lectual gestalts. Too often our educational system has simply required that we "swallow whole" great syntheses of knowledge, without the essential de-structuring necessary for integral assimilation. The whole process of creative learning must be taken into account, if we are to conceive the new curricula on all levels.

The third project of the Exchange, now under way, is the preparation of a "Catalogue of Integrative Liberal Education," selected from the programs of the top 10% of U. S. colleges and universities. Additional courses, or extensions of those listed, will be proposed by the Center as new possibilities present themselves. This course review is intended to assist those interested in establishing integrative programs within a department, a divisional or special studies area, or for an entire college.

Our future plans include assembling readings and materials in the following areas: 1. The Design of the City of Man, 2. Origins: three readings on the place of man in nature (the Universe, Life, and Man), and 3. The Great Traditions: readings of fundamental works from the West, the Levant, India and China.

In all of these endeavors, we ask for criticisms, suggestions, and descriptions of special integrative programs, news of which may not yet have reached us.

Main Currents of Modern Thought
Vol. 27, No. 4, March-April 1971, pp. 133-5

Reviews

Design with Nature, Ian L. McHarg, Garden City, N. Y., The Natural History Press, 1969, 198 pp., illus., $19.95.

How ironic, perhaps blasphemous, to write about *Design with Nature* while ensconsed in a book-filled room, perched above Broadway on New York's upper west side. McHarg sings praise of the soothing air on the mountain pasture, of a clear sky and a dazzling sun, of the lush land discreetly clothing the earth's strong structure, of the restful rhythm by which a shaping surf sculpts the sandy shore, of the intricately interdependent lives that are the vitality of sea and earth, of desert, plain, and forest. Yet here the shades are drawn to hide the gray vista and the dark furnace smoke belching from the buildings across the way. Here the sounds of rasping motors, screeching brakes, honking roaring trucks and buses and shouting people are the normal noises, a high-decibel silence occasionally broken by the cooing of an unexpected pigeon. Here only two species thrive, man and the roach, and that leashed sub-species, the defecating dog. There is little nature here.

Nevertheless, in *Design with Nature* Ian McHarg offers some hope. Not much, perhaps, for areas such as my Manhattan, which seem irretrievably overdeveloped. But even for Manhattan, one can see missed chances and intimations of possible changes; even here, where nature seems so excluded, opportunities exist to design with nature. However inelegant, man and the roach are natural creatures, and the city has its own ecology, not all of which is a mere perversion of untrammeled nature. The hope that McHarg offers to city and country alike, and even to despised suburbia, is a method of planning by which all the different values of the environment can be appropriately taken into account.

Urban chaos, suburban sprawl, rural ruin have resulted, not from inherent improprieties in these forms of habitation, but from the unchecked, random play of a single principle, mammon. The strength of McHarg's method of planning is that he insists, along with the hard-nosed developer, on economic value, but always as part of other values which it affirms. Thus, in Socratic fashion, he draws the exploiter into a system of reasoned discourse that envelops economic value and includes it in a series of values all of which merit equivalent concern, thereby revealing nature as a vast system of self-regulating exchanges. The planner, the developer, and the lowly inhabitant must attend not only to the debits and credits that regulate financial value, but also to those that determine geologic value, water value, plant value, animal value, historic value, scenic value, recreational value, residential value, civic value, and so on. All these values contribute to the life and death of any particular place. Further, the plans that most fully take into account the range of these values will in the long-run achieve the optimum for each particular component, the financial included. This means that the developer with sufficient foresight to design with nature can ultimately do better on narrow economic grounds than can the developer who sets out merely to turn the biggest buck.

McHarg explains his method with effect. He begins with a simple case, the great sand spits along the New Jersey shore, a wounded wonder of nature. Over the years, carefree vacationers have not respected the nature of the dune. Houses have been built, wells dug, land filled, vegetation trampled, without concern for the natural exchanges that must be maintained if the dune is to persist. Hence, nature has begun to call due the accounts; in 1962 a hurricane began to break down the spits, devastating property and reshaping the map. Mindlessly exploited, the dunes may have been thrown into irrevocable decline.

Erosion of the Jersey shore could have been avoided if its exploitation had been planned in view of nature's

design of the dune. Each part serves an integral function in the entire system, and each has its internal structure, which may be delicate and vulnerable or strong and resistant. A cross-section of the spit shows it to be like a series of waves of loose sand held in place by a mat of vegetation. The front wave, the primary dune, slopes into the sea; its beach is strong — on it, men and gulls can play to their hearts' content — but as the dune rises, to shield what lies behind from salt spray and storming surf, it becomes very delicate. Sand grasses hold it together; these can survive most any challenge but that of a falling water table and trampling feet. Here nature posts a keep-off sign that men did not heed. Behind lies the first trough, which harbors more varied vegetation and can sustain, without damage, some building and some sport. Then, the secondary dune rises; its function is to guard the rear areas, to prevent hurricane waters from breaching the spit and flooding the bay. Here nature posts another unheeded sign: do not clear, cut, or excavate. Beyond the second dune are the rear areas, which are tough and well-covered; here men may build as they please, provided the density of habitation does not draw off fresh water until its ground level falls and desiccation destroys the vegetation that holds the system together. Finally comes the bay, which can serve numerous purposes provided it is not slowly filled in. In that case, the volume of water it can absorb will rapidly fall, and when the high seas come, even if successfully blocked from the front, they will sweep around the back, overflow the brackish bays, and kill the dunes from behind.

From this example, the book proceeds in two parts, each winding around the other as in a double helix. One part is a series of case studies in which McHarg applies his basic methods to ever more complicated problems. The other is a series of essays in which he explains nature's basic exchanges of value, for these must be understood and respected by those who would intelligently design with nature. Chapters from each part more or less alternate with one another; the procedure is pedagogically sound: it leads the reader through a dual course on the elements of ecology and the arts of enlightened planning.

The nine case studies are fascinating: they include the one on the Jersey shore and others on Staten Island, Philadelphia, the outskirts of Baltimore, Washington, and the Potomic River basin. In each, McHarg and his co-workers — either in his firm, Wallace, McHarg, Roberts and Todd, or in his Department of Landscape Architecture and Regional Planning at the University of Pennsylvania — carefully study the natural and cultural character of the land in question. From this data they make a series of maps that reflect the distribution either of various costs or of various values. For instance, to site a highway, they calculate not only the economic costs of building on various strips of land; they further inventory the geologic, the hydrologic, the zoologic, the cultural, historic, and institutional costs. For each of these categories they shade in a map, dark for high cost land, light for low cost land; then they superimpose all of these maps and plot the path that least intersects areas of high composite costs.

If, instead, the maps are made to reflect values rather than costs, the resultant composite is useful not in showing how best to achieve a particular function, but in establishing guidelines for the general use of a given area in order to realize its fullest potential. McHarg's maps of this type, which provide a positive, not a negative picture, strongly suggest that in most cases single-use zoning is an absurd dogma, which leaves much developed land needlessly underexploited and induces an inflated demand for developing land that would better be left rural or sylvan. McHarg is careful, however, not to suggest that any of his maps, no matter how comprehensive and detailed, can serve alone as an effective plan. They simply schematize the possibilities. To have a plan, McHarg cautions, one must add, to a vision of potentials, the political will and muscle to make the potential actual. Hence the other helix.

A moving discourse on the values of nature spirals around the case studies. Man is natural; he exists in nature. To separate man from nature is to blind oneself to reality, to human reality; sightless pride then leads men to the folly of abusing nature. To correct this myopia, McHarg shows first the human plight we are creating by abusing nature, and then explains, or rather, insinuates the basic principles by which nature maintains her vital balances. He deftly imparts the pertinent technical knowledge — from biology, geology, physics, chemistry, botany and zoology, astronomy and climatology. Throughout, the photographs and diagrams are beautiful aids to understanding and appreciation. To one's surprise, almost without effort quite difficult concepts like entropy and negentropy become simple, familiar tools that one can use to understand the dynamics of the biosphere. Cumulatively, McHarg's chapters on form, process, and value, his depiction of startling perspectives on life and the world, and his invention of a wise, utopian people, the naturalists, inspire in the reader a love and reverence for nature.

By inciting this love and reverence, McHarg wins a constituency for his methods of planning. Such proselytizing is integral to the whole endeavor, for no matter how perfect in principle his methods may be, they are nothing in practice until they are backed by an effective will to implementation. True, a number of the case studies show that when a clear and present danger has confronted certain communities, McHarg and his associates have found themselves a ready-made following. Certain agencies have occasionally commissioned McHarg to make long-ranged planning studies of substantial areas. But both emergency reaction and distant study fall far short of the continuously implemented foresight to which McHarg aspires. For this, a change of consciousness seems to be a pre-condition, a change by which men will come to understand natural

values as intuitively as they do the economic. Then they will take the commandment, design with nature, neither as a defensive expedient nor as an ideal to be quickly eroded by political and financial realists.

It is here, however, in the context of developing a worthy following for his principles, that McHarg lets one flaw creep into his book. He is masterful in insisting on the claims of nature, and one can understand his anger at man's heedlessness. But it seems unnecessary and unconvincing to blame this heedlessness on the Judeo-Christian heritage of the West. The matter is simply much more complicated than McHarg suggests in his polemic against the view of nature given in Genesis. One finds the complexity of Western ideas about nature well explained, for instance, in Clarence J. Glacken's monumental study, *Traces on the Rhodian Shore.* Glacken shows that the view which infuriates McHarg (that nature is there for man to conquer and exploit) is a significant strand in Western thought about the world. But Glacken also shows that McHarg's own view — that some hand greater than man has inscribed a design in nature, which men must respect and understand — is an equally important strand in Western thought, with both Hellenic and Judeo-Christian origins. It is impolitic, in seeking to draw men into working towards a better future, to suggest that they should discard a heritage that many may still cherish, especially when the heritage itself is a valid source of the envisioned future.

Although McHarg is not at his best in the history of ideas, it matters little. Whether one agrees or disagrees with his historical interpretations does not determine whether one can be moved by his vision of nature. The real strength of his position lies in the fact that his chosen route to the goal is not the only one possible. As a result, many of us who are not ready to give up our humanism or theism for his naturalism may still eagerly agree, for reasons of our own, with his conviction that the nature of design is to design with nature.

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Contemporary Schools of Metascience: Studies in the Theory of Science, G. Radnitzky (2d Edition), Two volumes in one: Vol. 1, *Anglo-Saxon Schools of Science,* bibliography, author index, 202 pp.; Vol. 2, *Continental Schools of Metascience,* bib., author index, 200 pp., New York, Humanities Press, 1970, $13.50.

This book introduces the challenging perspective on the natural and cultural sciences developed by Dr. Radnitzky and others, particularly Håkan Törnebohm, at the Center for the Theory of Science, University of Göteborg, Sweden. Radnitzky maintains, with abundant evidence to substantiate his view, that quite different general concepts of science have prevailed in Anglo-American universities and in European universities. The guiding philosophy of science in the English-speaking world has emphasized physics, mathematics, and clarity of results. The Continental philosophy of science, growing up in symbiosis with the cultural and social sciences, attempts "to understand the production of new knowledge in the human sciences by means of models of the development of knowledge in certain typical situations." (Vol. 1, p. xix)

This contrast of two radically opposed concepts of philosophy of science allows an exploration much broader and deeper than the title might suggest, and this needs to be emphasized. Radnitzky and the Institute for the Theory of Science, in formulating a theory of the *development* of knowledge, have adopted a genuinely new perspective point, "at a higher elevation" than those found in most discussions of the structure of knowledge. This new "perspective point" should make this book of considerable interest to those concerned with the structure of the university, as well as those concerned with General Education in high school curricula.

As is discussed in the general introduction, a *systems* orientation guides certain phases of the analysis, both in terms of a consideration of the "flow" of information through a group carrying on active scientific research, and in the concept of "levels," mentioned above, which allows for a richer sense of the whole realm of knowledge than appears in much of the philosophy of science in the English-speaking lands.

Certain sections of this book will be of general interest: Towards a Theory of Intellectual Traditions; Unified Science and Reductionism; Rounding Out the Groundplan in Philosophical Anthropology of Knowledge (especially the interest in improving the "scientific" worldpicture); The Hermeneutic-Dialectic Approach; The Complementarity of the Naturalistic and Hermeneutic Approach.

Radnitzky suggests that a unity of science is not possible "on the level of science." "There is a *continuous diversification* of the special sublanguages of science. This is a necessary development *because only highly specialized sublanguages can be efficient for special tasks. . . .*" He goes on to point out that: "There are two well-known and . . . well-neglected ways of counteracting this increasing babylonization: First, synopsizing from the fragmentary knowledge provided by the scientific enterprise for *philosophical* cosmology and *philosophical* anthropology, i.e., worldpicture-making. Second, cross-fertilization of fields of studies which appear to stand in what above was termed 'neighborhood relations.'" (Vol. 1, p. 89)

This interesting position should be of value to those concerned with the unity of knowledge. We already have a great effort expended on interdisciplinary approaches, both in research programs and in the curriculum, but there is lacking a genuine development of the synoptic