is ambiguous. To be the 'I' is to enjoy a privileged position. One is able to influence the play – shoot for goal, make a heroic move. But equally one is potential victim – the fool, the one to be excluded. Hence the collective turns around the endless selection and passing on of 'I's.

We become subjects through the way in which we are caught up in the circulation of that which will make us 'it' – the 'moving back and forth of the "I"'. Sociality is neither an atomistic adding together of individuals, nor an abstract contractual arrangement. It is a collectivity assembled and held

together by the circulation of an object. This materialist basis to sociality has been long overlooked:

Our relationships, social bonds, would be as airy as clouds were there only contracts between subjects. In fact, the object, specific to Hominidae, stabilizes our relationships, it slows down the time of our revolutions. For an unstable band of baboons, social changes are flaring up every minute. One could characterize their history as unbound, insanely so. The object, for us, makes our history slow. (Serres, [1982] 1995a: 87)

Serres here describes a passage from thing to object and thence to quasi-object. Humans, he claims, make things into objects by adopting them as markers of relations. This is the triumph of Rome, which ‘discovers the object’ in its dismembering of Romulus. Once put into circulation, such objects then leave behind their objective status. Enquiring into the objective characteristics (e.g. size, qualities, properties) of a quasi-object reveals nothing about what it actually does. But unlike the joker or the blank domino, which are for Serres ‘pure multiplicities’, the quasi-object is only relatively undetermined, meaning that it can become embedded within a concrete, highly deterministic social practice. There is then a passage of an object to the status of quasi-object and the subsequent emergence of a distinctive social practice. These practices are more sophisticated solutions to the problem of social order and violence than scapegoating. In his genealogy of quasi-objects, Serres points in particular to three ‘universal’ solutions in the form of religion, commerce and the military, each of which he assimilates to George Dumézil’s tripartite scheme of Indo-European social functions (see Table 1). Religion, for example, seizes upon sacred objects which become circulating ‘fetishes’ to bind the faithful, the military achieves the same by taking weapons and making them operate as ‘stakes’, while commerce adopts money and goods which it transforms into ‘merchandise’.

The history of human relations is then bound up with, or slowed down by, the operation of these ‘social universals’ with their respective quasi-objects. Note, though, that for Serres there is a kind of equivalence between these schemes. Religion involves calculated exchanges and warfare, just as much as commerce has its own violence and forms of sacrifice, and the military has its fetishistic and economic aspects. The fourth social universal – communication – is to some extent associated with modern science, which

Table 1. The Four Social Universals

Social practice	Objects	Quasi-objects	God
Religion	Icons, relics	Fetishes	Jupiter
Military	Weapons, violence	Stakes	Mars
Commerce	Money, goods	Merchandise	Quirinus
Communication	Messages, signals	Information	Hermes

has made information in the form of genetic code the very principle of life (a key player in this being Serres' friend the molecular biologist Jacques Monod). But science, that which was supposed to make a break with the 'unreason' which supposedly characterizes the other social universals, ends up operating by much the same principles:

[I]n wanting to replace the society of missionaries, in contracting orders with the society of mercenaries, and in absorbing an expanding financial bulk, science has gotten filled to the brim with fetishes, stakes and merchandise. Its objects have become fetishes to be worshipped, prizes and competitive stakes, and desirable merchandise. Science is returning to the most archaic of societies. It is not science any more, it no longer resolves our crises or our terrors. (Serres, [1982] 1995a: 90–1)

Serres offers Hiroshima as an exemplary moment of the lapse of science into its own fetishes, stakes and merchandise. This marks a particularly curious moment in the history of science. At the very moment when science appears to be at its most powerful, it appears to be 'full to the brim' with the other social universals. This makes for an extremely volatile situation:

We are now, admittedly, the masters of the Earth and of the world, but our very mastery seems to escape our mastery. We have all things in hand, but do not control our actions. Everything happens as though our powers escaped our powers – whose partial projects, sometimes good and often unintentional, can backfire or unwittingly cause evil. As far as I know, we do not yet control the unexpected road that leads from local pavement, from good intentions, towards a possible global hell . . . *So, it no longer depends on us that everything depends on us.* (Serres with Latour, 1995: 171–2)

Here Serres plays on the ancient distinction between 'those things that depend on us' (i.e. sociality) and 'those things that do not depend on us' (i.e. nature). His point is that modern technoscience renders us such complete control over the natural world that not only does the entire world now fall prey to our powers, but that we can no longer choose to abdicate responsibility for the exercise of these colossal powers ('it no longer depends on us that everything depends on us'). In *The Natural Contract* ([1990] 1995d), Serres argues that this unique situation is exacerbated by the globalization of human relations. We are now the biggest parasites of them all, able to communicate and act (i.e. parasitize) on a global scale, with far-reaching effects:

Finally we have reached such sizes that we exist physically. The thinking individual, having become a beast collectively, is now joined to others in multiple ways and turns to stone. Upon this rock is built the new world. (Serres, [1989] 1995c: 19)

Human society is now at such a scale that it 'weighs upon the earth' like a tectonic plate. We 'exist physically' for the planet, our actions constituting a significant 'variable' in its evolution and fate. It is at this point that the problem of evil returns for Serres. Maria Assad (2000) points out that French possesses a single word '*mal*' for both evil in the moral sense and the far lesser adjectival form 'bad'. So if the parasite is 'evil', it is so initially in this latter sense as an irritant, a 'bad thing', but not 'evil' in the fully moral sense. Yet, it is of the nature of parasitism to assemble itself into chains. From small initial causes, these chains may multiply their effects – 'the parasite becomes an invader, a veritable tidal wave of tsunamic power that sweeps any opposition aside' (Assad, 2000: 274). When human society reaches a globalized state, the increasing extension of parasitic relations approaches such a monumental scale that it appears as something like a biblical 'evil'. From small origins, global communication makes it possible to amplify random acts of parasitism beyond all imagination.

In *Angels* ([1993] 1995e), Serres turns back to the sacred to find a vocabulary in which to speak of this evil, and also to search for a counter-power. Serres writes in the wake of what he assumes to be the failure of all four universal solutions and quasi-objects – fetishes, stakes, merchandise and information – to address global parasitism. But rather than reject all four outright, he seems to be aiming for a synthesis of religion and communication. Hence the figure of the angelic as 'message bearer' which runs through the book. There are a number of strands to his argument. First, since each social universal shares the same characteristics, we must choose between them according to the degree to which they foster violence and sacrifice. Religion, at least in the Christian monotheist tradition, minimizes sacrifice by making a single scapegoat pay for all, making it in some sense 'preferable'. Second, modern mass information communication technologies, although fostering the extension of parasitism, also make a form of global community possible. We see this in the recent satellite images of the Earth that show the urban sprawl of Western cities as a single gigantic smudge of light. Serres ironically terms this global city 'Los Angeles': city of angels, city of light. Such a community might collectively be able to overcome its own parasitic impulses and start to renegotiate its own relations with the planet. Finally, these incredible satellite images also enable us to envisage, for the first time, the planet itself as a kind of 'global subject'. We are now literally able to see what it is that we are trying to negotiate with.

The goal of such negotiations is the return of the *foedera naturae*, in the form of a new 'natural contract'. About the exact terms of such a contract, Serres is understandably sketchy. He describes it as a bond, a cord which binds partners to one another:

The cord has three functions. First, the cord . . . marks out a field and with its flexibility surrounds it: can anything be defined without it? To this object, second, it attaches the subject, as if to its knowledge or its property. And third, it informs others, contractually, of the situation produced by the

enclosure: can there be collective forms of behaviour without this? These practices concern, respectively, form, energy and information; they are, if you will, conceptual, material and judicial; geometric, physical and legal. Bonds of knowledge, of power and of complexity. All in all, its triple tress links me to forms, to things and to others, and this initiates me into abstraction, the world and society. Through its channel pass information, forces and laws. In a cord can be found all the objective and collective attributes of Hermes. (Serres, [1990] 1995d: 108–9)

The cord, the contract, first of all defines an object – such as the planet – which is made over into a form. A subject is then linked to this object, but in a crucial relationship of dependence (i.e. our dependence on the planet for life). The cord then indicates what is necessary for its own preservation. Thus the ‘contractual’ aspects of these practices are grounded in ‘objective’ characteristics of the cord itself. Now, whether or not we share Serres’ apparent belief that global communication can facilitate this kind of meditation on the shape of the new *foedera naturae* – and there are certainly contrary voices worth hearing (see Bell, 1997) – the real power of Serres’ claim lies in the way he points out that we have never really talked about or thought about anything else. Science, law, religion – these are all ways of making contracts, cords that bind us to one another and to the world. We are at once very modern and very ancient, approaching the brink and right where we have always been. Hermes returns. One more reason to follow Serres in seeking instruction from the knotted spaces which lie between these practices, these times.

Notes

1. ‘Nicolas Bourbaki’ was the pseudonym for a floating group of French mathematicians who began, in 1935, the grand project of reconstructing mathematics on the basis of then recent developments in set theory and algebra. The project continues to this day.
2. These books are *La Communication*; *L’Interference*; *La Traduction*; *La Distribution*; *Le Passage du Nord-Ouest*. Extracts from the Hermes series have been translated as Serres (1982a).
3. However, Serres changes his mind in a 1997 paper, after learning of ice core samples taken from the Antarctic which indicate that volcanic activity around the time of the paintings may actually have resulted in just the kind of atmospheric conditions that Turner paints. The lesson Serres draws is that his own former analysis was insufficiently instructed by both science and culture.
4. Two other notable instances of science studies which similarly elide the externalist/internalist distinction are Latour (1999) and Stengers (1997), both of whom have worked with Serres.

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