

FRANCIS BACON, SLAVE-DRIVER
OR
SERVANT OF NATURE?



Is Bacon to blame for the evils of our polluted age?

by

Nieves H. De Madariaga Mathews
author of

Francis Bacon : The History of a Character Assassination

When considering at what point we took a wrong turning, destructive to the earth and all that dwell upon it, those who are working for a new concept of science often invoke, as the villain of our disastrous piece, Francis Bacon, the 'father of experimental science', whose prophetic *New Atlantis* was published soon after his death in 1626. Bacon is reproached (along with Descartes) for spearheading a scientific revolution which promoted a mechanistic view of nature, and abdicated all responsibility for the results of its discoveries. Some have seen in a 'Messianic' Bacon the very model of the biotechnology at work today in the global markets - a 'cult camouflaged as science', 'a mindset that views science as a way of bringing man closer to God', and claims to improve our lives while actually degrading them.

In the film *Mindwalk*, based on the ideas of Fritjof Capra in *The Turning Point* (1982), Liv Ullman, as 'the physicist', indignantly decries our modern science, of which Francis Bacon is made the epitome. According to Bacon, the physicist declares, 'nature had to be hounded and made a slave to the new mechanized devices; science had to torture nature's secrets out of her'.

And 'hasn't modern science', she concludes, 'done exactly what Francis Bacon preached - hasn't it tortured our planet?'

Did Bacon really preach these things? Many have believed he did, since, half-way through our century, two illustrious thinkers at the opposite extremes of the political scale concurred in laying at his door not only our polluted air, sea and soil, but the polluted lives of our alienated consumer society. In 1942 Herbert Marcuse, the patron saint of a generation of leftist extremists, described Bacon as the 'evil animus' of modern science, while Martin Heidegger, who was still celebrating in 1953 what he called 'the inner truth and greatness of Nazism', denounced in Bacon the symbol of a nefarious identification of science with technology. During those same decades Bacon's reputation as a scientist was also at its lowest ebb. At the hands of Karl Popper and others, the 'Great Secretary of Nature' had been demoted to sham thinker - a mere fact-collecting inductionist - and altogether excluded from the present scientific scene. Struck by the paradox, an eminent Baconian scholar, Paolo Rossi, pointed out that those who exalted science allowed Bacon no part in it, while those who looked on it as thoroughly evil, saw him as 'its very essence'.

When we turn to what Bacon *actually said*, however, these various dismissals prove groundless. Absorbed in their respective ideologies, their authors had failed to read Bacon in the original - and to read him in context - thus making a gross travesty of his model of science, and reducing his philosophy to a handful of slogans. This was the conclusion of various Baconian scholars who, in the 1980s, closely studied the meaning of his texts, reconstructing the situation in which he worked. Bacon's

induction, based on the generation of laws from observation and experiment, by means of an intuitive 'analogical leap' from the observed to the unobservable, was shown to be a highly original contribution to philosophical thought, and he was rehabilitated as a founder of the new science, alongside Galileo and Descartes. His apparently one-sided exaltation of technology was similarly shown to have sprung from a misinterpretation - where not an actual misreading - of his words, in particular from the neglect of his basic tenet, that 'works are of greater value as pledges of truth than as contributing to the comforts or life'. We owe these misunderstandings in part to the tendency of some commentators to project the experience of a later time onto past ages (thus making Bacon, among others, a nineteenth century utilitarian, a positivist and even a Marxist). But we have also to understand why Bacon alone among English Renaissance thinkers, has been singled out in our time for consistent vilification. This anomaly has a good deal to do with the distorted image of his life which most of us have been brought up on, ever since, in 1837, the historian Macaulay published his brilliant but thoroughly untrustworthy essay, depicting a contemptible Bacon, soon to be loaded by subsequent biographers with every conceivable vice. This negative image of the man, which could not but influence that of the thinker, is still present in many people's minds, and it has made them only too ready to see him as a scapegoat for the harmful effects of the science he had heralded with so much acclaim. Bearing these points in mind we can now look at the principal complaints made of Bacon by the friends of Gaia.

Bacon's scientific revolution launched a mechanistic view of nature, in which living organisms are seen - and treated - as machines. The partition of the universe into live human mind and passive, mechanical nature was Descartes's gift to modern science, not that of Bacon, who stopped well short of 'the pitfall of classical mechanization', as it has been called.

Already in the eighteenth century the Italian philosopher, Vico, had congratulated his predecessor on having wisely avoided 'the rocks of mechanistic thought', while a contemporary recalled that, as a youth, he was given the works of Bacon to read so that he could be on his guard against 'the aberrations of Descartes'. For Coleridge 'the impulse towards a true natural philosophy, based on legitimate experience', had been betrayed by Descartes's science of mechanics. Like Shelley, Coleridge regarded Bacon as the man 'by whom Science was married to Poetry', while early in our century Alfred North Whitehead appreciated Bacon above all as a Renaissance vitalist.

And so we will find him. In his own *Theory of Heaven* he categorically denied the void he had earlier envisaged, and conjured up instead a starry heaven of 'fluctuating waves and reciprocations', an earth on which 'all objects emit rays'. He conceived the dynamic processes of nature - organic and inorganic - as a constant flow and ebb of 'vital spirits', struggling against the 'spirits' of inanimate matter to preserve youth and beauty, and to develop higher organic forms. It was by the synthesis of this universe

in perpetual fluctuation with the quantitative aspects of his new science - a unique feat, as has been noted - that he sought to interpret all natural phenomena, 'from planet to planet, from spirit to star'. Indeed, with his vital spirits, 'impressed by God upon the primary particles of matter', it looks as if Bacon had by-passed Newton's clockwork universe to rejoin the quantum scientist, Heisenberg, just as he had by-passed Aristotle to rejoin the pre-Socratic Heraclitus - that 'tracker-down of truth', as Bacon called him - whose complementary opposites he liked to recall, and with whose fire, 'both matter and moving force', Heisenberg identified his own 'particles of energy'. Anyone inclined to attribute a cold, mechanistic view of nature to Bacon should read his notes for a History of Generations and Pretergenerations, with its cascades or 'perturbations', 'vivifications' and 'gestations', its limitless 'potentialities', all leading to an order based on the 'generative and vivifying power in things' - a power which bears within it, 'like a second chaos', that air 'in which the seeds of so many things act, wander, endeavour and experiment'.

Bacon advocated 'the torture of nature'. 'The art of enquiry into nature itself, and or putting it on the rack', was never Bacon's, and these words, so often quoted against him, will not be found in any of his works. As recalled by Peter Pesic (from whose thorough studies of this subject, in *Isis* 1999 and elsewhere, I have taken most of the material for this section), they were written in 1696, by his great admirer, Leibniz, in praise of 'the art of experimentation which Lord Bacon began so ably'. Influenced, perhaps, by the fact that torture was still used in his day as a touchstone of certainty, Leibniz failed to distinguish, as Bacon emphatically did, between the concept of racking, or torture - terms which Bacon invariably connected with a brutal abuse - and that of 'the trials and vexation of art', indicating the agitation or provocation of nature in the course of an experiment aimed at verifying the evidence of the senses. Bacon depicted this 'vexing' or 'crossing' of nature with vivid images related to discovery or pursuit - never to torture. Many of them - such as 'espials', examination, trial, interrogation, deciphering - are taken from legal practice. Others are grouped around his concept of 'the Hunt or Pan, or Learned Experience' - a hunt 'in the woods or experience' for nature's laws - all of nature being 'nothing else than a hunt', while man himself 'hunts after his works'. If you 'follow and as it were, hound nature in her wanderings, you can drive her afterwards to the same place again': this is Bacon's description of controlled experiments aimed at making results replicable.

Turning to mythology, he described experimentation as a wrestling-match with that indestructible 'thrice-great prophet, Proteus, or Matter' - a matter permeated with spirit - who has to be gently but firmly held in place with the 'handcuffs' of mechanical aids, as he wriggles from one shape to another - or disappears for a time, as a gas; until, having rung all his changes, he finally discloses some of nature's secrets, thus assisting her to 'achieve her ends'. The experimenter is also tested in this process (being much in need of purification, since the mind of man is ever prone 'to distort the nature of things by mingling his own nature with it'). In the end, however, his part is a small one, for, Bacon insisted, 'all that man can do is to put together and

put asunder natural bodies. The rest is done by nature within.' On the role played by man in vexing nature, within these limits, Bacon is quite clear. He gives examples from the age-old crafts - baking, brewing, pruning - by which nature is 'forced out of her natural state, and squeezed and moulded', and he cites experiments such as confining the spirits of wine in a sealed vessel, or making a rainbow in a spray of water.

We are far from the 'racking of nature' imagined by Leibniz. None the less, a few others were to follow him in confusing Bacon's charged images, and more recently various feminist writers - including Carolyn Merchant (1980), from whom, alas, Capra took his notion of Bacon's views - have contributed their own brand of confusion. Bacon is now denounced for launching 'a science infused with sexual and misogynistic metaphors' - in particular with images of rape and torture - aimed at encouraging middle-class male entrepreneurs 'to exploit nature, as a female to be tortured through mechanical inventions'. As Alan Soble has demonstrated (Oxford, 1998), none of the passages adduced by these writers remotely supports their claims. By omitting key words and sentences, and introducing metaphors of rape and of 'the torture chamber' where there are none, they completely transform his meaning. Thus Bacon's remark that 'a useful light' might be gained by the scientist from an inquiry into the arts of witchcraft, to Merchant 'strongly suggests the interrogations of the witch trials and the mechanical devices used to torture witches' - and in *Mindwalk* he will be made out presiding over the witch trials of King James, though these were held in Scotland, many years before Bacon became Attorney General. Merchant saw caverns like that of the Sybil as 'sexual holes', and, she complained, Bacon 'frequently described matter in female imagery, as a "a common harlot"'. In fact he referred (twice) to an 'untenable opinion' of Plato's 'that matter is like a common harlot, always seeking after new forms'.

Nature cannot literally be tortured, but some of her creatures can, and often are today, in our service. At a time when vagabonds were regularly flogged, thieves hanged alive in chains, and felons gradually crushed to death under rocks, people were not much preoccupied with the suffering of animals. Descartes defended vivisection, and compared animals to creaking machines. Even Spinoza, half a century later, declaimed in his *Ethica* that we could treat them 'in any way which best suits us'. Bacon was in two minds.

He believed that vivisection had rightly been condemned, but, in exceptional cases 'of great usefulness', it could have been a mistake to 'relinquish it altogether'. We may doubt that he ever came across such a case, for this 'tender-hearted' judge, as he was known to his contemporaries, who looked on offenders 'with the eye of compassion' - and who searched for ways of mitigating pain - repudiated torture, not only for its cruelty, but because he believed it was more liable to evoke 'strange fallacies' than to discover the truth. When 'vexing' even inorganic matter (which to him was alive) Bacon compared the care to be taken in regulating and varying the heat used in

experiments to the gentle action of the womb. As for living tissue, eggs might be studied, but cutting out the foetus from the womb (as advocated by his contemporary William Harvey, who discovered the circulation of the blood) 'would be too inhuman'.

The womb is very present in Bacon's writings. He saw his own thought 'rooted in the lap and womb' of a nature more subtle 'many times over' than the mind of man, while the Scholastics 'touched nature only with the tips of their fingers, without mingling themselves into her being'. Had they 'remained attached to the womb of nature and continued to draw nourishment from her', he said, there would be no need for a new science. Far from preaching the rape of nature, the closer union Bacon sought with her was as the bride in 'a chaste and lawful marriage', from which 'many helps to man' might spring. (And should anyone object to the patriarchal view of her as a 'fruitful spouse', let us recall that nature appears as the dominant partner in another patriarchal image, with the arts subject to her 'as the wife is subject to the husband'). Bacon obviously preferred a 'happy match' to a grappling, however gentle. It is only men 'too intent upon their ends', he said, who 'rather struggle with Nature than woo her embraces with due observance and attention'.

Bacon offered mankind the boundless expansion of human power which has given science its daemonic and Faustian character. The power Bacon offered was never boundless. 'All knowledge is to be limited by religion', he said, 'and referred to use and action'. And keen as he was for man to 'open and dilate the powers of his understanding' and reach out to the spacious new worlds of discovery that lay beyond the pillars of Hercules, he never once lost sight of those essential restraints. The arrogant claim of unlimited power for man is precisely what he most strongly deprecated in the magicians of his day - those self-seeking and vainglorious 'braggarts', as he called them, who looked on themselves as gods, and in their 'blind greed' attempted 'to domineer over nature', merely to boost their own personal influence. It was not long since Marlowe's *Dr Faustus*, 'lord and commander of the elements', had boasted on the stage that his dominion 'stretched as far as doth the mind of man'. Bacon too, in *The Advancement or Learning* (1623), sought 'to extend the bounds of human empire' - but read on: 'as far as God Almighty in his goodness may permit.' (This limiting condition does not appear in the *New Atlantis*, where the sentence ends 'to the effecting of all things possible'. But the words are spoken there in the same religious context, 'for the love of God and man'.

What exactly do these religious limits to knowledge imply? While in sympathy with 'the heathen' (the fathers of whose church, he said, were the poets), Bacon lived his spirituality within the newly reformed Church of his time, as a practising Christian - witness his inspired religious writings, and his evident interest in 'the true temper of a man who has religion deeply seated in his heart'. He conceived his New Instauration as the fulfilment of a Biblical prophecy and a rediscovery of 'the seal of God on things'. Which did not mean that he could ever see in the practice of a technology 'a

first step to becoming one with God' - as proclaimed of child-cloning by one of its famous promoters. On the contrary, Bacon repeatedly warned his readers against the 'unwholesome' mixture of things human and divine, and admonished them never to 'presume by the contemplation of nature to attain to the mysteries of God'. The meaning of that crucial condition, 'as far as the Almighty may permit', is simple. Bacon solemnly disavowed both 'power and knowledge such as is not dedicated to goodness or love'. The words are used with precision. 'Goodness' means the search of truth for its own sake - since 'the very beholding of light is itself a more excellent thing than all the uses of it'. 'Love', or 'goodness applied', means doing everything possible to relieve 'the immeasurable helplessness of the human race'.

This aim was the leitmotiv of Bacon's life, and his whole new concept of science was geared to it. He had seen the effects of hunger at first hand as a young legal counsel, when examining a band of rebel yeomen. Shocked by what he found, he had set out to study their condition, and had defended, in Parliament after Parliament - with a heat that surprised fellow Members - a Statute for the Relief of the Poor that was to last for centuries, and his two bills against the enclosure of common lands - which, he rightly insisted, 'destroyed the bread of the poor'. Bacon believed that poverty could best be eliminated by achieving abundance for all, and it was to remedy 'the pinched and narrow state of human fortunes' that he wanted to multiply the discoveries of science, made so far by accident, like that of silk, glass or the magnet. This claim, now used by some multinationals to justify their depredations, was a new one at that time, although he had inherited his strong sense of the service owed to mankind from an ancient Platonic and Christian tradition known as the *vita activa*, of which his friend, Sir Philip Sidney, was the living example. Bacon was however the first scientific thinker to have appropriated the *vita activa* to science, and made 'the weal of man' his goal.

It is in this light, and recalling his precept that 'the true ends of knowledge' are neither profit, fame nor power, that we should interpret his concept of dominion over nature - a dominion evoking the benevolent authority of the first King of Atlantis, with his 'large heart, inscrutable for good'. For Bacon, power meant 'the power to do good'. There is no place in the *New Atlantis* for a world dominion, which he described as 'the evil dream of a prosperous brigand'. In the heyday of colonization he stressed that 'people are not to be planted' so as to displace others, and he lamented the miserable fate of 'the poor Indies, brought from freedom to be slaves'. Neither did he look on nature as man's slave. The only case in which he appears to couple slavery with nature - when offering an imaginary pupil 'to bind nature to your service and make her your slave' - has been found to be a mistranslation of the Latin original for 'slave', 'mancipaturus', which actually means 'to be assigned to an office'. It implies a bond - in Bacon's case a mutual one - but without the indignity of slavery. Himself, as he believed, 'born for the service of mankind', Bacon took every opportunity to emphasize that man is but the servant of that nature which he was now joyfully placing at the service of his 'dear, dear son'; that beyond following and observing her

order, he 'knows nothing and can do nothing'; and above all that 'the least part of knowledge' is passed to him 'by a Charter from God', and 'must be subject to that use for which God hath granted it'. Failing which 'all manner of knowledge becometh malign and serpentine.'

In the *New Atlantis* Bacon set up a model for the manipulation of nature which, carried to extremes, has led to the widespread genetic modification of plants by our multinational corporations. Bacon extended his inexhaustible capacity for wonder to 'the border regions of knowledge', as he put it. There was nothing he did not propose to study, from the transmutation of metals, and 'those minute particles that do so great effect ', to a drink he had heard of 'called coffa, as black as soot and of a sharp scent, which comforteth the brain and heart'. He wished an inquiry to be carried out 'with all sobriety and severity', into 'the transmission of spirits at a distance', precognition, hypnosis and telepathic dreams. And he was interested in every aspect of plant life, from their 'enlarging and dwarfing', and 'transplanting one species into another', to the effects of 'the force of imagination' on 'their sudden fading or lively coming up', their closing and opening, their 'bending one way or another'.

But, whatever our opinion of his programme, we cannot reproach Bacon for holding the man-centred - and in his case still earth-centred - view of the universe, which has been an essential part of our Western tradition since Genesis. Or for advocating a manipulation of nature that has been with us ever since Cain ploughed the first field and a Persian gardener bred the first rose. That our species should thrive at the expense of the rest of creation, appears to us now increasingly 'malign and serpentine'. Many of us are more in sympathy - at least as a counsel of perfection - with Eastern attitudes that deprecate stepping on an insect, or those of native Americans, when they ask a plant's permission to harvest it. But where exactly does each of us stand? Do we accept the human kidney transplant but not the heart of a pig? Can we take as a gift from Bacon's prescience hearing aids and spectacles, microscopes and air-conditioners - submarines even, but not those dangerously polluting aeroplanes? Do we accept 'the multiplication of light at a distance', and Bacon's binary scale, on which our computers are based, but not the medical panaceas - or at least not the cosmetics - we owe to the suffering of mice and dogs? Some of us now think we should not destroy life 'without sufficient reason'. But how much is sufficient? Ought we to eat miserable factory-farmed animals, when a less sentient vegetable could feed us? Bacon's position was clear. He would 'try all things and hold that which is good.' We are trying all things, but we no longer know what is good. And we stop at nothing. In each case it is possible to identify the point at which we disregarded the limits Bacon laid down, and, failing to obey nature, brought - and are still bringing - upon ourselves every kind of disaster. ('Force maketh Nature more violent in the return.')

We will find Bacon in radical disagreement with the promoters of present day biotechnology on at least four fundamental counts. The first relates to their respective

priorities. For Bacon, profit was excluded. Research was a matter of public funds - a task, he said, 'for Kings and Popes', and he stringently admonished scientists who 'turn aside after profit or commodity' : they do so, he warned, 'to the infinite loss of mankind'. There can be no comparison between a philosopher whose 'only earthly wish', from youth to old age, was to promote inventions that could relieve the poverty of man, and a corporation professing to 'do the right thing (namely, to feed mankind) while doing business', and publicizing this worthy aim out of the huge profits they had made with ventures such as Agent Orange and the defoliation of Vietnam; or planning the sinister Terminator Seed 'to protect their investments'. The second difference is one of scale. The ever moderate, middle-of-the-way Bacon, who noted that 'the personal fruition of man cannot attain to feel great riches', knew that more is not better. ('It is the empty things that are vast, things solid are most contracted, and lie in little room.') Bacon could not have conceived the escalating size, the global greed of corporations coolly planning to take over a large portion of the earth's water resources or feverishly decoding some three billion DNA sequences, in a bid to patent the entire human genome. The third radical difference between corporation practice and the thinker who would not reap the green corn, and who reminded us that it is not the tempest but 'the soaking rain that relieves the ground', is one of timeliness. Bacon would have deplored, as the worst 'levity and rashness in new experiments', the immoderate haste with which giant multinationals are now combing the virgin forests for plants that have yielded their healing properties over the millennia, in a headlong rush to extract, code, genetically modify and patent substances which would require generations of testing before they can be fed to adults - much less to babies. The fourth, and perhaps most striking difference, is the contrast between the corporations' stealthy moves to impose their untested wares on us, as a part of their silent progress towards world supremacy - with Bacon's declared goals of open communication and exchange of knowledge, placed at the service of mankind.

Bacon promoted a science in which the experimenter abdicates all responsibility for the results of his discoveries. In fact Bacon was the only thinker of his day to unite scientific knowledge with ethical ideals, as he was the first to evolve a concept of fraternity in 'learning and illumination' among scientists of all countries, 'joining forces for the common good'. Bacon presents his new scientist - neither 'Schoolman' nor magus, but a 'pioneer' (or digger) in the mine of truth - with 'tears of tenderness' for his fellow beings in his eyes. And it is because he envisaged a succession of such scientists, handing down the torch of a continuous tradition, at his symbolic 'Promethean Games', that Loren Eiseley described Bacon as 'the first great statesman of science'. But as a statesman Bacon was also aware of the dangers of scientific knowledge, and, on setting forth his plan of work for the *Great Instauration*, he confessed to 'inward hesitations and scruples'. The new learning, he feared, 'might open a fountain', and who could tell where its waters would fall? Alone among the forerunners of modern science Bacon foresaw the possibility of that 'rape of Minerva (wise nature), by Vulcan (the mechanical arts)', which we have since perpetrated. His

myth of 'Daedalus, or the Mechanic' - famous for his 'pernicious genius', 'unlawful inventions' and 'depraved applications' - sounds a dire warning against the 'imperfect births and lame works' which 'chemical productions and mechanical subtleties' could lead to, if mechanical art should attempt 'to force Nature to its will. And well we know how far in cruelty and destructiveness they exceed the Minotaur himself.'

Bacon hoped, as many have after him, that the mechanical arts might 'serve as well for the cure as for the hurt'. And since people are not to be trusted with dangerous discoveries, the brotherhood of Salomon took an oath of secrecy for 'the concealing of all inventions they thought fit to keep secret', even, if necessary, from the state - a solution not open to our democracies, although some scientists have resorted to it, and one great poet has appealed for it to be practised in our time. (In any case the salutary independence of scientists from Bacon's Utopian state compares favourably with the tacit understanding between powerful corporations and some of our governments.) The only reliable safeguard, however, in Bacon's view, was the age-old remedy of prayer, and in *New Atlantis* daily services were held 'of laud and thanks to God for his marvellous works', and of prayers (similar to those Bacon affixed to his own works) 'imploring God's aid and blessing for the illumination of our labours, and the turning of them to good and holy uses'. For Bacon the efficacy of prayer was not in doubt. He saw the orations of the monastic orders as 'true works that cast their beams upon society for the benefit of man'. In our less believing age we may look on the prayers offered daily at Salomon's House as a declaration of intent, and a decision to maintain that intent by concentrating the mind upon it.

It is for the firmness of his own purpose and the stress he laid on turning our labours to good uses that I think ecologists can look on Bacon as an ally in the struggle ahead. The needs of humanity are changing, but never has it been more imperative for us to 'join forces for the common good' - that of our whole planet, this time. Bacon's was a cyclical view of history, in which 'the sciences have their ebbs and flows'. Four centuries ago he proclaimed a science that was to go on 'fructifying and begetting', as long as there was room for its wastes. But now that the tide has begun to turn, might not the forward-looking Bacon, had he lived today, be urging us to redirect our inborn thirst for knowledge away from the dead-ends of uncontrolled genetic engineering and the nuclear nightmare? Towards - new variants of earth-healing culture, perhaps? Undiscovered forms of renewable energy, a 'revivifying' concept of growth, or some other form of resurgence we haven't yet thought of?

Be that as it may, he appears to be in unison with the ecological vision in one respect. There is a remarkable affinity between Bacon's dynamic concept of the origins of life, and the cosmologies now emerging in centres like Schumacher College at Dartington, and the Santa Fe Institute of New Mexico - an affinity perceptible even in the vocabulary of these seekers. The 'fluctuating patterns' now found 'running deep in nature' (as cited by Brian Goodwin, in *How the Leopard Changed his Spots*, 1994), bring to mind those 'fluctuating reciprocations' noticed above in Bacon, the

'resemblances and conjugations' which, he believed, 'reveal the unity of nature' and 'the fabric of the universe'. And when we read today of 'the dynamic fluidity' with which elements 'move from chaos to order and back again', interacting rather than competing, in 'a creative play of forms', or 'a sacred dance', we are very close to that world which, in Bacon, 'enjoys itself and in itself all things that are', while 'the souls of the living leap about and dance with infinite variety'; a world in which 'Pan, or Nature' is ever inclined to 'fall back into ancient chaos' - but that Cupid foils him in the contest; in which God himself 'delights in hiding his works', so as to give man the pleasure of finding them.

We must not forget that if Bacon took the dominion of Adam over his fellow-creatures for granted, he himself extended his 'feeling of communion with men also to beasts', had thoughts of 'nourishing and comforting the trees', and dearly loved birds. He believed that nature was 'corrupted by too much cultivation' - after all the first scientists were 'the brute beasts, quadrupeds, fishes and serpents'. And when it rained, we are told, he would go out in his open coach 'to receive the Nitre in the air and the Universal Spirit of the World'. Let us hear him in his *History of the Winds*, a late work, urging us to 'make a stay with nature' and 'meditate upon her':

'Wherefore if there be any humility towards the Creator; if there be any praise and reverence towards his works; if there be any charity towards men and zeal to lessen human want and sufferings; if there be any love of truth in natural things ... men are to be entreated again and again ... that they should humbly and with reverence draw near to the book of Creation, and becoming again as little children, deign to take its alphabet into their hands.'

For further information and references for most of the above, see chapter 33 of *Francis Bacon, The History of a Character Assassination*, by Nieves Mathews (Yale U.P. 1996), and for Bacon's attitude towards judicial torture, chapter 24.

On the 'torture of nature' see Carolyn Merchant, *The Death of Nature* (1980); Alan Soble in *A House Built on Sand*, ed. Noretta Koertge (Oxford, OUP, 1998); Peter Pesic, "Nature on the Rack, Leibniz's Attitude towards Judicial Torture and the 'Torture' of Nature", *Studia Leibnitiana*, Band XXXIX/2, (1997), and "Wrestling with Proteus, Francis Bacon and the 'Torture' of Nature", *Isis* (1999).

On the rehabilitation of Bacon's science after the criticism of Karl Popper, Alexandre Koyré, Peter Medawar and others, see Thomas Kuhn (1977) Peter Urbach (1987), Antonio Perez Ramos (1988), Brian Vickers, "Bacon's so-called 'Utilitarianism'", and Paolo Rossi "Ants, Spiders and Epistemologists", both in Francis Bacon, *Seminario Internazionale*, ed. Marta Fattori, Rome, 1984.

Also Rossi, "Bacon's Idea of Science", in *The Cambridge Companion to Bacon*, ed. Markku Peltonen (CUP 1996); On Bacon's cosmology, Graham Rees, (1984).

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Nieves H. (Hayat) De Madariaga Mathews was born in 1917. She has lived in various countries, from Spain during the civil war to England, Switzerland, France, and Mexico. She has worked approximately 20 years for the F.A.O., in Rome. She has been dedicated to the "defense" of Francis Bacon as seen in her monumental study: [*Francis Bacon - The History of A Character Assassination*](#), Yale University Press, 1996
