Essay

LEWIS THOMAS:

On Alchemy

Alchemy began long ago as an expression of the deepest and oldest of human wishes: to discover that the world makes sense. The working assumption—that everything must be made up from a single, primal sort of matter—led to centuries of hard work aimed at isolating the original stuff and rearranging it to the alchemists' liking. If it could be found, nothing would lie beyond human grasp. The transmutation of base metals into gold was only a modest part of the prospect. If you knew about the fundamental substance, you could do much more than simply make money; you could boil up a cure-all for every disease affecting mankind, you could rid the world of evil, and, while doing this, you could make a universal solvent capable of dissolving anything you might want to dissolve. These were heady ideas, and generations of alchemists worked all their lives trying to reduce matter to its ultimate origin.

To be an alchemist was to be a serious professional, and it required long periods of apprenticeship and a great deal of late-night study. From the earliest years of the profession, there was a lot to read. The documents can be traced back to Arabic, Latin, and Greek scholars of the ancient world, and beyond them to Indian Vedic texts as far back as the tenth century B.C. All the old papers contain a formidable array of information, mostly expressed in incantations, which were mandatory learning for every young alchemist and, by design, incomprehensible to everyone else. The word "gibberish" is thought by some to refer back to Jābir ibn Hayyān, later known as Geber, an eighth-century alchemist who lived in fear of being executed for black magic and worded his doctrines so obscurely that no one knew what he was talking about.

Indeed, black magic was what most people thought the alchemists were up to, in laboratories filled with the fumes of arsenic, mercury, and sulphur, and the bubbling infusions of all kinds of obscure plants. We tend to look back at them from today's pinnacle of science as figures of fun, eccentric men in comical conical hats, engaged in meaningless explorations down one blind alley after another. It was not necessarily so; the work they were doing was hard and frustrating, but it was the start-up of experimental chemistry and physics. The central idea they were obsessed with—that there is a fundamental, elementary particle out of which everything in the universe is made—continues to obsess physicists.

The alchemists never succeeded in making gold from base metals, nor did they find a universal elixir in their plant extracts; they certainly did not rid the world of evil. What they did accomplish, however, was no small thing: they got the work going. They fiddled around in their laboratories, talked at each other incessantly, set up one crazy experiment after another, and wrote endless reams of notes, which were then translated from Arabic to

Greek to Latin and back again. More workers became interested, and one thing led to another. As time went on and the work progressed with error after error, new and accurate things began to turn up. Hard facts were learned about the behavior of metals and their alloys; the properties of acids, bases, and salts were recognized; the mathematics of thermodynamics was worked out; and, with just a few jumps through the centuries, the helical molecule of DNA was revealed in all its mystery.

The current anxieties over what science may be doing to human society, including the worries about technology, are no new thing. The third-century Roman emperor Diocletian decreed that all manuscripts dealing with alchemy were to be destroyed, on the grounds that such enterprises were against nature. The work went on in secrecy, and, although some of the material was lost, much of it was translated into other languages, passed around, and preserved.

The association of alchemy with black magic has persisted, partly because the objective—the transmutation of one substance into another—seemed magical by definition, and partly because of the hybrid term. *Al* was simply the Arabic definite article, but *chemy* apparently came from *khēmia*, the ancient word for Egypt, "black land." A similar-sounding word, *khumeia*, meant an infusion or elixir, and this was incorporated as part of the meaning. The Egyptian origin is very old, extending back to Thoth, the god of magic (who later reappeared as Hermes Trismegistus, master of the hermetic seal required by alchemists for the airtight vessels they believed were needed in their work). The notion of alchemy may be as old as language, and the idea that language and magic are somehow related is also old. Grammar, after all, was a word used in the Middle Ages to denote high learning, but it also implied a practicing familiarity with alchemy. Gramarye, an older term for grammar, signified occult learning and necromancy. Glamour, of all words, was Scotch for grammar, and it meant, precisely, a spell, casting enchantment.

Medicine, from its dark origins in shamanism millennia ago, became closely linked in the Middle Ages with alchemy. The preoccupation of alchemists with metals and their properties led to experiments—mostly feckless ones—involving the therapeutic use of all sorts of metals. Paracelsus, a prominent physician of the 16th century, achieved fame from his enthusiastic use of mercury and arsenic, based on what seems a wholly mystical commitment to alchemical philosophy as the key to understanding the universe and the human body simultaneously. Under his influence, three centuries of patients with all varieties of illness were treated with strong potions of metals, chiefly mercury, and vigorous purgation became standard medical practice.

Physics and chemistry have grown to scientific maturity, medicine is on its way to growing up, and it is hard to find traces anywhere of the early fumblings toward a genuine scientific method. Alchemy exists only as a museum piece, an intellectual fossil, so antique that we no longer need be embarrassed by the memory—but the memory is there. Science began by fumbling, by running up and down blind alleys and garden paths. It works because the people involved in it work, and *work together*. They become excited and exasperated, they exchange their bits of information at a full shout, and, the most wonderful thing of all, they keep *at* one another.

Something rather like this may be going on now, without our realizing it, in the latest and grandest of all fields of science. People in my field, medicine, and some in the "hard" sciences, like physics and chemistry, tend to take lightly and often disparagingly the efforts of workers in the so-called social sciences. We like to refer to their data as soft, subjective, based on their own preconceived notions of human behavior, and we fail to acknowledge the differences between the various disciplines within behavioral research. We speak of analytical psychiatry, sociology, linguistics, economics, and computer intelligence as though they were all of a piece, with all parties wearing the same old comical conical hats.

It is of course not so. The principal feature that the social sciences have in common these days is the attraction they hold for considerable numbers of bright young people, who see the prospect of exploring human behavior as irresistibly exciting and who hope that a sufficiently powerful scientific method for doing the exploring can be worked out. All of the matters on the social science agenda seem more urgent than at any other time in human memory. It may turn out, years hence, that a solid discipline of human science will have come into existence, hard as quantum physics, filled with deep insights, plagued as physics still is by ambiguities but with new rules and new ways of getting things done—such as, for instance, getting rid of thermonuclear weapons, patriotic rhetoric, and nationalism all at once. If anything like this does turn up, we will be looking back at today's social scientists, and their close colleagues the humanists, as having launched the new science in a way not all that different from the accomplishment of the old alchemists, by simply working on the problem—this time, the fundamental, primal universality of the human mind.

Keep them at it, I say, keep them working, bring in more of them, crowd them together in the deepest water, way beyond their depth. Goad them into swimming into each other, sputtering new bits of information each time they touch, losing themselves in a high surf of metaphor but each time regaining their feet for a new try. Sooner or later something will come of it, something like knowledge, new to them, new and surprising to all the rest of us. ▣