THE LAUCKS FOUNDATION —

from time to time calls attention to published material that might contribute toward clarification or understanding of critical issues affecting world peace. The accompanying reprints constitute Mailing No. 19.

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"Who Speaks for Earth?"

"Hypnotized by mutual mistrust, almost never concerned for the species or the planet, the nations prepare for death. And because what we are doing is so horrifying, we tend not to think of it much. But what we do not consider we are unlikely to put right.

Every thinking person fears nuclear war, and every technological state plans for it. Everyone knows it is madness, and every nation has an excuse . . .

How would we explain the global arms race to a dispassionate extraterrestrial observer? How would we justify the most recent destablizing developments of killer-satellites, particle beam weapons, lasers, neutron bombs, cruise missiles, and the proposed conversion of areas the size of modest countries to the enterprise of hiding each intercontinental ballistic missile among hundreds of decoys? Would we argue that ten thousand targeted nuclear warheads are likely to enhance the prospects for our survival? What account would we give of our stewardship of the planet Earth? We have heard the rationales offered by the nuclear superpowers. We know who speaks for the nations. But who speaks for the human species? Who speaks for Earth?"

from COSMOS
by Dr. Carl Sagan

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Hugh of St. Victor / Science by People

by

IVAN ILLICH

(I am editing a Reader on the History and Philosophy of Alternative Tools, which will be published early in 1981 and will contain contributions by Karl Polanyi, Lewis Mumford, André Gorz, Ivan Illich, and possibly two others. It will reproduce as an appendix my Reference Guide to Convivial Tools. The title, The Convivial Archipelago, was coined by Gorz under his journalistic signature "Bosquet". Hugh of St. Victor / Science by People is a draft which Illich submitted as his contribution to the Reader.
Valentina Borremans, Cuernavaca, November, 1980)

The term, "science by people" came up in the Seventies and is now quite common. It appears mostly in the kind of literature for which the V. Borremans Bibliography is the best guide (among the multifaceted, decentralized community of authors who unplug themselves from consumption and use modern procedures to live simple, uncluttered and more autonomous lives). I have been asked to clarify my understanding of the term which they use to designate their research activities. It is a new term which, at first, seems slippery and ideological. One finds no antecedents for it in the recent past. I have the impression that those who use it intend a meaning which is the exact inverse of what science has signified ever since Bacon, or even since the XIII° century.

My survey of the Borremans literature shows that "science by people" is used in opposition to "science for people". The latter designates something called "research and development" — or, since World War II, simply "R and D". R and D is usually conducted by large institutions — governments, industry, universities, clinics, the military, foundations, and the like. It is also carried out by small teams of enterprising persons who hope to sell their research results to institutions. It is usually a highly prestigious activity, done for the common good — so its supporters and practitioners claim — and is expensive and, for the most part, tax-exempt. It provides regular well-paid jobs for academics with advanced degrees. R and D can be social or natural, fundamental or applied, specialized or interdisciplinary. The use of the term "science for people" does not usually imply reproach; in principle it does not signify disapproval of an endeavor. It simply means that the results of the research have no bearing on the immediate everyday activities of the one who does it. R and D can be carried out on neutron bombs, muscular distrophy, solar cells or fish ponds — always for the service of other people. Obviously, "science by people" is not this.

Initially, the use of the term science by people might be interpreted as sour grapes. It designates research done with few or no funds, no sponsorship, no access to publication in the prestigious journals, producing results that are without interest to the supermarket. Yet the people who do it seem neither jilted nor on the make. They do careful, methodical and disciplined research, are fully informed of the R and D in related areas, use these results when applicable, and in only one decade have built up an alternative network of publications which provides a forum for the diffusion and criticism of their efforts. They work alone or in tiny teams, primarily for results that directly shape their mode and style of living, are uninterested in patents, rarely produce finished products for sale. They give no impression of being the poor cousins of those working in R and D.

Intuitively, it is easy to recognize the dictinction between this research and R and D. In the former, people concentrate on constructing, improving and beautifying the tools

and immediate environment which serve them directly, leaving to others the task of imitating or adapting what they do. Most discussion of the distinction appears to me to be hazy, emotional, ideological or beside the point. When clearest, the distinction still remains negative. A good example is that of V. Borremans herself: "... research done to increase the use-value of daily activities without increasing the person's dependence on the market or professions."

Apparently, it is impossible to find a better term than "by people". "Research by people" does convey a search for something which is difficult to name in twentieth century language. The activity clearly is research — not an assortment of hit-or-miss tryouts. It is supported by library surveys and critically evaluated by peers around the globe. It represents an effort to unplug its practitioner from the market. It is a search for autonomy, but in a new synthesis, not in a return to the "good old days", or in an imitation of Amish community living. Such research is not a hobby or a religious enterprise. And since it primarily seeks to improve the actual comfort or beauty of those who do it, research by people cannot be called utopian in the accepted sense. A set of intentions and activities which fits these criteria is something patently new. No one word can explain it.

Now, as an historian, I am very suspicious of anything which pretends to be totally new. If I cannot find precedents for an idea, I immediately suspect that it is a foolish one. If I cannot find anyone in the past with whom I am acquainted, and, in my fancy, discuss with him what surprises me, I feel very lonely, a prisoner of my own present-day and parochial horizon. Therefore, when I was challenged to clarify the meaning of research by people, I looked around and finally found Hugh of St. Victor, a XII^{o} century thinker who has proved to be excellent company. Living before the XIII^{o} century, but after classical antiquity, he is untainted by what we conventionally call science.

Hugh was born around 1096, probably in the Flemish town of Ypres, and grew up in Saxony. To his own century, he was known as Hugh of St. Victor (the latter being the name of the cloister where he taught), Magister Hugo, Venerabilis Hugo, Hugh the Great. He was also called Hugh the Saxon, and later some imputed noble birth to him from the reigning house of Blankenburg. In the philosophy of technology, he deserves an important place, since he dealt with the subject in an original way, quite distinct from any other author whom I know. But up to now his ideas have never been examined for the potential contribution they could make to the current attempt to identify the alternative to R and D. Mindful of this, I find it quite significant that he is not discussed in the major histories of science and technology. At best, one sometimes finds him in a cursory list along with ten other names. Therefore, before I can discuss his ideas, I must first make him come alive.

As a young man, he joined a new kind of religious order, the Canons Regular of Hammersleben, a German-speaking area. These were not monks, but communities of men brought into existence by the recent demographic changes in Europe, principally the rise of the free city. The rule and practice of monks prescribed a life in small rural communities, often quite isolated. They tended to live in a self-sufficient enclave, surrounded by newly cleared land. Their activities were confined almost exclusively to the management of their monasteries and fields. The new canons, on the other hand, usually established themselves in the cities, where they lived a commitment to exemplary virtue for the edification of the Christian population.

Hugh traveled from Saxony to Paris, where he settled in the Augustinian cloister of St. Victor, then still outside the city walls. Paris teemed with intellectual excitement. Men of immense learning, filled with deep passion for their convictions, acting out of shameless simplicity, clashed in public controversy. The center of all this spiritual ferment was still the Cathedral school, from which the university would evolve seventy years later. Peter Abelard was prefect. A brilliant cleric with a biting and incisive wit, one of the great teachers of the West, he was idolized by his students. But more than one of Abelard's colleagues among the teachers were driven by their ridicule into exile. Hugh's own master, William of Champeaux, was among them. Abelard's teaching was decisive in renewing scientific procedures and methods in thought. In the midst of an

age dominated by faith and obedience, he insisted on the value of methodical doubt. He demonstrated the necessity of doubt by juxtaposing the contrary opinions of respected authorities against one another, and by emphasizing the role of reason when such conflicts between traditions and authors had to be resolved. In ethics, he applied analogous principles, stressing conscience and intention in an age of ritual and legalism. He had powerful enemies. The great mystic, Bernard of Clairvaux, noble, austere, the violent reformer of Benedictine monasticism, was the driving spirit infusing a lifelong crusade to silence Abelard. For Bernard, philosophy and the humanities fitted a monk's and scholar's life only to the degree necessary for a better grasp of Holy Writ.

Abelard's enemies achieved a temporary triumph. Because of his notorious affair with Héloïse, the most brilliant of his pupils, he was chased from his chair, gelded and dishonoured. Probably at this moment, Hugh arrived in Paris to teach about the place of science in human life. We find the first documentary evidence for Hugh's presence in this milieu when he was already the recognized Master of St. Victor in a double sense — he was the director of studies, and exercised the powerful intellectual influence which would extend beyond his own lifetime. For two generations, St. Victor owed its odd mixture of down-to-earth mysticism, both tender and humorously critical, to Hugh.

We know very little about his life. Few anecdotes are told about him. Once he probably traveled to Rome. But those who read his works have no difficulty identifying the original and unique character of his ideas. They are all marked by a strong personal style. His repeated advice to his students seems to have been: learn everything. With time, you will find out that none of it was acquired in vain. E. R. Curtius knows of no earlier theologian who would have recommended laughter to Christians. Hugh even encouraged teachers to foster merriment among their students, since serious matters are absorbed more easily and with more pleasure when they are mixed with humor. Such a recommendation flew straight in the face of at least seven hundred years of Christian exhortation to serious study. Until his last moment, Hugh maintained his high spirits, as Osberg, the brother who nursed him, records. This brother relates that throngs of people came to visit his tomb, but that ugly rumors also began to circulate in Paris. Students, probably from among the anti-humanist Cistercian monks, complained that Hugh's ghost visited them at night. He came to ask for prayers needed to release him from Purgatory where he was doing penance for his exaggerated curiosity about scientific and mechanical matters.

Hugh's posthumous influence was felt far beyond his own cloister where he had faithful, but later, flat-footed disciples. He influenced the famous Dominicans, Albert the Great, and his student, Thomas Aquinas, the Franciscan masters, Alexander of Hales, and Bonaventure. His thought and statements years later became popular reading in the Imitation of Christ. He is among the few medieval thinkers quoted by Kierkegaard. But his clearest and broadest influence occurred through the use of his work, Didascalion, as a textbook.

The middle of the XII° century constituted one of those rare moments in history when scholars possess a confident sense that the mastery of the works of the past is about to reach a natural end. The thought of Greece, Rome and the Church Fathers seemed assimilated. Thinkers began to feel comfortable about their command of the past's achievements. St. Bernard, Abelard and Hugh of St. Victor represented an entirely new kind of genius that flourished during the short period between 1110 and 1150 — thinkers, who, having thoroughly digested their tradition, now felt free to create a new synthesis. The scientific and metaphysical works of Aristotle had not yet reached and upset Paris. They had not yet been translated from the Arabic, and their Arab commentators were still unknown. During this creative lull, some of the West's greatest textbooks were written: Peter the Lombard's Sentences (1150), Gratian's Concordance of the Law (1140), and the first of them, Hugh's Didascalion (cca 1127). These books remained in use, obligatory reading for those who sought a liberal education, into the XVII° century — a part of every cleric's, indeed, every scholar's formation. As school books, with the exception of grammars, they had an extraordinary lifetime. The end of their undisputed acceptance marks the conclusion of the Middle Ages much more decisively than either the Renaissance or the Reformation. In view of this lengthy and extensive renown, it

is highly significant that his completely original thoughts on science went unobserved and unnoted. Hugh defined mechanical science as that part of philosophy which studies remedies for bodily weakness, when such weakness derives from humanly-caused disruptions in the environment. Science, then, is a corrective for an ecological disorder. Asked to clarify the notion of a new conception of science which underlies the various movements of science by people, I know of no better approach than a confrontation with the thought of Hugh of St. Victor.

It would be beyond the scope of this paper to introduce the reader to Hugh's central concerns about metaphor, analogy, mystical knowledge and love. Therefore, I must tear out of their context his reflections on science as an aid or cure and the scientific aspect of the mechanical arts. But, to make his thought understood, I must explain a bit about his perception of the human condition. He accepted the story of man's origin as related in Genesis. God first created Adam, and out of him, Eve. He made them that they might live in harmony with the rest of creation. When he appointed them gardeners of Eden, he gave them an exacting task, but one which implied no toil.

Hugh strongly believed that God made each thing according to its own beauty. This insistence on beauty, and on the visual perception of reality, is characteristic of him. He gave three sets of "eyes" to Adam and Eve — the eyes of the body, providing for ordinary cogitation; the eyes of reason, for meditation on the significance of eternal beauty for the beholder; and eyes fit for the contemplation of the Creator himself. This last set of eyes, made to look into blinding light, is designed to see the invisible, "what he is not, never what he is". The three sets of eyes are part of the basic endowment with which the Creator outfitted human beings. For Hugh, the light which fired the three sets of eyes is the divine light, as reflected by nature, the soul, and heaven, in the mirror which is man.

Accepting the biblical story, he believed that certain restrictions had been imposed on the first couple by the Creator. They were not to break the fruit from just one tree. In Hebrew, it is called the tree of jadah — meaning knowledge, penetration, power, possession. But the serpent, a fallen angel, was envious of their exalted position within the universe. He persuaded Eve to break the fruit. Adam, moved by affectus dilectionis (a love of deep affection) for Eve, ate what she offered him. As a consequence, the human world was upset. As the mirror of their eyes darkened, they felt ashamed. Simultaneously, nature, which they had offended, and from which they had to obtain their sustenance, was accursed. Those who had been created to be the gardeners of Eden now had to obtain their wherewithal from a field full of thistles, and give birth from a bleeding womb. Created to be leisurely gardeners of Paradise, their own transgression of the rules of primordial nature compelled them henceforth to eke out their existence in sweat and frustration. Hugh takes this historical understanding of ecology as the starting point of his general theory of science. Humans, through their own fault, are weakened, and must survive in an environment they themselves have damaged. Science, then, is the search for a remedy for this painful condition. Thus, the primary emphasis is the attempt to relieve human weakness, not to control, dominate or conquer nature for the purpose of turning it into a pseudo-paradise.

Hugh was like a moving flame. Brought up in Germany, he lived in Paris, but his own language was Latin. This Latin was the kind of language which English speakers today experience great difficulty understanding. No one was born to it. Scholars learned its classical variety. But for scholars, scribes, religious, and lawyers, it then became the main language of everyday intercourse. Therefore, they felt entitled to shape it to their needs, their feelings, their whims. It was not a dead language, or an elite language into which only some are born. It was the living language of a scholarly community, where all who used Latin acquired it relatively late in life. This fact makes any translation from medieval Latin a risky undertaking. For example, when Hugh speaks about philosophia, I strongly suspect that his meaning in contemporary English is much closer to "science" than to "philosophy".

Hugh presents his general theory of philosophy — or science — in two works: his textbook for a general introduction to advanced studies, the Didascalion, and the Dialogue of Dindimus on Philosophy. The Dialogue was probably written a couple of years after the textbook. In it

Hugh hides behind the figure of a holy man from the pagan East, Dindimus, King of the Brahmins. He took this figure out of a novel on Alexander the Great, which reached him in a Latin translation of Pseudo-Callisthenes. As interlocutors for Dindimus, he provides: Indaletus, the legendary apostle who converted Southern Spain (at the time of Hugh, this region had been under Muslim domination for more than four hundred years), and Sosthenes, the chief of the synagogue mentioned in the Acts of the Apostles (18.17). A subtle method lay in this apparently strange procedure. Hugh wanted to make a point which could not but offend many people. So he chose a virtuous pagan, a Brahmin, to make it for him. The Brahmin could insist, with more freedom than a Christian, that scientific inquiry was part of the human birthright, and could proceed unaided by Holy Writ. His choices were severely limited. Had he chosen a pre-Christian Greek, his readers could have argued that, after the coming of Christ, the situation of science had changed. Had he chosen a Muslim, his readers could have interpreted the latter as a hardened infidel arguing the light of faith. So he chose an ascetic pagan, a man who, in the thought of the time, could be considered an unconscious Christian. To Dindimus he assigns the task of explaining the criterion which gives unity to philosophy/science, and the place of the mechanical arts within it.

When the first couple transgressed the order of nature, the disharmony thereby provoked clouded their eyesight. But it did not totally extinguish the eternal fire of truth found externally in the senses, and internally in the imagination. This fire continuously kindles curiosity, surprise, admiration — the starting point of science. Science has three principal goals:

> "...wisdom, virtue and competence to face needs. Wisdom is the understanding of things as they are. Virtue is a habit of the heart, a habit which establishes harmony with reason in the way of nature. Necessitas [competence in the face of need?] is something without which we cannot live, but without which we would live more happily?
>
> "These three things are as many remedies against the three evils to which human life is subject: wisdom against ignorance, virtue against vice, and competence against the body's weakness. In order to do away with the three evils, men have sought these remedies, and in order to reach them, art and discipline were discovered. For wisdom, the theoretical arts were discovered; for virtue, the practical arts; for needs, the mechanical arts".

In this text, Hugh starts from ignorancia, the feebleness of the mind's eyes, deprived of God's clear reflection. As a corrective, the mind needs theoretical science, a vision of things as they are. Such science leads to wisdom. Then Hugh deals with vitium, moral flabbiness which requires the aid of habitus animi, stable habits of the soul — in the language of Erich Fromm, character. These one acquires in the ethical or social science, practica, which leads to virtue. Finally, we live out of harmony with nature. Because of our aggression, a kind of revenge imposes necessities on us. To live, we must face and overcome these necessities. This can be accomplished through recourse to the mechanical arts. Theorica, practica and mechanica are the three cures for personal weakness. Dindimus argues that the element common to all science is the fact that it serves as a crutch for human weakness. As far as we know, Hugh was the first to reduce the invention of arts and science to certain defects in human nature. But we do not know whether this reduction is an invention of his own. It is certain that the definition of science as a remedy for the weakness of the individual, or the persons who engage in it, and who must do so to survive in an environment originally impaired by human action, is characteristic of Hugh alone. The idea is picked up by Richard of St. Victor, in his Liber Exceptionum (cca 1159), and last mentioned eighty years after Hugh's death. It is a view of science which is diametrically opposed to what began to take shape in the XIIIo century — when Aristotle was rediscovered — and to what is still dominant in the West. To see this opposition more clearly, perhaps we should stick to Hugh's term and, with Dindimus, speak about it as philosophia — as the caring pursuit of truth, motivated not by that love which cherishes the well-known, but rather driven by the desire to pursue further what

has been tasted and found pleasing.

Science by people may be a 1980 term in search of a wisdom analogous to what Hugh meant when he defined science as an aid for a self-induced weakness which is man's destiny in a world which he himself has marred.

For our reflection on science by people, Master Hugh has a second important contribution to make. He was original, not only with his ideas on science as a remedy, but also in placing scientiae mechanicae in philosophy. These constituted methodical reflections on specific remedies for bodily weakness — lanificium (weaving), armatura (metal work), navigatio (trade and transportation), agricultura (agriculture), venatio (perhaps primary sector activities would be a meaningful transposition), medicina and theatrica (entertainment). In each of these arts, Dindimus maintains, wisdom is hidden. Therefore, reflection on the art should be treated as a part of philosophy.

> "All living beings were born with the armor which befits them. Only man comes unarmed and naked into this world. What was given to others by birth, he must invent. Imitating nature and outfitting himself through reason, he shines forth more brightly than if he had been born with the equipment to cope with his environment".

Hugh manifests deep cheerfulness, an intellectual optimism about human nature, which can only be appreciated when seen against the background of his medieval Christian faith. His theological writings show how fully he was imbued with the sense of human sinfulness and the need for redemption. He was equally convinced that human disobedience and aggression against nature were now forever reflected in nature's rebellion, nature's refusal to serve human desires and human needs. Yet he neither preaches resignation nor does he incite to a new warlike attempt to submit nature to human domination. Rather he sees in the man-caused disharmony between humans and their environment the critical challenge to humanity — the challenge to create works of art which imitate nature, and which serve people as crutches on which they can rise above the condition in which they would have been had they lived in Paradise. The study of the wisdom which is implicit in the construction of such crutches Hugh calls the mechanical sciences. And he includes these in philosophy. I see that a similar action is taken by several contemporary proponents of science by people. They have no qualms about using the results of science for people, but claim that such use is for a purpose which is sui generis. To many, this claim sounds sentimental or fuzzy. And those who make it have no tradition of thought about science on which they can fall back. Perhaps reflection on Hugh of St. Victor can help them to be more precise in their claims.

Hugh's originality in the treatment of the mechanical arts will be better understood by following the evolution of the term up to the Middle Ages. "Mechanical" is of Greek origin (mēchanē). For the Greeks in classical times, the mechanical arts were procedures to outwit nature by miracles, magic make-believe, and such devices as water clocks and parabolic mirrors. When Greek became the trade language of the Mediterranean, mēchanē did the surprising thing and fabrica the straightforward. Latin never adopted the term or its equivalent. The Roman genius did not need to outsmart nature, nor did the Romans ever coin a catchall term for techniques. The Romans could write with precision about agriculture or about the art of war (de agricultura, de arte bellica) — their own, that of others, or that which they brought to Rome. But just as they needed no theology, so they needed no technology.

In late antiquity, the term was rarely used. Before the Moors overran Spain, Isidore of Seville helped it to survive into the Middle Ages. For him it meant any well thought through process of making. Then, at the time of Charlemagne, artes mechanicae acquired a new but ambiguous meaning. For the first time, scholars used the term to designate human activities through which artful imitations of nature were created. Gerber of Aurilac, the weird genius who became Pope Sylvester II, by a mechanical art was able to represent in formulas the intricate movements of all the heavenly spheres. For others, the term referred to the architectural projects which recreated in Romanesque cut stone an image of the visible and invisible world. But mechanics remained an elite concept. This appears clearly from

a letter which around 830 an unsigned young monk wrote to Master E., his former teacher in Compiègne.

> "...when I was with you, Master Manno told me what mechanics is all about, and what to think of the mechanical arts. Unfortunately I have completely forgotten all this. Please find out and send me word — what are mechanical forces? And, above all, how does mechanica [magic] differ from astrology?"

For the Greeks, the term had meant the outwitting of nature; in scholastic use at the time of Hugh, it meant making artful imitations of nature. In this sense, Hugh uses the word "mechanical". He explores the relations of practical art to wisdom.

Those who in the Middle Ages used the term before Hugh always combined it with art, writing of artes mechanicae. Hugh is alone in uniting it with science. He always speaks of scientiae mechanicae. He was concerned, not with wool making, but with the relationship between this art and wisdom. He wanted to establish the contribution which research about weaving or trading or medicine or acting would make to the scientist's wisdom, to his ability to remedy the weakness of his own being. In the practical arts, he seeks a mirror of truth, as elsewhere he describes creation and the human soul as the other two great mirrors.

Analyzing art as a mirror for truth, Hugh establishes an essential difference between the reflection he sees in art and the one he sees in creation and the soul. Nature and the soul reflect the light of truth in a medium created by God but clouded by humans. Mechanical science seeks the reflection of the same light in a medium which is partly natural and partly the work of man. Mechanical science is the study of man's work insofar as this study can contribute to a practical remedy for human weakness. In a sense, Dindimus says, mechanical sciences are named such improperly. They provide man with a passkey to the workings of nature. Then, learning from her, he is able to face necessities better. To explain this two-faced, bastard quality of art, half human conception and half imitation of nature, Dindimus employs a preposterous etymology. He derives mēchanē from moichos (adulterer). For him, techniques mirror the truth, but also distort it.

Neither Hugh's idea of science as a remedy, nor his notion of mechanics as part of science, survived him. This is surprising, since both ideas are clearly expressed in the Didascalion, his most popular and widely used work. Part of the explanation as to why his readers did not take up the latter idea is to be found in the accelerated technological developments which coincided with Hugh's 45 years. In less than a century, iron consumption in northwestern Europe more than doubled. The iron was needed for such things as horseshoes, heavy plows and scythes — inventions three centuries old and now widely used. And the Crusades began in this period, requiring large quantities of armor. The number of watermills increased greatly, as did the number and variety of new machines powered by these mills. Monasteries appeared to be converted into machine parks. The men who built, maintained and repaired all this milling and mining equipment multiplied. And they were a new kind of artisan and tradesman — wandering tinkers and expert miners who did not quite fit former models. Their trades came to be called the mechanical arts. City people tended to look down on the practitioners of such novel arts as a new kind of rabble. When, two generations after Hugh's death, both windmills and universities spread throughout Europe, no educated person would have talked about mechanics as an academic subject. Mechanics now designated a new sort of job, a kind of wage labor — rare in XII° century France — which was a first form of mechanical mass-production. The term had little to do with outwitting nature, and even less with its imitation. Its meaning was closer to the exploitation of nature, having evolved in the direction of its domination. Centuries would pass before any serious attempt would be made to incorporate disciplines which required manual skills into the sciences. When half a millenium later, in the XVIII° century, such activities finally found their way into the university curriculum, they were conceptualized as diametrically opposed to Hugh's scientia mechanica. Where the latter pursued wisdom in the imitation of nature, the new subject clearly was an

engineering science.

The intellectual climate of Europe changed radically between the early part of the XII° and the early part of the XIII° centuries. At the time of Hugh, Abelard and St. Bernard, it was quite correct and fitting to let Dindimus, "King of the Brahmins", speak for a Christian philosopher. The relationship between mankind and the environment was perceived in such a way that conversation with Taoists or Hindus could start from common premises. Science was conceived as part of a moral undertaking which seeks to provide individuals and communities with a better form of subsistence in harmony with nature. Then this was changed abruptly. Through Peter the Venerable, Benedictine monks and Spanish Jews, Greek and Arabic thought was introduced to Europe. The new mills became the age's symbol of man's power over nature. In fact, the relationship turned out to be, more precisely, the power exercised by some men over others, with nature as its instrument. The mendicant [sic] orders founded by St. Francis and St. Dominic, and others which followed, relegated the Benedictine work ethic to an ideal for a monastic elite alone. Through the scholars of these new orders, the Church interpreted the classical position of aversion to manual labor as a Christian theory which supported science as a means to govern nature. The ecological interpretation of the Paradise story, which Hugh had presented, seemed not even worth remembering.

Even those who now advocate science by people seem unaware that 850 years ago their own tradition contained colleagues sharing the same spirit. Searching for antecedents to support their ecological insights, they sometimes attempt to import Chinese or Indian concepts. They are ignorant of the fact that in the creative lull which produced Romanesque and the earliest Gothic architecture, an attempt was made to define science in a way precisely the inverse of that which Bacon codified for the West and the modern world.

Bacon, too, was concerned with theology, and preached more than Hugh did. He was interested in the "...restitution and reinvestiture of man to the sovereignty which he had in his first stage of creation in Paradise." For him, "...the progress of arts and sciences [is] to achieve mastery over nature"; the scientist comes to you, in "...very truth leading to you Nature with all her children to bind you to her service and make her your slave." He "vindicates the right over nature ...which is man's by divine bequest", [and] promises liberation from the inconveniences of man's estate." Bacon believed that "...the mechanical inventions of recent years do not merely exert a gentle guidance over Nature's course, they have the power to conquer and to subdue her, to shake her to her foundations."

This is the basic assumption from which most R and D starts today. But not all. Increasingly there is ecological research, soft science, research to seduce nature by blandishments, to seek liberation from the inconveniences of man's estate. We see now that some R and D attempts to do better what anarchic researchers do. From the institutional perspective of the former, the science by people group, working consciously or unconsciously in Hugh's framework, is inefficient, without the right equipment, lacking even doctorates. The danger now is that the attempt to clarify what the inverse of R and D might be may have the same fate as Hugh's analysis. Science by people could become submerged in ecological systems engineering.

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