



*Patrick Geddes:  
Synthetic Vision  
Ellen Sullivan*

Patrick Geddes: Synthetic Vision

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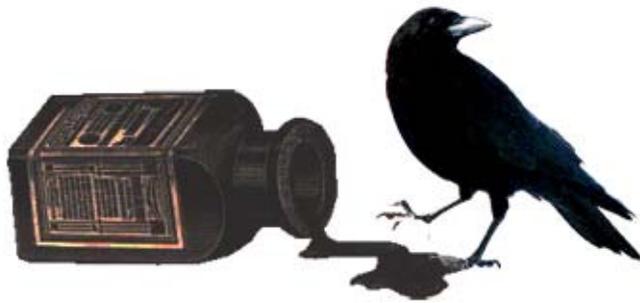
### **ABSTRACT**

Among the founders of the science of town planning at the beginning of the twentieth century, Scotsman Patrick Geddes introduced methods of investigation commensurate with other sciences. A biologist, trained by Thomas Huxley, Geddes borrowed the practices of the microscopical laboratory in creating the Outlook Tower in Edinburgh, Scotland which served as a model for an approach to the study of cities. His method was like that of a field botanist studying a species, and assumed an interdependent relationship between place, work and folk. Embracing the evolutionary theory of Charles Darwin, Geddes proposed subtle town planning interventions as a means by which cities could adaptively respond to change over time. He advocated the employ of a graphic device, which he called his "thinking machines," and which served as a paradigmatic strategy to forge new relationships within sets of ideas. Such an approach aligned him with the taxonomic strategies in practice in the formation of museum collections and display of the nineteenth century. This work examines the archival evidence of the principles underlying Geddes' methods in the hope that they may be recovered in contemporary town planning.

## DEDICATION

To John, Sarah and Joe --

You believed when I doubted,  
and the strength of your belief gave wings to this work.



## **ACKNOWLEDGEMENTS**

As in any pilgrimage, or Fool's journey, it is the encounters along the way that make possible some final realization. I am indebted to many guides who gave direction when I was lost, and who, with infinite patience, helped set a course through challenging straits.

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## **INTRODUCTION**

*This exactness to advance nothing but what has been verified, is that which has made Democritus so greatly extol'd amongst the ancients, when having collected a great abundance of strange Curiosities, it is reported that in his Collections he marked with his own Seal, those of which he Experimentally knew the Truth, to compose a volume of them, which he intituled the Book of Choice. Thus after his Example it is that we design that this collection, be a choice of all that ever has been found and carefully remarkt in the animals which could be examined.*

-Claude Perrault, 1688<sup>1</sup>

When in the last decades of the nineteenth century Scotsman Patrick Geddes opened the Outlook Tower atop the Royal Mile in Edinburgh, he established a social laboratory in which he gathered "thinkers" at "Summer Meetings" whose work in the opening fields of economics, geology, sociology, and town planning would have far reaching result. The Outlook Tower was a viewing platform, where not only were views shared among conference participants, and Geddes' views disseminated to a wider world, but the Tower itself was devised as a tool for viewing the complexity of "the city" within its social, economic and regional context. In creating this "applied civics laboratory," Geddes was intent upon establishing a new science, "sociology," and he readily borrowed the conventions of established and emerging sciences to lend legitimacy to the new field. Nested within sociology was the science of town planning, and the Outlook Tower served as an instrument of investigation, like a microscope writ large. The Tower housed an "index museum" of the city and region, and presented a sequence of experiences meant to train visitors as field investigators. Here, borrowing procedures learned in his training as a biologist, Geddes employed the tools and methods of biology, zoology, botany, meteorology, astronomy, and geology to achieve what he called "the synoptic view." In addition to these methods of gathering observations of the city and its region, he applied the lenses of psychology, ethics, and aesthetics, to obtain a "synthetic view." At both The Outlook Tower, and in his "Cities and Town Planning Exhibition," Geddes' choreography of visitors' experiences asserts the pedagogical role of the museum and exhibition, newly-found in the nineteenth century, and reflects consideration of the arrangement of display as it served the narrative of knowledge, a topic central to collection and display practices, hotly debated in the nineteenth century, and debated still. The work that follows examines the evidence of the development of Geddes' approach to the study of cities, and traces his thoughts to their origins in a wide range of disciplines. Carlo Ginzburg claims "venatic origin of the conjectural paradigm,"<sup>2</sup> and, like a hunter encountering animal tracks in the snow, this investigator has sought to work her way back to the animal's den as well as forward to her prey.

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<sup>1</sup> Perrault, Claude (1688) *Memoirs for a natural history of animals: containing the anatomical descriptions of several creatures dissected by the Royal Academy of Sciences at Paris*. Joseph Streater. Preface. <http://digicoll.library.wisc.edu/cgi-bin/HistSciTech/HistSciTech-idx?type=header;pview=hide;id=HistSciTech.Perrault>

<sup>2</sup> Ginzburg, Carlo (1989) "Clues: Roots of an Evidential paradigm". *Clues, Myths, and the Historical Method*. The Johns Hopkins University Press. Baltimore. P 116.

### Early Influences and Education

Patrick Geddes was born in 1854, in Aberdeenshire, Scotland. His father, Alexander, was a soldier in the Royal Highland Regiment, the Black Watch, and an elder in the Free Kirk. This denomination formed in 1843 when approximately one third of the ministers and congregants of the Church of Scotland withdrew in protest of a system of patronage that gave control of appointment of ministers to landed gentry. Led by Dr. Thomas Chalmers, the Free Kirk advocated preservation of Scottish communal traditions, co-operative effort, and funded foreign and domestic missions. "The West Port Experiment" organized the poorest neighborhood of Edinburgh into districts of 100 households, served by volunteers who offered no material aid, but counseled residents in sanitation and hygiene and gospel, and gathered information about residents' needs to be distributed to a wider philanthropic community. A school, where children could also bathe and get haircuts, also housed a laundry room. A lending library and adult reading room was opened, and a church built. Organized to encourage leadership from within the ranks of poor residents, the project was a departure from other charitable efforts wherein funds and community leadership positions were held by middle and upper-class volunteers. Though as an adult, Geddes was not an active participant in the Free Kirk, the early influence of this approach to social engagement would be reflected in his social reform efforts.

When Geddes was three years old, his family relocated to Perthshire. Perth, located approximately forty five miles north of Edinburgh and 20 miles west of Dundee is located in central Scotland on the River Tay. Geddes attended Perth Academy, and entered Edinburgh University in 1874, where he remained for one week, departing in dissatisfaction with the instructional regimen of the Department of Botany where "...the revelation of life and all its glorious mysteries, was being reduced to the classification and dissection of dead specimens." <sup>3</sup> Inspired by Thomas Huxley's *Lay Sermons*, Geddes enrolled at the London School of Mines in London in 1875 where he studied zoology under Huxley. This placed him in south Kensington during the period that Huxley was engaged in shaping policy for training teachers in science as well as defining the relationship between lecture theater, museum and laboratory. One of Huxley's lecturers recalled that Huxley "...laid special stress upon personal observation at first hand as the leading feature of biological study...Its effect was at a single stroke to convert each student into a potential investigator." <sup>4</sup>

During his period of study in London, Geddes made the acquaintance of Richard Congreve, follower of August Comte (and translator of his work) and founder of the London Positivist Society and the Comtist Church of Humanity. Geddes attended the Comtist Church on Chapel Street. Positivism, advanced by August Comte, asserts that

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<sup>3</sup> Mairet, Philip (1957) *Pioneer of Sociology: the life and letters of Patrick Geddes*. Lund Humphries. London. P15.

<sup>4</sup> Bower, F.O. (1925) "Teaching of Biological Science". *Nature*. 115. P 712.

all phenomena are subject to universal laws: "As we have seen, the first characteristic of the positive philosophy is that it regards all phenomena as subjected to invariable natural laws,"<sup>5</sup> -- and the degree of *positivity* of any phenomena is the degree to which its characteristics can be accurately determined. Comte argues that the *method* of scientific inquiry should be constant across disciplines. Comte's method comprises three parts: observation, experiment, and comparison. Geddes would employ this method at his Outlook Tower laboratory in Edinburgh.

Another acquaintance made in these years was that of Annie Besant. Socialist and women's rights activist, Besant had endured a public trial for the 1877 publication of Charles Knowles' *The Fruits of Philosophy, or the Private Companion of Young Married People*, which explained the physiology of conception and gave information about contraception. Acquitted at trial, Besant was tutored by Geddes as she prepared to enter London University to study science. Two years later she met Helena Blavatsky and became a Theosophist. In 1907 she assumed the presidency of the Theosophical Society. A friend of George Bernard Shaw, she was sponsored as a member of the Fabian Society. In an interesting parallel, Geddes and his associate J. Arthur Thompson published *The Evolution of Sex* in 1889, a reviewer commenting, "The more delicate parts of the subject are handled with a tact that cannot give offence to persons of most opposite views."<sup>6</sup>

From London Geddes travelled to a marine biological station in Roscoff, Brittany for a month, then on to Paris where he studied at the Sorbonne in the winter of 1878-79. In Paris he met Edmond Demolins who introduced him to the work of Frederic Le Play. LePlay was a French engineer and professor of metallurgy at the *Ecole des Mines*. He conducted a survey of the social and economic conditions of workers in Europe, publishing *Les Ouvriers Européens* in 1855. In 1856 he founded the *Société internationale des études pratiques d'économie sociale*. It was at a local chapter meeting of this society that Geddes met Demolins. LePlay developed the case study method of sociological study, and fundamental to his work was the relationship between family (which he viewed as the basic social unit), work and place. He identified three types of families: *patriarchal*, which retained authority in a patriarch and membership in a family business; *stem*, wherein a patriarch and one son continued the family concern, but other sons dispersed to found other businesses, and the original family home continued to be the center of family custom; and *unstable*, an un-extended nuclear family, most vulnerable to negative economic impact. LePlay's field study led him to conclude that there was a relationship between family types, types of industry, and geographic region. This relationship between occupations and topography would be developed in Geddes' "Valley Section," and he would transform the social interaction of place, work, family into his triad "place/work/folk." The bond between place and people

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<sup>5</sup> Comte, Auguste (1998) *The Essential Writings: Auguste Comte and Positivism*. Gertrud Lenzer, ed. Transaction Publishers. New Brunswick and London. P 75.

<sup>6</sup> (1890) *The American Naturalist*. Vol 24. No 283. P 755.

and its expression in social constructs would prove fundamental to Geddes' understanding of the city, and his "science of cities" was a continual investigation of the nature of this bond.

In 1880 Geddes returned to Edinburgh and for the next ten years there is a remarkable expansion of Geddes' interests and activities beyond what one might expect of a biologist thus far engaged in field and laboratory research. Though the decade opened with Geddes winning the Ellis Prize in Physiology from the University of Edinburgh and ended with the publication of *The Evolution of Sex* (with J. Arthur Thomson), these events bookend forays into social economy and social reform, association with radical socialist organizations as well as more conventional academic and civic societies, and the beginning of engagement with town planning. Teaching practical botany at the University of Edinburgh and the University of Dundee, he also lectured on Economics, and in 1881 published *The Classification of Statistics and Its Results*. In 1883 he designed a botanic garden at Grange House, Edinburgh, writing that "Every town at least might thus utilize and beautify one or two of those odd half acres which now lie waste or form the shut-up gardens of dismal squares."<sup>7</sup> In 1884 he published *An Analysis of the Principles of Economics*, and *John Ruskin: Economist*, the same year he, with others organized the Edinburgh Social Union. Through the Union he was engaged in the reclamation of distraught properties in the Old Town of Edinburgh, and the creation of children's gardens on disused plots of land. In 1884 he lectured on "Conditions of Progress of the Capitalist and the Labourer" at the Industrial Remuneration Conference in London, and two years later received Peter Kropotkin, the Russian zoologist, social evolutionist and anarcho-communist, as a guest in his home. He contributed an article "Parasitism," to the 9<sup>th</sup> Edition of the Encyclopaedia Britannica in 1885, and in 1887 he wrote *Industrial Exhibitions and Modern Progress*, followed by *Every Man His Own Art Critic, Glasgow Exhibition, 1888: An Introduction to the Study of Pictures*, in 1888. During this period he also purchased the building that would become the Outlook Tower.

Through the first decade of the twentieth century, Geddes directed his energy to the founding of the practice of town planning, encouraging an approach commensurate with other sciences. At the outbreak of World War I, Geddes arrived in India where he would be engaged for many years, promoting his science, and, incidentally, renewing his acquaintance with Annie Besant. In India he also met Rabindranath Tagore, poet and social reformer who, in 1913 was awarded the Nobel Prize for Literature. Tagore founded an ashram/school in Santiniketan, which he expanded in 1921 with agricultural economist Leonard Elmhirst to become the *Institute for Rural Reconstruction*. In Tagore Geddes found a mind of like-spirit, and they remained friends and correspondents for the rest of Geddes' life. "Your idea of the graphic representation of human life and mind, the cycle of their activities and varied manifestations has strongly captured my

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<sup>7</sup> Geddes, Patrick (1883) "A Type Botanic Garden". *Transactions and Proceedings of the Botanical Society of Edinburgh*. Vol XVI.

mind. I wish we could make a place for it in our institution," wrote Tagore to Geddes.<sup>8</sup> Geddes was professor of sociology at the University of Bombay from 1919 to 1925, and prepared numerous town planning reports for Indian cities.

In 1919 Geddes prepared a master plan for Jerusalem (not realized) at the request of the British Mandate, and in 1925 devised a master plan for Tel Aviv (realized). In 1924 he moved to Montpellier, France, where he founded the *College des Ecosais* (Scotts College). Envisioned as a complex of residences, gardens, and library which would supplement the program at Montpellier University and promote the continuation of Geddes' work within an international community, this endeavor would primarily occupy Geddes for the last decade of his life. Lewis Mumford,<sup>9</sup> with whom Geddes' maintained a correspondence after Mumford's initial contact in 1915, expressed his frustration with what he saw as a dissipation of Geddes' energy, resulting in his failure to complete a number of proposed publications:

I should have either aided you at the beginning of the Montpellier scheme, or have diverted you completely away from it toward something of greater immediate urgency and prospect of accomplishment -- namely, the various books that you have still to write....For the sake of the ideas that both you and Branford<sup>10</sup> had to give the world, I could wish that you both had either gone into a lay monastery in 1920 or been imprisoned by the civil authorities, with nothing other than pen and ink and a library to keep you company...Surely it was contrary to your own teaching, to build the buildings first and then attract the pupils.<sup>11</sup>

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<sup>8</sup> Fraser, Bashabi (2005) Letter to Patrick Geddes from Tagore Rabindranath, 1922 in *A Meeting of Two Minds: Geddes Tagore Letters*. Word Power Books. London. P 83.

<sup>9</sup> Lewis Mumford (1895-1990) Writer, literary critic and urban theorist, his first publication *The Golden Day* (1926) revived interest in American transcendentalism. *Sticks and Stones* (1924) was his first foray into architectural history and criticism, and his *The City in History* (1961) received the National Book Award. He wrote as the architectural critic for *The New Yorker* for thirty years, and received the Presidential Medal of Freedom in 1964, the same year it was awarded to Walt Disney, Aaron Copeland, Willem de Kooning, T.S. Eliot, Carl Sandburg and John Steinbeck. He first wrote to Geddes in 1915, and they maintained a friendship and correspondence for the next 17 years, often challenging each other's intellectual assumptions. They first met face to face in 1923 when Geddes visited New York, and this proved to be a disappointing encounter, for Geddes had hoped Mumford would fill the role of protege and biographer, and Mumford hoped for Geddes' endorsement of his, by then, independent career as social and urban theorist. Despite their disappointment with each other, they remained close, Mumford naming his first child Geddes, and addressing his letters to Geddes, "Dear Master."

<sup>10</sup> Victor Branford (1863-1930) British sociologist and founder of the British Sociological Association. He first met Geddes when he was a student in Edinburgh, and later as an accountant, worked diligently to manage the chaotic finances of Geddes' many endeavors. Influenced, as was Geddes, by the work of August Comte and Frederic Le Play, Branford also funded Le Play House in London.

<sup>11</sup> Novak, Frank G. (1995) *Lewis Mumford and Patrick Geddes: The Correspondence*. Routledge. London and New York. P319-320.

A brilliant writer himself, Mumford could hardly have failed to realize the deplorable quality of Geddes' writing. Rambling and tedious, Geddes rarely makes a point succinctly, and, more often, strays onto trail after trail, leaving his exhausted reader to reassemble broken trains of thought:

The problem with Geddes' publications is not only their varying quality. Much of what he wrote is difficult to follow because he developed a totally idiosyncratic approach to the very concept of knowledge and created his own unique methodology. Most of published work was aimed at initiating readers in his special outlook and approach. Thus, in every short article he began again at the beginning, outlining and repeating his basic ideas endlessly.<sup>12</sup>

Writing is a very linear means of revealing thought, and, as will be seen, Geddes thought process resisted linearity. Whether by design or by default, he sought alternate methods to explain his thinking and to encourage new ways of thinking among his adherents and potential converts. His writing is only a part of the supporting evidence of his approach to town planning, and the very incoherence of his writing suggests a mind at work in a way anathematic to scholarly tradition. He admired Thomas Carlyle's *Sartor Resartus*, and identified with the imaginary central character, Professor Teufelsdröckh. Carlyle's 1836 work is the account of an editor who receives a manuscript from the German Diogenes Teufelsdröckh, Professor of "Things in General" at Weissnichtwo University. The content of the manuscript, "Clothes, Their Origin and Influence," is embedded within a narrative of the editor's attempt to gather biographical information about Teufelsdröckh, the biography itself, and the editor's commentary on the work. Carlyle used the device of non-fiction within fiction to examine the source of truth, locating it finally in the free will to construct meaning, meaning which changes as do the fashions of clothing. The book challenges transcendentalism and anticipates existentialism, and was highly regarded by Walt Whitman, Henry David Thoreau, Herman Melville and Jorge Luis Borges (who uses a similar structure in several of his stories). In the story Teufelsdröckh sends, upon the request of the editor, autobiographical notes which arrive as "Six considerable paper-bags, carefully sealed, and marked successively, in gilt China-ink, with the symbols of the Six southern Zodiacal Signs, beginning at Libra; in the inside of which sealed bags lie miscellaneous masses of sheets, and oftener shreds and snips, written in Professor Teufelsdröckh's scarce legible *cursiv-shrift*..."<sup>13</sup> Geddes, in soliciting Mumford's collaboration, likens his record-keeping to that of the imaginary Professor, "It is my dream that I shall find perhaps my long sought collaborator in you -- who may be at once willing and able to try

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<sup>12</sup> Meller, Helen (1993) *Patrick Geddes: Social Evolutionist and City Planner*. Routledge. London and New York. P3.

<sup>13</sup> Carlyle, Thomas (2002) *Sartor Resartus: the Life and Times of Herr Teufelsdröckh*. Canongate Classics. Edinburgh. P 87.

to work with me and over these Teufelsdröckhian paper bags,"<sup>14</sup> and later describes his setting in Montpellier, "Here I've tower and House going up together, so *can* tackle the Teufelsdröckhian paper bags..."<sup>15</sup> The description of Teufelsdröckh's writing style may also be likened to Geddes':

Considered as an Author, Herr Teufelsdröckh has one scarcely pardonable fault, doubtless his worst: an almost total want of arrangement. In this remarkable Volume, it is true, his adherence to the mere course of Time produces, through the Narrative portions, a certain show of outward method; but of true logical method and sequence there is too little. Apart from its multifarious sections and sub-divisions, the Work naturally falls into two Parts; a Historical-Descriptive and a Philosophical-Speculative; but falls, unhappily, by no firm line of demarcation; in that labyrinthic combination, each Part overlaps, and indents, and indeed runs quite through the other. Many sections are of a debatable rubric, or even quite nondescript and unnameable; whereby the Book not only loses in accessibility, but too often distresses us like some mad banquet, wherein all courses had been confounded, and fish and flesh, soup and solid, oyster-sauce, lettuces, Rhine-wine and French mustard, were hurled into one huge tureen or trough, and the hungry Public invited to help itself.<sup>16</sup>

Mumford comments on the difficulties of reading Geddes, "Those who look for Geddes in the libraries will never find him: they will be put off by his crabbed, somewhat Carlylean style, by his incomplete thoughts, by his impatient shortcuts and his wilful [sic] exaggerations,"<sup>17</sup> describing his writing as "uneven in texture."<sup>18</sup> Teufelsdröckh suffered similar limitations:

On the other hand, let us be free to admit, he is the most unequal writer breathing. Often after some such feat, he will play truant for long pages, and go dawdling and dreaming, and mumbling and maundering the merest commonplaces, as if he were asleep with eye open, which indeed he is... On the whole, Professor Teufelsdröckh is not a cultivated writer. Of his sentences perhaps not more than nine-tenths stand straight on their legs; the remainder are in quite angular attitudes, buttressed-up by props (of parenthesis and dashes), and ever with this or the other tagrag

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<sup>14</sup> Novak, Frank G. (1995) *Lewis Mumford and Patrick Geddes: The Correspondence*. Routledge. London and New York. P 169.

<sup>15</sup> Novak, Frank G. (1995) *Lewis Mumford and Patrick Geddes: The Correspondence*. Routledge. London and New York. P213.

<sup>16</sup> Carlyle, Thomas (2002) *Sartor Resartus: the Life and Times of Herr Teufelsdröckh*. Canongate Classics. Edinburgh. P 39.

<sup>17</sup> Mumford, Lewis (1944) Introduction. *Patrick Geddes: Maker of the Future*. Philip Boardman. The University of North Carolina Press. Chapel Hill. P viii-ix.

<sup>18</sup> *Ibid.* P xii.

hanging from them; a few even sprawl-out helplessly on all sides, quite broken-backed and dismembered.<sup>19</sup>

It is tempting to imagine that Geddes styled himself after the fictitious Professor, for the parallels are remarkable, but more likely that he recognized in Carlyle's celebrated work a means of ranging over a variety of sources, trusting readers to fashion meaning as one might fashion clothing to suit the occasion. In his Outlook Tower and "Cities and Town Planning Exhibition," Geddes produced "paper bags" of ideas, and then instructed visitors as to how to recompose their arrangement, in so doing discovering the relationship between ideas that would enable investigators to anticipate new ideas, bound in function to those which had come before. In such a way, he proposed a synthetic vision by which the future of the city could be seen. Such a method defies the deterministic linearity that would inform the "great plan" approach which dominated urban design for much of the twentieth century, and allows for both the interpretation of place through its subtleties, and insertion of modest intervention. His method required that designers be investigators first, on the watch for every clue as to the nature of the city. His is a tedious approach, for it demands the rigor of the biologist in the laboratory, and an active engagement in construing meaning, rather than the ego-driven formalist attack on place which characterizes contemporary urban design practice. The way Geddes thought, and the purpose behind his often confounding methods is the purview of this study, and can perhaps best begin with an examination of his "thinking machines" which exemplify his unique approach.

### Thinking Machines

Geddes' range of interests and activities is indicative of the "synoptic view" he would later advocate as he developed ideas about town planning. The term "synoptic" had, at the beginning of the 19th century, been applied to the gospels of Matthew, Mark and Luke which were seen to be interdependent texts, that is they contained similar wording, stories, and sequence -- multi-faceted views, which, when grouped together composed a "synoptic" narrative of the life of Jesus of Nazareth. The term was appropriated by chemist William Hyde Wollaston in 1813 in his *Synoptic Scale of Chemical Equivalents*; a paper read to the Royal Society of London.<sup>20</sup> Wollaston's scale was "...designed to answer at one view..."<sup>21</sup> questions concerning calculations of proportions and weights of chemical compounds. The scale was meant to save time and labor in the laboratory, and was described in Michael Faraday's *Chemical manipulation: being instruction to students in chemistry, on the methods of performing experiments of demonstration or of research with accuracy and success* in 1827. Forty years later, in 1869, Russian chemist Dmitri Mendeleev published his *Periodic Table of*

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<sup>19</sup> Carlyle, Thomas (2002) *Sartor Resartus: the Life and Times of Herr Teufelsdröckh*. Canongate Classics. Edinburgh. P 34-35.

<sup>20</sup> Wollaston, W. H. (1813) "Synoptic Scale of Chemical Equivalents". *Philosophical Transactions. The Royal Society*. <http://www.jstor.org/stable/107420>

<sup>21</sup> Ibid.

*the Elements*, in which chemical elements are arranged in "periods" and "groups" which indicate a relationship between properties of elements, a sort of "family tree" of elements. Mendeleev included empty cells in his chart to accommodate then undiscovered elements, and in so doing he provided a predictive means for discovery. In like manner, Geddes devised a system of graphical notation which allowed him to arrange ideas in relationship to one another, simultaneously or synoptically view ideas, and anticipate or predict content for additional cells. Geddes claimed "I am an eager and hungry '*visual*.'" <sup>22</sup> and this was his rationale for the peculiar method of notation which he called his "thinking machines." In a 1923 article, he explained the origin of this method:

Out exploring in Mexico, as a young man, my eyes gave way; hence, nearly three months in darkness, with periodic bleedings well nigh to exhaustion (with depressing knowledge of in this respect a bad line of descent). In this period the reflection was pressing – "What can a *blind visual* do with himself?" and then learning to "see" (as the blind say) with fingers – the solution came one day when feeling the frames of the outwardly obscured and shuttered panes – *Graphics! Notations!* (and raised in *relief*). These graphics are not merely of mathematical or statistical use. They can be used to express ideas of all kinds – physical and chemical, biological, and why not social also? <sup>23</sup>

Though he recovered his vision, he thereafter persisted in promoting this way of seeing, folding paper to mimic the division of frames, and then writing in the cells. (Figures 0.1, 0.2, 0.3) Only three of his "thinking machines" were prepared for publication: one in a paper presented at a Royal Society meeting in 1886; another, or series of diagrams, was presented in 1905 to the British Sociological Society; a third, with which most are familiar, his "Chart of Life" diagram, appeared in 1927 in a biography of Geddes written by Amelia Defries. These three are "complete" and belie the fluidity apparent in the many, generally "incomplete" diagrams held in the Geddes archive. This larger set of cards are Geddes' own notes in which remain clues as to how he was thinking, as well as what he was thinking. Their incompleteness is suggestive of their predictive utility, and in some cases the arrangement and content of the diagrams reveal the intent of his method of approach to the study of cities. <sup>24</sup> The cards themselves are roughly the size of today's index cards, though of a lighter-weight paper. Geddes must have carried these papers with him, as one might carry a sketch-book, since, in one instance, even

<sup>22</sup> Geddes, Patrick (1923) "A Note on Graphic Methods, Ancient and Modern". *Sociological Review*. Vol 15. No 3. Pp 227.

<sup>23</sup> Geddes, Patrick (1923) "A Note on Graphic Methods, Ancient and Modern". *Sociological Review*. Vol 15. No 3. Pp 227-235.

<sup>24</sup> When such a relationship has been apparent to this investigator, reference to a specific card is included as supporting evidence for the argument of this thesis. However, many cards appear to bear no relationship to the central theme of synthetic vision, except perhaps as, overall, they indicate Geddes' non-linear strategies.

his laundry list is written on one. (Figure 0.4). The subject content of the cards varies, indicating their broad application across the range of Geddes' interests. Additionally, there appears to be no consistency in the diagrammatic arrangement within the cards – often, there appear “sub-cells” within cells. Most obvious is their quality of incompleteness – in many cases, cells are left empty – and while it is often possible to interpret the specific reference within a cell or group of cells, one may not follow an argument across the arrangement to a conclusion of thought. Geddes includes arrows, and sometimes writing appears in a different orientation – that is, the card has been rotated ninety-degrees and a note added. Overall, the cards are evidence of a synthetic and paradigmatic method of inquiry which opposes Geddes' “logico-mathematic” claim for them.

In the wake of nineteenth century advancement of graphic methods in the sciences, Geddes asserted that his diagrammatic “thinking machines” provided a means of graphic notation for the social science. At a Royal Society meeting in 1886, Geddes presented a paper, “A Synthetic Outline of the History of Biology,” illustrated with one of his diagrams. (Figure 0.5) Under two headings, “Morphology,” and “Physiology,” separated by a vertical column “General Survey” and “Encyclop. [arrow] Buffon,” he has made columns of structures (“protoplasm,” “cells,” “tissues,” “organs,” “forms”) under “Morphology,” and functions (“habits and temperaments,” “functions of organs,” “functions of tissues,” “functions of cells,” “functions of protoplasm”) under “Physiology.” Below these respectively are names of scientists associated with each: “Dujardin,” “Schwann,” “Bichat,” “Cuvier,” “Linnaeus,” “Haller,” “Muller,” “Bichat,” “Virchow,” “Bernard.” He explained,

If we suppose the diagram rolled into a cylinder, the meeting of the two edges will readily illustrate how, in the study of protoplasm, morphology and physiology come into ultimate contact. Again, if the diagram be folded along the middle perpendicular lines, a gradual unfolding from the center outwards will, as column after column is exposed, illustrate the historic evolution of the sciences. (Figures 0.6, 0.7) <sup>25</sup>

As is typical with Geddes' diagrams, the cells are not completely filled in, leaving one to wonder if remaining cells here were to hold additional names of scientists associated with respective fields. His instructions are somewhat ambiguous regarding the direction of folding (vertical or horizontal), however, what is clear is that he intended this diagram to be physically manipulated, so giving it a dynamic quality not present in a two-dimensional illustration. It is an example of the way in which his “thinking machines” transgressed hierarchies and brought into relationship ideas which would remain distant and distinct in static diagrams.

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<sup>25</sup> quoted in Boardman, Philip (1978) *The Worlds of Patrick Geddes: Biologist Town Planner Re-educator Peace-warrior*. Routledge and Kegan Paul. London. P91.

In January of 1905, Patrick Geddes addressed the second meeting of the newly founded British Sociological Society, with a paper entitled, "Civics: As Concrete and Applied Sociology, Part II". Responding, in part, to criticism of an earlier paper: "The paper does not quite bear out its title: 'Civics as Applied Sociology.' The application has not begun,"<sup>26</sup> Geddes argued for the need of a system of scientific notation for the social sciences commensurate with emerging visual presentments in other sciences. "It is in fact only as we can agree upon some definite and orderly method of description that our existing literature of social surveys can be adequately compared or new ones co-operatively undertaken. Hence the importance of discussions of scientific method such as those who have so largely occupied our first volume."<sup>27</sup> Having previously outlined the necessity of thorough regional survey as a preliminary step in the process of proposals to address social need in towns and cities – "Often though philanthropists forget this, diagnosis should precede treatment"<sup>28</sup> – Geddes used this opportunity to demonstrate his method of graphical notation. "I am an eager and hungry 'visual', he was later to write, "Religion, ethics, politics and more; even philosophies and theologies; poesies or what you will, are all capable of notation...Notations are thus not simply records or abstracts; they are also capable of being developed in '*Thinking machines*' of each subject."<sup>29</sup>

A biologist by training, Geddes saw his venture into the new social science as an extension of his study of organisms – for he understood the city as an organism – and he was eager that sociology claim its place among the "older sciences." Victor Branford, a Geddes supporter who had provided funds for the founding of the Sociological Society had said in a speech given to the Manchester Sociological Society,

...there is a small but ever increasing number of scientists who push on through the world of form with which the mathematical sciences deal, onwards through the world of matter with which the physical sciences deal, and thence through the world of organic life with which the biological sciences deal, and finally attempt to explore with a scientific spirit and with scientific methods the world of mind and society with which the psychological and social sciences deal.<sup>30</sup>

<sup>26</sup> Geddes, Patrick (1904) "Civics: as Applied Sociology". Paper read before the Sociological Society at a meeting in the School of Economics and Political Science, University of London. Dodo Press. P 23.

<sup>27</sup> Geddes, Patrick (1904) "Civics: as Applied Sociology". Paper read before the Sociological Society at a meeting in the School of Economics and Political Science, University of London. Dodo Press. P 62.

<sup>28</sup> Geddes, Patrick (1904) "Civics: as Applied Sociology". Paper read before the Sociological Society at a meeting in the School of Economics and Political Science, University of London. Dodo Press. P 94.

<sup>29</sup> Geddes, Patrick (1923) "A Note on Graphic Methods, Ancient and Modern". *The Sociological Review*. Vol 15. P 227.

<sup>30</sup> Branford, Victor (1906). "Science and Citizenship". *Manchester Sociological Society*. George Allen. London. Pp 12-13.

Defining the methods of established sciences, and extending those methods to the new social science, Auguste Comte, in his 1831 'First System' of the *Cours de Philosophie Positive* wrote of the positive method in its application to social phenomena,

The main scientific strength of sociological demonstrations must ever lie in the accordance between the conclusions of historical analysis and the preparatory conceptions of the biological theory... and we shall see, as we proceed, that the succession of social states exactly corresponds, in a scientific sense, with the gradation of organisms in biology; and the social series, once clearly established, must be as real and as useful as the animal series.<sup>31</sup>

In accordance with the extension of biological principles to the study of sociology, Geddes, in his 1905 address encouraged the application of visual methods like those of other sciences:

...while astronomer and geologist and naturalist can and do describe both the observational results and their general conceptions in literary form...they also carry on their work by help of definite and orderly technical methods, descriptive and comparative, analytic and synthetic. These, as far as possible, have to be crystallized beyond their mere verbal statement into formulae, into tabular and graphic presentments, and thus not only acquire greater clearness of statement, but become more and more active agencies of inquiry – in fact, become literal *thinking-machines*.<sup>32</sup>

His interest in "graphic presentments" reflects the relatively new but insistent appearance of visual methods in the sciences throughout the nineteenth century. As Martin Rudwick has explained, the sciences have recruited from within "an educational tradition of 'numeracy' which is strongly mathematical in emphasis and non-visual in outlook."<sup>33</sup> In the field of botany, great controversy raged in the first half of the 19<sup>th</sup> century about the appropriateness of inclusion of illustrations in texts.<sup>34</sup> In part, centered around concerns that the rational mind could be overtaken by the sensual pleasure afforded by illustrations, the debate demonstrates a shift in a tradition which had granted primacy of text in developing rational and scientific minds.

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<sup>31</sup> Lenzer, Gertrud (1998) *Auguste Comte and Positivism: Essential Writings*. Translation Publishers. London. P 251.

<sup>32</sup> Geddes, Patrick (1904) "Civics: as Applied Sociology". Paper read before the Sociological Society at a meeting in the School of Economics and Political Science, University of London. Dodo Press. P 63.

<sup>33</sup> Rudwick, Martin J. (1976) "The Emergence of a Visual Language for Geological Science". *History of Science*. Vol 14. P 149.

<sup>34</sup> Secord, Anne (2002) "Botany on a Plate: Pleasure and the Power of Pictures in Promoting Early Nineteenth-Century Scientific Knowledge". *Isis*. Vol 93. No 1. Pp 28-57.

By the 1820's, an increasing number of the scientific journals in Europe began to publish graphs and charts that described and compared measurements of a wide range of natural and social phenomena. Graphical analysis of data finally emerged in the period 1830-1835 as a regular feature of scientific publication, particularly in England...By mid-19<sup>th</sup> century, quantitative graphics had become an accepted part of statistics. The third International Statistical Congress, meeting in Vienna in 1857, organized an exhibition display of graphs and cartograms and debated the merits of various graphical methods.<sup>35</sup>

In the course of the nineteenth century charts and graphs were increasingly the means of presenting the synthesis of data. Francis Galton, who had lectured at the first Sociological Society meeting in 1904 on 'Eugenics', had developed not only his physiometric studies, but created the first weather map, was first to recognize regression toward the mean in statistics, and created the *quincunx* or 'bean machine' which demonstrated the central limit theorem and normal distribution. Charles Booth Chair of both the first two sessions of the Sociological Society, had in 1891 published a study, *Life and Labour of the People of London*, which was illustrated with maps showing income groups of London. Geddes cited geographers Alexander von Humboldt, Carl Ritter, and Elisee Reclus and "developmental technologists like Boucher de Perthes and regional economists like LePlay"<sup>36</sup> as models of scientists whose graphical methods encouraged the interpretation of observed phenomena.

But while the mathematician has his notations and his calculus, the geographer and geologist their maps, reliefs and sections, the naturalist his orderly classificatory methods, it has been the misfortune and delay of political economy...that its cultivators have so commonly sought to dispense with the employment of any definite scientific notations...<sup>37</sup>

As the sciences developed their respective visual languages, there was a simultaneous necessity of educating those within the discipline, as well as laypersons, to "read" the language. Since the maps, sections, charts and diagrams were all abstractions of observable data, they demanded interpretive skills in their application to operational knowledge.

In other words, a geological map – or any other visual diagram...-- is a document presented in a visual language; and like any ordinary verbal

<sup>35</sup> Beniger, James R. and Dorothy L. Robyn (1978) "Quantitative Graphics in Statistics: A Brief History". *The American Statistician*. Vol 32. No 1. P 4.

<sup>36</sup> Geddes, Patrick (1904) "Civics: as Applied Sociology". Paper read before the Sociological Society at a meeting in the School of Economics and Political Science, University of London. Dodo Press. P 62.

<sup>37</sup> Geddes, Patrick (1904) "Civics: as Applied Sociology". Paper read before the Sociological Society at a meeting in the School of Economics and Political Science, University of London. Dodo Press. P 63.

language this embodies a complex set of tacit rules and conventions that have to be learned by practice. Again, like an ordinary language, these visual means of communication necessarily imply the existence of a social community which tacitly accepts these rules and shares an understanding of these conventions.<sup>38</sup>

With the goal of establishing such tacit agreement, Geddes, in his lecture of 1910, proceeded to demonstrate the applicability of his diagrammatic methods. This is the only explanation Geddes makes of the process of “walking through” one of his machines: “In the everyday world, in the city as we find it, what is the working classification of ideas, the method of thought of its citizens?...This set of views is obviously not easy of precise analysis of exact classification. In broad outline, however, a summary may be made, and even tabulated as follows:--“<sup>39</sup> \*

THE EVERYDAY TOWN AND ITS ACTIVITIES		
PEOPLE	AFFAIRS	PLACES
(a) INDIVIDUALS (Self and others)	(a) COMMERCE INDUSTRY, etc. SPORT.	(a) MARKET, BANK etc. FACTORY, MINE etc.
(b) GOVERNMENTS Temporal and Spiritual (State and Church)	(b) WAR and PEACE (Latent War).	(b) FORT, FIELD, etc.

Next note how from the everyday world of action, there arises a corresponding thought-world, also...thus the extended diagram, its objective elements expressed in yet more general terms, may now be read anew (noting that mirror images are fully reversed).<sup>40</sup>

\* Geddes' diagrams are here recreated after those that appear in Meller, Helen E. (1979) *The Ideal City*. Leicester University Press.

<sup>38</sup> Rudwick, Martin J. (1976) “The Emergence of a Visual Language for Geological Science”. *History of Science*. Vol 14. P 149.

<sup>39</sup> Meller, Helen E. (1979) *The Ideal City*. Leicester University Press. P 133-134.

<sup>40</sup> Geddes, Patrick (1904) “Civics: as Applied Sociology”. Paper read before the Sociological Society at a meeting in the School of Economics and Political Science, University of London. Dodo Press. P 66.

	PEOPLE	AFFAIRS	PLACES
"TOWN"	(a) INDIVIDUALS	(a) OCCUPATIONS	(a) WORK-PLACES
	(b) INSTITUTIONS	(b) WAR	(b) WAR-PLACES
"SCHOOLS"	(b) HISTORY (Constitutional?)	(b) STATISTICS and HISTORY (?Military?)	(b) GEOGRAPHY
	(a) BIOGRAPHY	(a) ECONOMICS	(a) TOPOGRAPHY

Whether he was projecting slides, displaying prepared diagrams, or making the diagrams as he lectured is unclear. However, he does say,

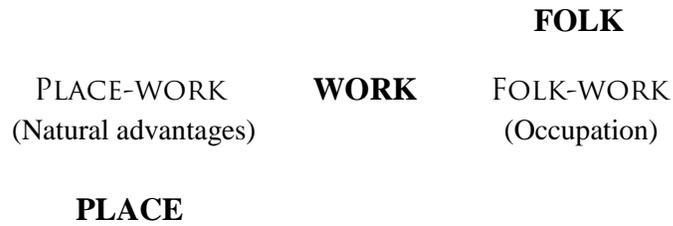
Tabular and schematic presentments, however, such as those to which we are proceeding, are apt to be less simple and satisfactory to reader than to writer; and this even when in oral exposition the very same diagram has been not only welcomed as clear, but seen and felt to be convincing. The reason of this difficulty is that with the spoken exposition the audience sees the diagram grow upon the blackboard; whereas to produce anything of the same effect upon the page, it must be printed at several successive stages of development.<sup>41</sup>

This seems to suggest that he was drawing the diagrams upon a blackboard as he spoke. Even so, he was thinking of them as his paper-folded 'thinking machines' since the lines of the diagrams are like those of the folds of his many papers. Also, when he says "mirror images are fully reversed," one can't help but think of folding the diagram to create the relationship of mirror image. He also says, "...more fully to understand this two-fold development of Town and School..."<sup>42</sup> in which case he may have been speaking figuratively, but perhaps is also expressing his usual habit of folding diagrams.

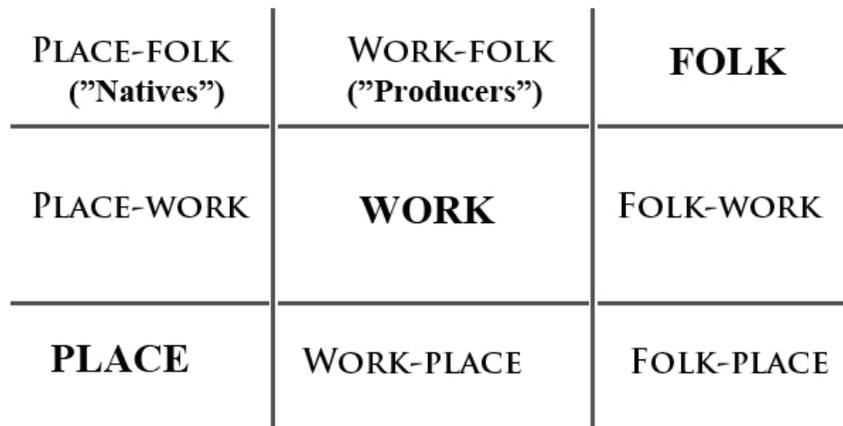
Geddes adapted LePlay's triad of "*Lieu, travail, famille*" to "place, work, folk," which he develops as:

<sup>41</sup> Ibid. P 69.

<sup>42</sup> Ibid. P 68.

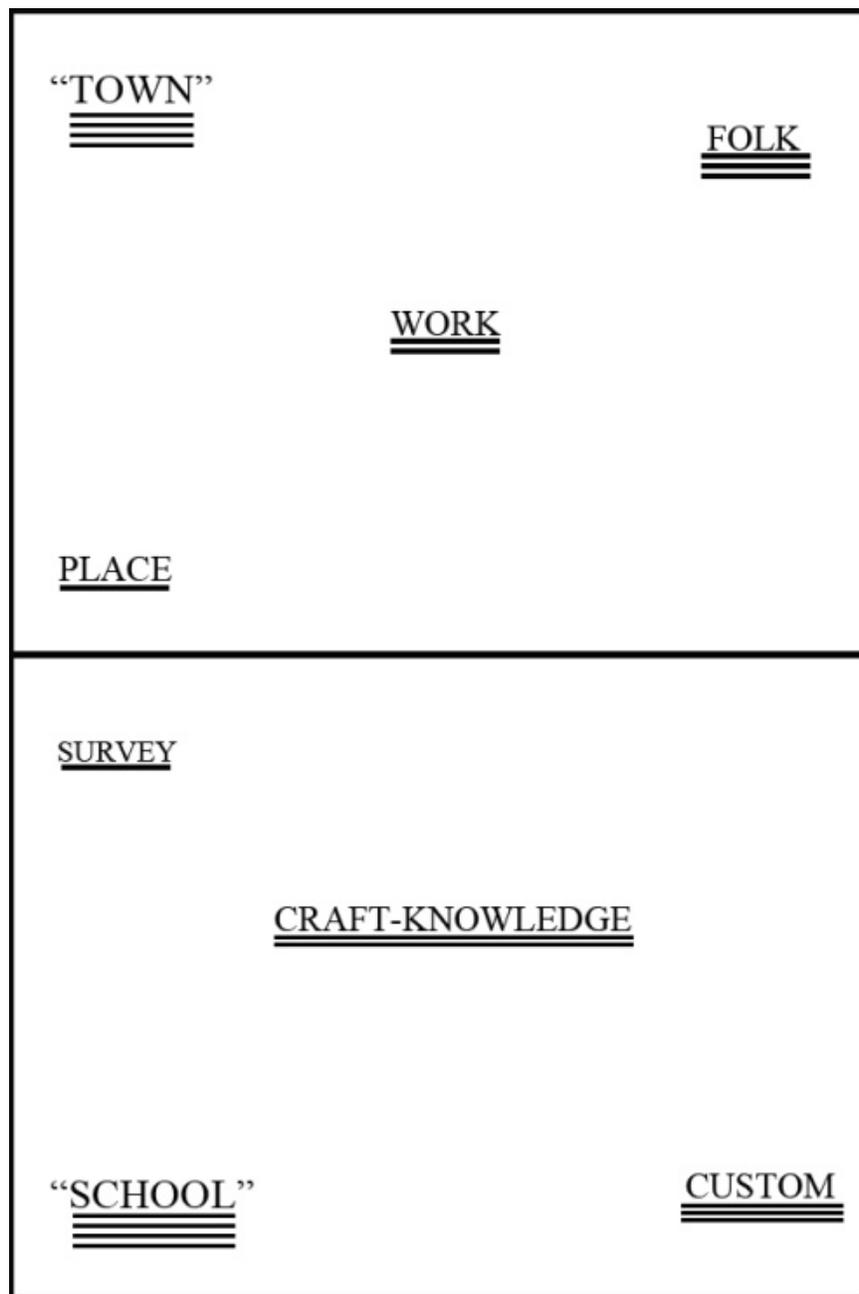


and which Geddes says, “again naturally develops into a regular table, of which the filling up of some of the squares has been already suggested above, and that of the remaining ones will be intelligible on inspection.”<sup>43</sup> His next diagram we recognize as a matrix:



Geddes succeeds in creating a "ground" for these words, and their relatedness and changing hierarchy derives from movement on the plane. In his next diagram, one can see that the mirror-image of "town" is "school," and folding the diagram results in the pairings of folk/custom, work/craft-knowledge, and place/survey.

<sup>43</sup> Ibid. P 69.



We may now summarize and tabulate our comparison of Town and School, and on the schema it will be seen that each element of the second is printed in the position of a mirror-reflection of the first.<sup>44</sup>

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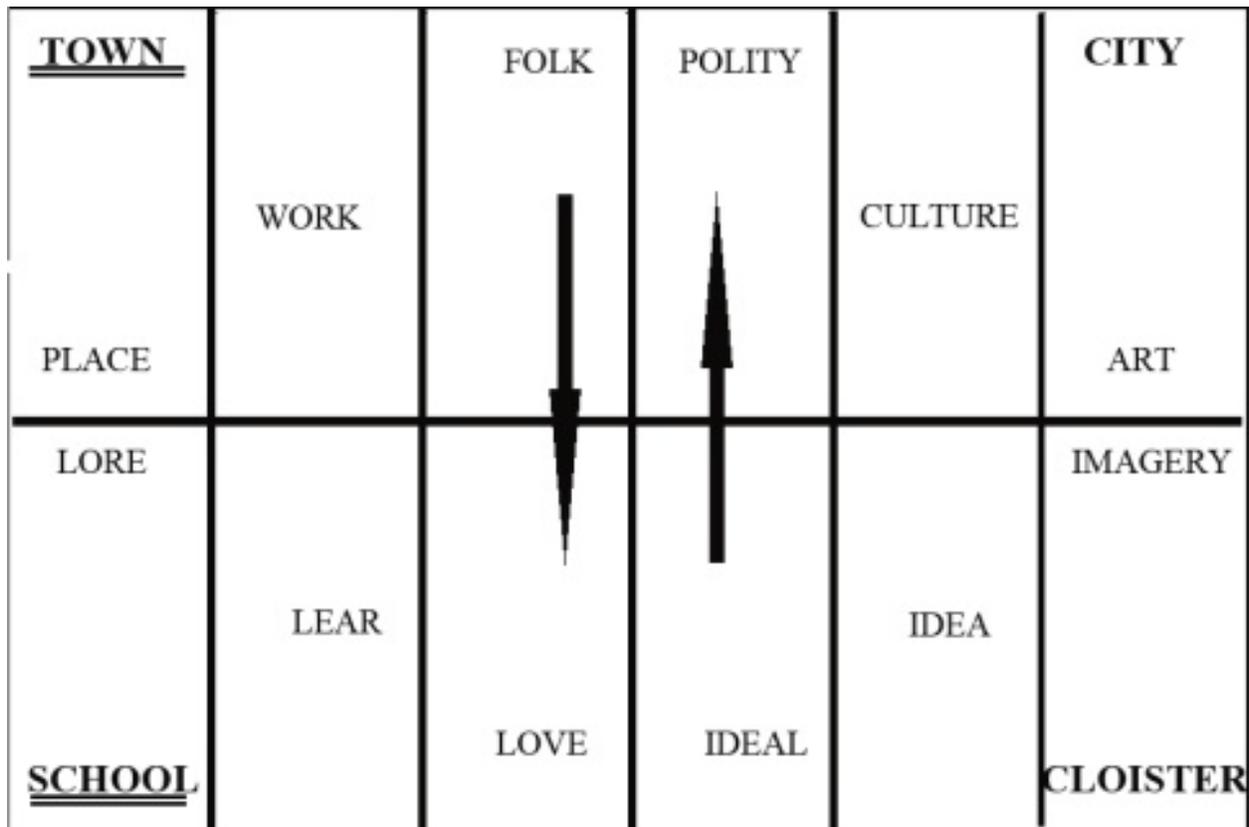
<sup>44</sup> Ibid. P 74.



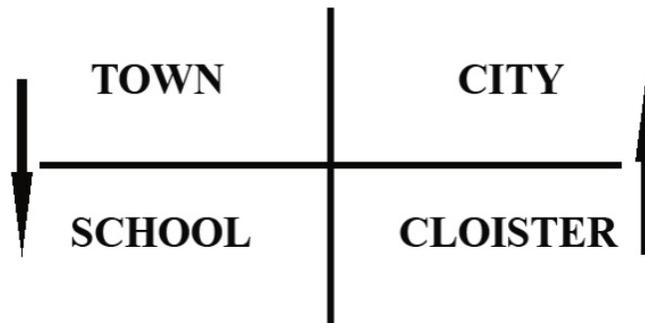
These two forms of the same diagram, the simple and the more developed, thus suggest comparison with the scheme previously outlined, that of People, Affairs, Places, and is now more easily reconciled with this; the greater prominence popularly given to People and Affairs being expressed upon the present geographic and evolutionary scheme by the ascending position and more emphatic printing (or by viewing the diagram as a transparency from the opposite side of the leaf).<sup>45</sup>

<sup>45</sup> Ibid. P 74.

Though most people found his diagrams confounding, they act as models of the unfolding of Geddes' thought process, and he evidently used them to search for new relationships: "Such diagrammatic presentments, while of course primarily for the purpose of clear expression and comparison, are also frequently suggestive – by 'inspection', as geometers say – of relations not previously noticed."<sup>46</sup> In his final two diagrams, the content is increasingly abstract, and the physical relationship of the folded squares is more pronounced.



<sup>46</sup> Ibid. P 66-67.



Returning then to our main diagram, with its four-fold analysis of the City so soon as we have completed this, and carried its progress up to the level of city life proper, we must turn over the leaf and begin a new page, with place work and folk once more. This simplest of acts expresses with graphic significance the very process of history; for in closing our diagram page its 'Cloister' has been folded down on the 'School,' our cathedral and forum, our 'City' proper upon the 'Town.' Thus it is that the ideals and the achievements of one day and generation and city are ever melting away, and passing out of sight of the next; so that to the joy or the sorrow of the successors the new page seems well nigh bare, though ever there comes faintly through some image or at least blurred suggestion of the fading past. Hence each page of history is a palimpsest.<sup>47</sup>

Folding paper and writing or placing symbols in the resultant squares offered to Geddes a non-linear way of exploring his wide-ranging ideas. He wrote,

...the points are (1) that thus 'ideas occur,' to different people in different order, and often in no apparent order (2) that memories fade (3) that their spoken presentment is necessarily successive – one idea at a time – and that a written list necessarily follows this order – of threefold disorder! But this is to say that our spoken or written presentment of ideas, our ordinary auditive language, cannot be truly synthetic – *i.e.*, orderly and simultaneous in mental vision – but is indeed the very reverse – it is analytic (vague), successive, and thus dispersive.<sup>48</sup>

He is particularly cognizant of the juxtaposition of words and symbols which come out of such manipulation, and the folding and unfolding provides a broader search space for him. There is obviously a rigor in his arrangement of ideas, as when he thoughtfully considers and lists the progression of qualities of a town, but the arrangement of those

<sup>47</sup> Ibid. P 92.

<sup>48</sup> Geddes, Patrick (1923) "A Note on Graphic Methods, Ancient and Modern". *The Sociological Review*. Vol 15. P 233.

ideas in diagrammatic form leads to unexpected contiguities, and in such a way the "thinking machines" serve a speculative as well as synthetic function.

Lewis Mumford, a Geddes admirer and correspondent who yet maintained a distance and independence in his work, was disappointed in Geddes' diagrams and described Geddes' devotion to them "a form of intellectual solitaire," and likened his "Chart of Life" diagram to a "tightly occupied and over-crowded chessboard" on which "the game could not be played; for Geddes had left no open spaces, as in the orthodox chessboards, for manoeuvre or riposte." "In short," Mumford concluded, "this was not "a public 'chart of Life,' but a private chart of Geddes' mind." <sup>49</sup> Geddes certainly expected that his folding of cards and charting ideas was a graphic language that would communicate his ideas more efficiently and effectively than words. He won no converts, save those who were devoted to him in the first place, to this graphical means, and for the most part, they remain confounding. The significance of Geddes' "thinking machines" is not in that they show *what* he was thinking, but *how* he was thinking. The very name, "thinking machine," suggests a linear, mechanistic approach – data in, conclusion out – which seems not to be their function at all. If, instead of considering these as machines for the manufacture of conclusions, they are seen as search fields for unanticipated relationships, their fluid application is more evident. Returning to their origin in the division of window frames, they may be understood as frames for viewing specimen, as in a cabinet or museum display. Each card displays a collection of specimen, or ideas, and in viewing the collection, a variety of assertions may be made about their coherence. The cards preserve the dynamism of relationships between ideas because the ideas "float" in non-hierarchical arrangement, and the incompleteness of the diagrams insinuates the active construance of meaning required of the investigator. The "thinking machines" serve as models of thought, as did Geddes' collections at the Outlook Tower and Cities and Town Planning Exhibition.

In a typewritten manuscript dated 1902, titled "Classification of the Sciences," Geddes compares a thinking machine to a card catalogue:

Our library, or card case, is thus passing more and more completely from a mere static store-house of information to active usefulness as a logical apparatus: it is an aid to inquiry and fresh observations, a source of suggestive interpretations and fresh hypothesis -- in short a 'thinking machine'...This mode of exercising ourselves, this folding and opening of our thinking machine is thus no mere repetition of scales and exercises. It is itself an intellectual performance...

...Our cards, each with its individual notation of thought, its value stamped upon its face, are thus worthy of a nobler comparison than that of a card

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<sup>49</sup> Mumford, Lewis and Patrick Geddes. (1995) *The Correspondence*. Frank G. Novak, Jr., ed. Routledge. New York. P 361-362.

game. They are the very patterns of the loom of thought itself; and expressing as they do in the first place, the actual recorded pattern of the strange and varied web of the past, so far as we can arrange it, are they not also well calculated to guide us in continuing this web of history? <sup>50</sup>

The "thinking machines" resist analysis because they are not indexical or analytical; they are associative and synthetic. They are not a place to search for answers, but a place to find ways of thinking. In one of these cards, titled "Objectified Thinking Machines," Geddes considers possibilities of "the game" of the Outlook Tower. (Figure 0.8) On it he has written "Toys of Sociologist." "The Game of Thought." "The Chessboard of Life." "Traveller to  Postcard [fire?]." and to the right, "(Towards Pro. Synthesis)." Whether or not this card was to "result" in an actual game, the card establishes the realm of play. One may look in vain for some profound explanation of the thinking machines in such a card, but one readily understands the joy Geddes found in "playing" with ideas.

### Synthetic Vision

A self-avowed "visual," Geddes' "thinking machines" are a demonstration of what he considered to be a visual approach to the organization and instrumentation of ideas. As he expanded the scale of investigation to include a museum and exhibitions -- material archives which were in a sense "thinking machines" -- he employed specific strategies which took advantage of emerging thought in the studies of visual perception. Like the folding of his cards which made them dynamic instruments for "seeing," the organization of display and the called-upon actions of visitors lent dynamism to an experience which relied upon visual perceptual strategies recognizable from nineteenth century thought on the nature of perception. The synthesis of subjective/objective experience which was becoming central to understanding of the capacity of the mind to condition experience was central also to Geddes' approach to "seeing" the city. As he would borrow from other scientific disciplines, his strategies at the Outlook Tower and cities and town planning exhibitions borrowed visual techniques from optical disciplines.

Among the optical instruments which became popular entertainments in the nineteenth century, the stereoscope transformed the planar photograph into an illusion of the solid. "Soften the eyes," the viewer was directed, for only by relaxing the focus of the gaze so that peripheral vision was engaged would the "stereo" image emerge. Today seen primarily as an entertainment device, the stereoscope was invented by Charles Wheatstone in 1838 as a tool to investigate binocular vision and locating solid perception outside of the eye. Resisting the empiricists' urge to regard the mind as a passive receptor, nineteenth century scientists investigating vision and optics explored the workings of binocular vision, concluding that the mind perceived solid (*stereo*) form

<sup>50</sup> University of Strathclyde Archives. T-GED 14/1/18-22

through a process of synthesis which is more than the adding up of discrete images, or concurrence of retinal stimulus.

Sir David Brewster, presenting a paper on binocular vision and experiments with stereoscopes to the Royal Society of Edinburgh in 1843, claimed, "...nothing is more remarkable than the tendency or desire, as it were, of the eyes, to unite and fix the two pictures hovering before them, to convert them into some figure of three dimensions...; and the suddenness with which the two images start into union, give birth to a solid figure on which the optic axes are converged..."<sup>51</sup> The acceptance of the mind as an apprehensive tool capable of construing "reality" on the basis of optical sensation marked a departure from the longstanding view that the mind was merely a recording device. Hermann Lotze, in examining depth perception, concluded that no actual eye movement was required, but that the suggestion of movement, that is, an *imagined* experience, was sufficient to measure discrepancy by which depth is perceived. His theory of *Localzeichen* (local signs) argues that objects and movement are reconstructed in consciousness, resulting in perception.

Explorations in after-image and color theory admitted of a mind independent of the objective world, yet the apparent simultaneity of perception suggested a phenomenal horizon to which the observer is bound.<sup>52</sup> Just as the effect of the stereoscope depends upon a soft focus as though one is looking to the periphery, such an engagement with the fringe is necessary to situate oneself within the world of place and phenomena. Merleau-Ponty wrote of the horizon "left at the fringe of experience," providing "present atmosphere and significance,"<sup>53</sup> and philosopher William James also wrote of the fringe "to designate the influence of a faint brain-process upon our thought,"<sup>1</sup> providing an associative context to sensation. Both considered this the generative power of perception. At the Outlook Tower, Geddes first introduced visitors to the panorama of the horizon, and having established the boundary then invited meticulous observation of the field. As Jonathan Crary explains in his choice of the word *observer* over *spectator* in *Techniques of the Observer*, "...an observer is...one who sees within a prescribed set of possibilities, one who is embedded in a system of conventions and limitations."<sup>54</sup> To observe, then, is not merely to look, but to operate within a defined precinct.

We contract, in a sense, with limits that are present to our consciousness. This contract is the basis of our understanding of experience, whether spatial or temporal. The past

<sup>51</sup> Brewster, David (1844) "On the Law of Visible Position in Single and Binocular Vision, and on the representation of Solid Figures by the union of dissimilar Plane Pictures on the Retina" *Transactions of the Royal Society of Edinburgh*. Vol 15. P 368.

<sup>52</sup> Baird, J.W. (1903) "The Influence of Accommodation and Convergence Upon the Perception of Depth". *The American Journal of Psychology*. Vol 14. No 2. P 189.

<sup>53</sup> Merleau-Ponty, Maurice (2005) *Phenomenology of Perception*. Routledge. London and New York. P25.

<sup>54</sup> Crary, Jonathan (1992) *Techniques of the Observer: On Vision and Modernity in the Nineteenth Century*. MIT Press. Cambridge. P6.

and future are obvious limits to the present and our contract with these boundaries is what gives form and meaning to our experience of the *here*, the *now*. Edmund Husserl describes it thus: "Every hypothetical construction of practical life and of empirical science is related to this shifting but ever-present horizon through which the world-thesis receives its essential meaning."<sup>55</sup> This essential meaning is the aesthetic experience through which we form judgment, and when Kant locates the aesthetic in the imagination, he recognizes the need to seek a boundary for the precinct in which sense and reason find repose in aesthetic experience. Geddes was to work this understanding to full advantage at the Outlook Tower where the presentment of the past and present urged the imagination to seek the boundary of the future. As John Dewey was to later argue, aesthetic experience is a re-enactment of production, and Geddes' Outlook Tower was both a viewing and performance platform upon which the future city could be enacted.

As the stereoscope takes advantage of the "desire of the eye," Geddes' proposed view of the city included the peripheral, fringe of history, geography, and economy out of which would emerge a solid figure which admits of "prevision and action."<sup>56</sup> Just as the stereoscope demonstrated a mind which forms a unitary, solid image by embedding discrete images within a peripheral field, Geddes' assemblage at the Outlook Tower provided a precinct in which observers could construct a future city derived from the bounding agency of the periphery. As Merleau-Ponty was to write, "We can no more construct perception of the thing and of the world from discrete aspects, than we can make up the binocular vision of an object from two monocular images. My experiences of the world are integrated into one single world as the double image merges into the one thing..."<sup>57</sup> Geddes' "thinking machines" allowed his mind to range over a field of possibilities, viewed simultaneously, and their folding mechanism was a performance that instrumented association. In the same way, the experience he composed at the Outlook Tower made of visitors "observers" of the city embedded in a world thesis. He wrote of this:

For there is no real incompatibility between the power of seeing the thing as it is -- the town as Place, as Work, as Folk -- and the power of seeing things as they may be -- the city of Etho-Polity, Culture and Art. Our city surveys, in fact, descend throughout their veritable inferno, yet ascend towards corresponding circles of higher life. what are these circles of ascent or of decline? The needful stereoscopic device of thought, the

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<sup>55</sup> Husserl, Edmund. (1931) *Ideas: General Introduction to Pure Phenomenology*. Trans. W. R. Boyce Gibson. London: Allen and Unwin; New York: Humanities Press. P 149.

<sup>56</sup> Geddes, Patrick. (1915) (1968) *Cities in Evolution*. Harper and row. New York. P 325.

<sup>57</sup> Merleau-Ponty, Maurice (2005) *Phenomenology of Perception*. Routledge Classics. London and New York. P 384.

analyses of a strangely mingled and ever-changing ebb and flow, the rise and fall of historical and individual evolution.<sup>58</sup>

Making use of the methods of science and using to full advantage theories of perception and aesthetics, he created an instrument of investigation that allowed the given to become the possible. Never abandoning his training as a biologist, he created a science of cities which still retains its potency. "My ambition being," he remarked, 'not to write in print, but to write in reality -- here with flower and tree, and elsewhere with house and city -- it is all the same; in each we need all resources on one hand -- simplicity and unity -- yet the rich mosaic of variety and detail too.'<sup>59</sup>

The work that follows examines the methods employed in Geddes' "Cities and Town Planning" exhibitions and Outlook Tower, and situates them within the context of nineteenth century science. Often referred to as a founder of town planning, Geddes is an historical figure, but the meaning which underlay his work is generally ignored as mere reference is made to the activities organized under his leadership. He proposed an understanding of the city that continues to promise utility provided it can be wrested from the practice of his time and lent to contemporary endeavor. "Chapter One: The Plan" situates Geddes' implementation of the Outlook Tower and "Cities and Town Planning Exhibition" within the tradition of collection and display and the nineteenth century culture of exhibitions. The emergence in the 19th century of museum typology, in fact the very emergence of "typology," was a result of development of taxonomic strategies in the sciences which informed Geddes' approach to town planning. The plan, as a spatial expression of relationships was instrumentalized in his exhibitions where the contingency of arrangement demonstrates both his thesis and method.

"Chapter Two: The Section" examines the specific practices and means of representation that Geddes borrowed from other disciplines as he created the new discipline of town planning. The work of Hutton, Lyell and Darwin provided an operational framework by which processes of the natural world lost mystery but gained might. Darwin's contribution of a theory of adaptive response of species to environment led the way to Geddes' thinking of the city as an organism, the many functions of which could be analyzed through section, as in anatomy.

The experience of the Outlook Tower is detailed in "Chapter Three: The Outlook." There Geddes assembled a collection of instruments for seeing the city and demonstrated his thesis that *species urbanis* could be examined like any other specimen, and insisted that by knowing the species one could determine its most

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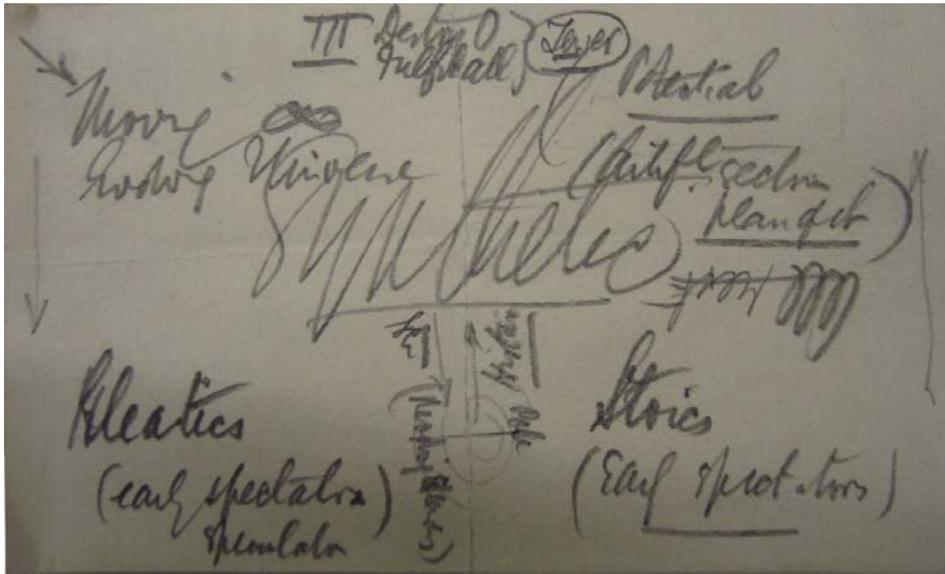
<sup>58</sup> Geddes, Patrick (1911) *The Civic Survey of Edinburgh*. Reprinted from the Transactions of the town Planning Conference.  
<https://ia600300.us.archive.org/20/items/civicsurveyofedi00gedduoft/civicsurveyofedi00gedduoft.pdf>  
12/17/13

<sup>59</sup> Defries, Amelia (1928) *The Interpreter Geddes: the Man and His Gospel*. Boni and Liveright. New York. P 168.

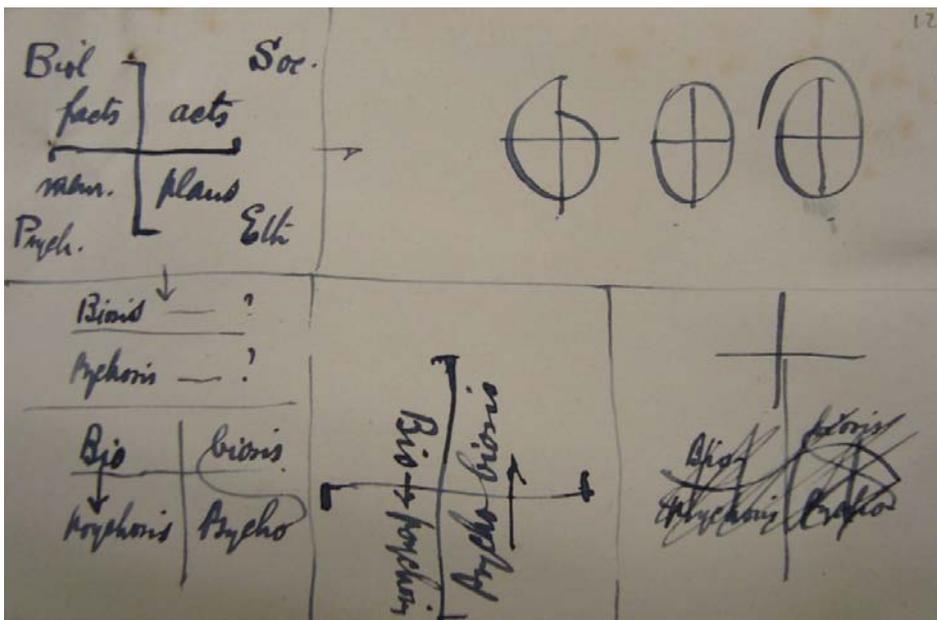
advantageous environment and predict its future form. "Chapter Four: The Inlook" presents the social and cultural initiatives that complement his place/work/folk triad, and recognizes his acknowledgement of the spiritualism nascent in the production of the city. His method is examined through his *City Development, a Study of Parks, Gardens and Culture Institutes* report to the Carnegie Dumfermline Trust.

It is here argued that there was method in the apparent madness of Geddes' many activities, and that this method, as familiar as any laboratory practice, maintains currency in today's world of practice of the design of place. The title of this work, "Patrick Geddes: Synthetic Vision" refers to both his synthetic appropriation of practices from a wide range of disciplines as he devised his method of investigation of the city, and the view of the future of place which Geddes believed would be the inevitable result of the synthesis of viewpoints gathered by his full-scale "thinking machine."

**IMAGES: INTRODUCTION**



**Figure 0.1: Thinking Machine**  
Source: University of Strathclyde Archives



**Figure 0.2: Thinking Machine**  
Source: University of Strathclyde Archives



MORPHOLOGY.					GENERAL SURVEY.	PHYSIOLOGY.				
Protoplasm.	Cells.	Tissues.	Organs.	Forms.		Habits and Temperament.	Functions of Organs.	Functions of Tissues.	Functions of Cells.	Functions of Protoplasm.
DUJARDIN.	SCHWANN.	BICHÂT.	CUVIER.	LINNÉ.	ENCYCLOP ↓ BUFFON.	HALLER.	MÜLLER.	BICHÂT.	VIRCHOW.	BERNARD.

Figure 0.5: A Synthetic Outline of the History of Biology

Source: Boardman, Philip (1978) *The Worlds of Patrick Geddes: Biologist and Town Planner*. Routledge and Kegan Paul. London. P 91.

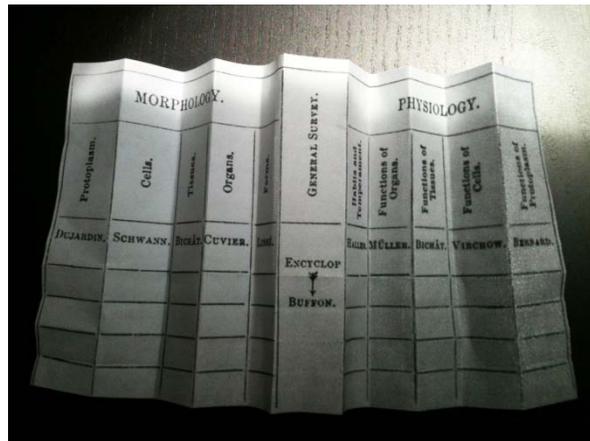
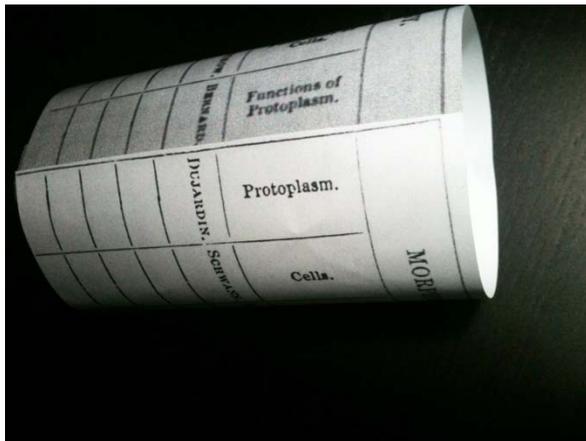


Figure: 0.6, 0.7: Recreation and demonstration of manipulation of "Synthetic History" card

Source: Author

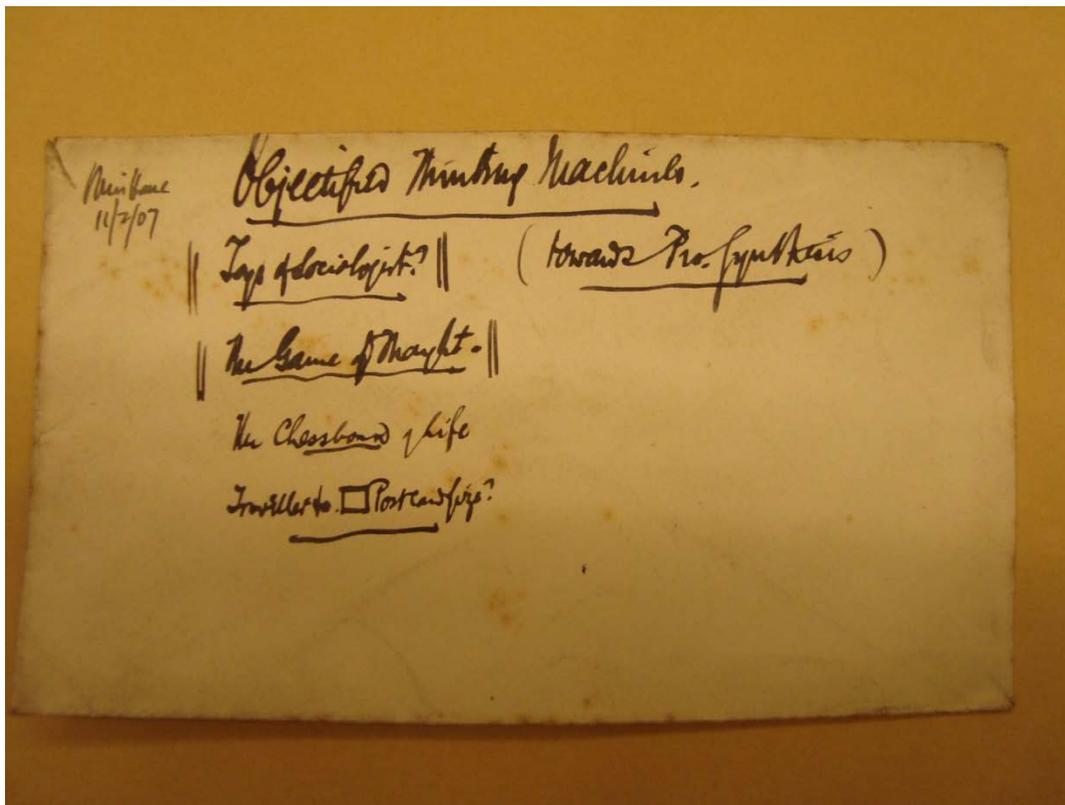


Figure 0.8: "Objectified Thinking Machines" card  
Source: University of Strathclyde Archives

## **CHAPTER ONE: THE PLAN**

*“Sherlock Holmes closed his eyes and placed his elbows upon the arms of his chair, with his finger-tips together. ‘The ideal reasoner,’ he remarked, ‘would, when he had once been shown a single fact in all its bearings, deduce from it not only all the chain of events which led up to it but also all the results which would follow from it. As Cuvier could correctly describe a whole animal by the contemplation of a single bone, so the observer who has thoroughly understood one link in a series of incidents should be able to accurately state all the other ones, both before and after. We have not yet grasped the results which the reason alone can attain to. Problems may be solved in the study which have baffled all those who have sought a solution by the aid of their senses. To carry the art, however, to its highest pitch, it is necessary that the reasoner should be able to utilize all the facts which have come to his knowledge; and this in itself implies, as you will readily see, a possession of all knowledge, which, even in these days of free education and encyclopaedias, is a somewhat rare accomplishment. It is not so impossible, however, that a man should possess all knowledge which is likely to be useful to him in his work, and this I have endeavored in my case to do.”<sup>1</sup>*

In 1885 Patrick Geddes purchased a five-story building at the top of the Royal Mile in Edinburgh where he established a base for the dissemination of his developing ideas about Town Planning. Calling it "The Outlook Tower," he claimed it as an "index museum," "...a civic institution...linking the many larger but scattered resources of culture...into one intelligible whole."<sup>2</sup> Collecting economists, biologists, geographers, sociologists, artists, and spiritualists, as well as charts, maps, diagrams, models, photographs, drawings, and optical devices, he endeavored, over the course of the next three decades, to create the Science of Cities through the employ of this relatively new type of public forum, the museum. As debate continued (and continues still) about the utility and organization of museums, Geddes envisioned an institution which, through the arrangement of display and choreography of experience, would be "not only an *Encyclopaedia Graphica* but an *Encyclopaedia Methodica*."<sup>3</sup> His experiences as a student of biology, field investigator, and lecturer in botany taught him the necessity of classification and the value of arrangement both as a means of investigation and provision of a coherent narrative of result. At the Outlook Tower and in his "Cities and Town Planning Exhibitions" he would provide an instrument for the study of cities through a particular sequence of experience determined by Geddes' own strategy of investigation and guided by his philosophy of the unity of place-work-folk. Viewing the city as an organism bound by the laws of nature, he considered that its study should be consistent with the methods of the other sciences, and that his "index museum" would be a training ground for investigators in this new science. The arrangement of this museum and exhibitions by needs would reflect Geddes' position as an evolutionary theorist and visitors would, in a sense, "perform" the actions of scientist within the

<sup>1</sup> Doyle, Sir Arthur Conan (2003). "The Five Orange Pips". *Sherlock Holmes: The Complete Novels and Stories*. Bantam Dell. New York. P343.

<sup>2</sup> Geddes, Patrick (1989) "The Index Museum: Chapters from an Unpublished Manuscript". *Assemblage*. No 10. P69.

<sup>3</sup> Ibid. P66.

Tower and exhibitions, and thus be prepared to perform, or "act" as Geddes would say, in the world. The experience of the Tower and exhibitions was intended to reveal the incipient future of a place and to that end, Geddes bent the arrangement of exhibits as a story of past and present that made the future evident. Like a fossil display in a natural history museum, where objects are arranged to lead to a particular conclusion which may vary according to the theories of the curator, materials were arranged under Geddes' curation. Contrasting his museum with those "ordinary congeries of minor museum galleries, which may be each of itself intelligible, but not upon any single plan nor upon plans clearly related," he wrote, "...the plan, the order must be no longer alphabetical or empirical, but rational; that is, in conformity at once with reason, truth, observation, with philosophy and with the order of nature."<sup>4</sup> Conformity to some construct is the organizing principle of any museum, and the museum that was the Outlook Tower was like any other in that it expressed a specific world view through its taxonomic order. This chapter will examine the role of the museum in late nineteenth and early twentieth century Britain and the ways in which museums and systems of classification manifested the "state of knowledge." Further, Geddes' own museums will be considered within this context and as they reveal through their arrangement his synthetic approach to town planning.

### Taxonomy and the Museum

*Sing in me, Muse, and through me tell the story  
of that man skilled in all ways of contending,  
the wanderer, harried for years on end,  
after he plundered the stronghold  
on the proud height of Troy.*

*He saw the townlands  
and learned the minds of many distant men,  
and weathered many bitter nights and days  
in his deep heart at sea, while he fought only  
to save his life, to bring his shipmates home.<sup>5</sup>*

The institution museum is of modern origin. The word *musaeum* for centuries referred to the Musaeum of Alexandria, a complex of housing and library for scholars founded by the Ptolemies in 3rd century BCE Alexandria, and disappearing around the fourth century CE. Existing thereafter only in legend, the concept of museum came to represent, by the time of the Enlightenment, an ideal of scholarly pursuit. As Paula Lee Young claims, the word *museum* entered the French and Italian languages by the sixteenth century and its use applied to a variety of contemplative settings, invoking the Musaeum of Alexandria but not designating a specific building type of repository.<sup>6</sup> The first use of museum in its modern sense in English applied to the collection of plants

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<sup>4</sup> Ibid. P66.

<sup>5</sup> Homer. *The Odyssey*. (1998) Robert Fitzgerald translation. Farrar, Strauss and Giroux. New York. p 1.

<sup>6</sup> Young, Paula Lee (1997) "The Museum of Alexandria and the Formation of the Museum in Eighteenth-Century France". *The Art Bulletin*. Vol 79. No 3.

and rarities assembled by the Tradescants.<sup>7</sup> Published in 1656, *Musaeum Tradescantianum* catalogued their collection. Coming into the possession of associate Elias Ashmole upon the death of Tradescant the Younger, the collection was donated to Oxford University which opened the Ashmolean Museum in 1678. The British Museum opened in 1753 in Montagu House, purchased by the British government to house the collection of Sir Hans Sloane, donated on his death. In France in 1793 the National Convention claimed for the Republic the collections of the *Cabinet du Roi* and the *Cabinet d' Histoire Naturelle*, formerly holdings of the King. The term *museum* was appropriated for these now public collections. These museums, open to the public, were the first view for citizenry of objects which previously had been privately held by wealthy collectors.

Cabinets of treasure had long been the means of containing and protecting wealth, but the Renaissance *studiolo* introduced the idea of display. The mid-fifteenth century Ducal Palace at Urbino included a *studiolo* complete with intarsia paneling which depicted the inventory of the collection, and "...served as a sort of fictional display reserved for the most privileged visitor."<sup>8</sup> Preserving the rare or precious as a display of wealth or dominion, collecting practices responded to the variety of objects brought back from voyages of discovery from the fifteenth to the eighteenth century. In addition to artefacts from distant lands, geologic specimen, plants, animals and animal remains were collected, and materially expressed both the plentitude of the natural world and the extent of man's ingenuity. These collections held a broad range of content, and their diverse holdings indicate that the rarity or difficulty in obtaining objects was their defining quality, rather than any internal coherence. Owning such collections was determined by wealth, social, political, and commercial connections, and they represented a particular social standing for their holders. A sample of the inventory of Tradescant's *Musaeum* – "Roman darts, Moddels for a Cannon, Iron manacle taken in the Spanish Fleet, Sith, Symiter, Steletto, Souldiers Coat of Arms"<sup>9</sup> shows that nearly any object would do for a collection, provided it was of exotic provenance. "The rarities Tradescant requested served as markers of patronage relationships alongside more traditional luxury goods such as gold cups and chains."<sup>10</sup> Accessed by privilege, the experience of the collection of rarities was limited to those same few whose positions of influence would determine the avenues of inquiry in the modern age. Collections became a source of knowledge of distant lands and peoples, and provided objects for

<sup>7</sup> John Tradescant the Elder (1570-1638), John Tradescant the Younger (1608-1662). English botanists, gardeners, and collectors of plants and rarities. Collection was housed in South Lambeth, London at their home, "The Ark." Younger traveled to Virginia between the years 1628-1637, bringing back plants specimen then introduced to England. Their holdings went to Elias Ashmole upon the death of the Younger and were then donated to Oxford University to found the Ashmolean Museum -- the first museum in England.

<sup>8</sup> Howard, Deborah (2001) "Seasonal Apartments in Renaissance Italy". *Artibus et Historiae*. Vol 22. No 43. P134.

<sup>9</sup> Peck, Linda Levy (2005) *Consuming Splendor*. Cambridge University Press. Cambridge. P 158.

<sup>10</sup> *Ibid*. P 153.

study of the natural world. As the variety of treasures and numbers of collections increased, scholars across Europe “were in regular correspondence with each other and carried on their arguments about the purpose and order of their collections in learned books.”<sup>11</sup> *Naturalia* and *Artificiialia* were common divisions within collections (and this division would play out in the nineteenth century when nature and art were again separated in London in the Museum of Science and the Victoria and Albert Museum), the collector could now “...reappropriate and reassemble all reality in miniature.”<sup>12</sup> In the sixteenth century collection of Antonio Giganti in Bologne,

The desire for symmetry shown in the display organization, the arrangement of the exhibits to allow maximum accessibility, and the atmosphere given to the whole museum and library by the constant presence of *naturalia*, all combine to suggest that this museum was conceived as a *theatrum naturae*...in short, we may say that in his museum Giganti sought to generate a harmonious vision which enabled a simultaneous evocation or *ars memoriae*, of the whole of art and nature.<sup>13</sup>

Responding to the initial impetus of the rare, the objects which nearly haphazardly found their way into collections formed the basis of the framework of understanding of the world. In turn, that framework determined which objects would be sought to be added to collections. In such a way there arose a material archive of natural philosophy which competed with, and in some cases, supplanted the written discourse. Robert Kirkbride writes of this:

The absolute and original meaning of *studioli* proves elusive, if not beside the point. It is precisely by their capacity to engage the observer – to draw us into speculation on the possible meanings of particular images, as well as the potential meanings constellated from clusters of images – that these chambers reveal their quintessence. The *studioli* do not represent total knowledge but offer an architectonic matrix within which the observer figures as a vital participant-agent in retrieving associations and forging them anew.<sup>14</sup>

This notion of engagement, the participatory demand of a collection on the viewer to construe meaning, well-served the scientific community of the nineteenth century which

<sup>11</sup> Blom, Phillip (2004) *To Have and To Hold: An Intimate History of Collectors and Collecting*. The Overlook Press. P 23.

<sup>12</sup> Olmi, Giuseppe (1985) “Science-Honour-Metaphor: Italian Cabinets of the Sixteenth and Seventeenth Centuries”. *The Origins of Museums: The Cabinet of Curiosities in Sixteenth and Seventeenth Century Europe*. Oliver Impey, ed. Clarendon Press.

<sup>13</sup> Laurencich-Minelli, Laura (1985) “Museography and Ethnographical Collections in Bologna During the Sixteenth and Seventeenth Centuries”. *The Origins of Museums: The Cabinet of Curiosities in Sixteenth and Seventeenth Century Europe*. Oliver Impey, ed. Clarendon Press. P 19.

<sup>14</sup> Kirkbride, Robert (2004) “On the Renaissance Studioli of Federico da Montefeltro and the Architecture of Memory”. *Chora 4: Intervals in the Philosophy of Architecture*. McGill-Queens University Press. P 167.

used the museum to construct models of thought. The natural history museums, science museums, or the art museums for that matter, of the nineteenth century, stood as models for the viewing public of the state of consensus regarding the natural world, technology, or art, while simultaneously serving as laboratories for investigators seeking new associations in the formulation of narratives which sought a new consensus. The organization and reorganization of display in museums, which is the continual activity of curators, reflects the continual restructuring of narrative critical to "scientific investigation."

The plans and arrangement of museums and exhibitions upheld the unfolding narrative of scientific insight. In his 1802 *Precis of the Lectures on Architecture*, Jean-Nicholas-Louis Durand compared museums to libraries, which "may be considered, on the one hand, as a public treasury enshrining that most precious of deposits, the knowledge of humanity, and on the other as a temple consecrated to study."<sup>15</sup> Continuing to museums, he wrote:

But whatever the extent of such buildings, whatever classes of objects they may be meant to hold, they are built to conserve and to impart a precious treasure, and they must therefore be composed in the same spirit as libraries...but museums, even those exclusively designed to hold the production of the arts, contain objects of different kinds and are made up of parts intended for different kinds of study. To maintain the calm that must prevail in all their parts, they must afford, aside from the principle entrance, as many separate entrances as they contain distinct departments.<sup>16</sup>

The recognition of "distinct departments" is an acknowledgment of the taxonomy which had begun to rule the collection:

In their quest for systematization, both the biologist and the architectural theorist were using similar conceptual categories; the *species* of the natural sciences corresponding to *type* in architecture. By means of these categories, it was possible to transcend the study of separate individual examples and to discover more generic principles that lay behind them. Classification, therefore, was a technique for extracting general principles from particular cases.<sup>17</sup>

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<sup>15</sup> Durand, Jean-Nicholas-Louis (2000). *Precis of the Lectures on Architecture*. Getty Research Institute. P 160.

<sup>16</sup> Durand, Jean-Nicholas-Louis (2000). *Precis of the Lectures on Architecture*. Getty Research Institute. P 160.

<sup>17</sup> Madrazo, Leandro (1994) "Durand and the Science of Architecture". *Journal of Architectural Education*. Vol 48. No 1. P 13.

Commissioned by Henry Cole in 1854 to outline a catalogue of history of the field of metal arts, Gottfried Semper used the opportunity to further expand on his elements of architecture. Titled “Practical Art in Metals and Hard Materials: Its Technology, History and Styles,” the first article begins, “On Collections, their History and Estates.” His fifth paragraph reads: “Public Collections of Objects of Art, always were and will be very powerful means of national Education, if properly organized.”<sup>18</sup> He then writes of the history of collections, and in Section 8 concludes:

A complete and Universal Collection must give, so to speak the longitudinal sections – the transverse section and the plan of the entire Science of Culture; it must show how things were done in all times; how they are done at present in all countries of the earth; and why they are done in one or another way. According to circumstances; it must give the history, the ethnography and the philosophy of culture.

He continues in Section 10:

Order and conspicuity are not difficult to obtain by separation and classification: but it is very difficult to combine it with a comparative system of arrangement, because the relations between existing things are innumerable and very complicated. Nevertheless it is certain that a good comparative system of arrangement will enable the student to see the things in their mutual relations, to observe their mutual affinities and dissimilarities, and to find out the laws and premises, upon which all these mutual positive and negative relations depend.<sup>19</sup>

In this treatise, Semper has embraced the arrangement of the collection as a material demonstration of inquiry and knowledge. His plan for the Ideal Museum is a diagram which “forms therefore a square, the four corners of which are the junction points with other collections which together will mutually complete themselves.”<sup>20</sup> These four corners are labeled “Textile,” “Carpentry,” “Masonry,” and “Ceramic Art,” which he calls the “four families.” Such a genealogy was nested within the advancing idea of evolution.

Geddes, too, wrote of the idea of museum “permeated by a conception of Evolution.”<sup>21</sup> Written around 1902, his unpublished manuscript, “Museums: Actual and Possible,” outlines the departments of a museum:

Our visitors then – workmen with chiefs of industry, a sprinkling of teachers and other active-minded women with an occasional student,

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<sup>18</sup> Semper, Gottfried (2008) *The Ideal Museum: Practical Art in Metals and Hard Materials*. MAK Studies. Schlebrugge, ed.

<sup>19</sup> Ibid.

<sup>20</sup> Ibid.

<sup>21</sup> Geddes, Patrick (1989) “The Index Museum: Chapters from an Unpublished Manuscript”. *Assemblage*. No 10. P 66.

artist, politician, parson, doctor, lawyer, engineer – would each have put into their hands a simple plan of the Index Museum. In each room of this they would find not only a catalogue and plan of all the exhibits of that class available to them, but some attempt at least to place and show these in clearly realized relation to the general activity and knowledge of the world. We have seen that our Index Museum must at once express the outer world in its concreteness, yet the inner thought world in its abstractness also. It is on one side a miniature of the exhibition, yet also a materialized presentment of the classification of the Arts and Sciences...beside the exhibits of the mechanical, chemical industries, ...we must place the means of a corresponding outline of mechanical, physical, and chemical science, and each, as far as may be, must be historically arranged; so that, for instance, along the gallery of electricity one may see such expression as may be practically possible of the various stages of electrical invention and application exhibited immediately below.<sup>22</sup>

He writes that

...as common-sense people we are well aware that we are no more likely to have exhibitions to arrange than countries to govern ... the problem of arranging special museums of this and that kind is one which constantly comes up...It may seem paradoxical to suggest that a museum may be thought out on paper without specimens at all; but after all, does not everyone accustomed to plans, work out his building to scale and measurement on paper, without touching either stick or stone?<sup>23</sup>

Like Semper before him, Geddes' articulation of ideals for a museum was meant to secure remunerative employment. However, that ambition was only realized through his own efforts at his Outlook Tower, and in his "Survey of Edinburgh" and "City and Town Planning Exhibition." Those efforts could be realized within a climate of fervor for civic museums and exhibitions.

The Museum of Natural History, constructed to relieve the overcrowded collection at the British Museum, opened in 1881, across the street and around the corner from two other museums which had been built to respond to the industrial impetus of the nineteenth century. Following the Great Exhibition of 1852 Queen Victoria's consort Prince Albert had called for the construction of a museum dedicated to the industrial arts. The South Kensington Museum, later to become the Museum of Patents and finally the Museum of Science was thus founded in 1857 and housed a collection of machinery and remains of the Great Exhibition. It also housed the collection of industrial

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<sup>22</sup> Ibid. P 67-68.

<sup>23</sup> Ibid.

arts which became the Victoria and Albert Museum. On the same street was the Museum of Practical Geology and School of Mines where Thomas Huxley taught, and where Geddes would become a student in 1875.

The discourse of the technical arts, newly coined "technology," was seeking a home within the framework of the classical scholastic franchise at the same time that display of the technical means of industrial production generated by the discourse sought an association with the classical within framework of "museum." The architecture of "museum" in Britain was determined by the British Museum, designed by Sir Robert Smirke and opened in 1832. The "essential components" are detailed by Charles Saumarez Smith:

The first, obviously, is the level of concentration on the ability of the arriving spectator to see and absorb the exterior façade, to take in at a glance the fact that however complex the range of exhibits on display inside, they are subject to a single, consistent architectural order...the façade effectively conveyed the message of an organization of knowledge and its subordination to a universal system of classification, which was essentially an enlightenment ideal...the second obvious characteristic...was the extent to which it was considered inevitable in the 1820's that the language of classical antiquity should be used...At the time that the British Museum was built there was a sense of the authority of the classical world and of the extent to which European culture had been constructed through a sequence of adaptations of its classical inheritance. It was felt to be entirely appropriate that the museum should be constructed as a temple of learning, intended to induce feelings of subordination to the authority of scholarship and admiration for a canonical tradition.<sup>24</sup>

This "canonical tradition" was interpreted variously in the museums of science that were built through the end of the nineteenth century. The Hunterian Museum of the Royal College of Surgeons was "a temple fronted design."<sup>25</sup> The Museum of Practical Geology had "a Renaissance façade."<sup>26</sup> The Oxford University Museum, like the university buildings, was in a Gothic style. Henry Acland, Oxford professor and a forceful member of the committee charged with directing the creation of the museum, thought "the choice of a medieval style for the new science building would make science appear to be a legitimate part of Oxford's physical and intellectual landscape; it would make science part of Oxford's history. Acland believed it was desirable to combine new

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<sup>24</sup> Smith, Charles Saumarez (1995) "Architecture and the Museum: The Seventh Reyner Banham Memorial Lecture". *Journal of Design History*. Vol 8. No 4. P 243-244.

<sup>25</sup> Yanni, Carla (2005) *Nature's Museums: Victorian Science and the Architecture of Display*. Princeton Architectural Press. New York. P 47.

<sup>26</sup> *Ibid.* P 53.

sciences with old (meaning medieval) architecture.”<sup>27</sup> The architecture of the museum was such a pastiche; the exterior facades of these museums linked science with a selective past, legitimizing the modern through association with idealized past values, and signaling the placement of modern science within the inexorable progress of man. The public face of the building and the public face of science greeted visitors with an assurance that the new was sanctioned by the old. Within the building, the arrangement of spaces conveyed “organization of knowledge and its subordination to a universal system of classification.” While relative allocation of volumes to specific program demands varied from museum to museum and reflected the particular aims of design committees in defining the space of knowledge and its production, the layout of display was systematic and consistent with nineteenth century regard for classification.

*Taxonomy* comes from the Greek *taxis*, “arrangement,” and *nomos*, “method.” The term was coined by Augustin Pyramus de Candolle in 1813 in his *Théorie élémentaire de la botanique*, though the practice of classification is older than written record. In his *Phaedrus*, Plato speaks of the time of “the birth of the Muses and the appearance of song.”<sup>28</sup> Ernesto Grassi recounts this dialogue in which those people, so enraptured by the song of the muses that they forget to eat, are made cicadas by the gods. Their role is then to report to each of the muses “which among those here honours which of them.”<sup>29</sup> “Among the activities of the Muses, the concept of arrangement, of order, clearly plays a prevalent part...The Muses represent the link with the objective, which makes the original order of the human world possible, in the face of the arbitrary, the subjective, the relative, and the changeable.”<sup>30</sup> As the daughters of Mnemosyne, the muses collect cultural memory in myth. Of poets: “they naturally preserved,” writes Vico, “the historical sense.”<sup>31</sup> “Sing in me, Muse, and through me tell the story,” begins Homer’s *Odyssey*,<sup>32</sup> and in most of Book II of *The Illiad*, the muses recount names and inventories “of the leaders and the lords of the Danaan.” Jean-Pierre Vernant writes:

Such collection of names may seem boring. But the taste for them shown by Homer, and even more by Hesiod, indicates that their role is of the first importance. Through them, the repertoire of knowledge and familiar references enabling a social group to piece its past together is established and transmitted. They constitute the archives of a society that has no writing. These archives are purely legendary: they serve no administrative needs, are not intended to glorify kings, and are not driven by historical concerns. Their purpose is to set up an order in the world of the gods and

<sup>27</sup> Ibid. P75.

<sup>28</sup> *Phaedrus*. (2005) Christopher Rowe translation. Penguin Classics. London. P 41.

<sup>29</sup> Grassi, Ernesto (1983). “Italian Humanism and Heidegger’s Thesis at the End of Philosophy.” *Heidegger and the Question of Renaissance Humanism: Four Studies*. Medieval and Renaissance Texts and Studies. Center for Medieval and Renaissance Studies. Binghamton, New York. P 14-15.

<sup>30</sup> Ibid. P 14-15.

<sup>31</sup> Vico, Giambattista. (2001). *New Science*. David Marsh trans. Penguin Books. London. P 149.

<sup>32</sup> Homer. *The Odyssey*. (1998) Robert Fitzgerald translation. Farrar, Strauss and Giroux. New York. P 1.

heroes, and to draw up as accurate and complete as possible a record of their names. In these collections of names – the list of human and divine agents and the details of their families, their countries, their genealogies, and their hierarchy – the various traditional legends are codified and the subject matter of the mythical stories is organized and classified.<sup>33</sup>

In *The Timaeus*, Plato describes the “Becoming” of the ordered universe:

...because it was filled with powers that were neither alike nor evenly balanced, there was no equipoise in any region of it; but because it was everywhere swayed unevenly and shaken by these things, and by its motion shook them in turn. And they, being thus moved, were perpetually being separated and carried in different directions; just as when things are shaken and winnowed by means of winnowing-baskets and other instruments for cleaning corn, the dense and heavy things go one way, while the rare and light are carried to another place and settle there. In the same way at that time the four kinds were shaken by the Recipient, which itself was in motion like an instrument for shaking, and it separated the most unlike kinds farthest apart from one another, and thrust the most alike closest together; whereby the different kinds came to have different regions, even before the ordered whole consisting of them came to be. Before that, all these kinds were without proportion or measure. Fire, water, earth and air possessed indeed some vestiges of their own nature, but were altogether in such a condition as we should expect when deity is absent from it. Such being their nature at the time when the ordering of the universe was taken in hand, the god then began by giving them a distinct configuration by means of shapes and numbers. That the god framed them with the greatest possible perfection, which they had not before, must be taken, above all, as a principle we constantly assert.<sup>34</sup>

Order, established by the winnowing-basket, or the song of the muses, is what establishes the comprehensible universe. Just as a well-constructed argument sways us, the well-constructed collection orders experience. The rhetorical potential of a collection derives from ordering, arranging. The curator determines the construct of the argument, and the viewer of an arranged collection, or the visitor to the museum, interprets the argument. Claude Levi-Straus writes of this interpretive capacity of viewers: “...signs allow and even require the interposing and incorporation of a certain

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<sup>33</sup> Vernant, Jean-Pierre (2006). *Myth and Thought Among the Greeks*. Zone Books. Brooklyn. New York. P 19.

<sup>34</sup> Cornford, F.M. (1977). *Plato's Cosmology: The Timaeus of Plato translated with a running commentary*. Routledge and Kegan Paul, London and Henley. P 198.

amount of human culture in reality... Images are fixed, linked in a single way to the mental act which accompanies them.”<sup>35</sup> Michel Foucault writes:

Order is, at one and the same time, that which is given in things as their inner law, the hidden network that determines the way they confront one another, and also that which has no existence except in the grid created by a glance, an examination, a language; and it is only in the blank spaces of this grid that order manifests itself in depth as though already there, waiting in silence for the moment of its expression.<sup>36</sup>

The “moment of its expression” is the immediate and necessary arrangement of those things, objects, words, “gathered together”, and fit into a cohesive whole. The collection is nothing more than Plato’s “random heap” unless organized by a hidden network. Such order derives from the desire for coherent narrative which corresponds to a larger, cosmological frame of reference. “Frames of reference... seem to belong less to what is described than to systems of description... If I ask about the world, you can offer to tell me how it is under one or more frames of reference; but if I insist that you tell me how it is apart from all frames, what can you say? We are confined to ways of describing whatever is described.”<sup>37</sup>

Systems of classification exercise power over the interpretation of data sets; they are the unseen narrative by which the meaning of display is communicated. For this reason, taxonomy was a highly contentious field, and a number of classificationists proposed systems before Carl Linnaeus<sup>38</sup> introduced a system, in use today, based on shared structural characteristics of plants. His system organized plants and animals in a nested hierarchy -- kingdom, class, order, genus, and species (today, family has been added under order and above genus). *Binomial nomenclature* names a plant by genus and species. For instance, the plant "Lungwort," so named in herbals<sup>39</sup> because of its usefulness in treating lung ailments, and also because, according to the doctrine of signatures,<sup>40</sup> its speckled leaves resembled lungs, was renamed *Pulmonaria officinalis*. Linnaeus recognizes its relation to the lungs in the use of *pulmonaria*, and *officinalis* means "belonging to the officina" which was the storeroom for medicinal

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<sup>35</sup> Ibid.

<sup>36</sup> Foucault, Michel. (1970) *The Order of Things: An Archaeology of the Human Sciences*. Vintage Books.

<sup>37</sup> Goodman, Nelson (1978). *Ways of Worldmaking*. Hacking Publishing Company, Inc. Indianapolis, Indiana.

<sup>38</sup> Carl Linnaeus (1707-1778) Swedish botanist, physician and zoologist. With the support of Dutch botanist Herman Boerhaave published *Systema Naturae* in 1735. In 1736 he visited Sir Hans Sloane and the Chelsea Physic Garden in London.

<sup>39</sup> Herbals are books which list medicinal plants and their properties. Often they are books of natural history as well, for example Pliny's *Historia naturalis*. The term "herbal" came into use in the beginning of the 16th century coincident with the wide availability of such printed texts.

<sup>40</sup> doctrine of signatures -- belief that herbs that resemble a part of the body are useful in treating ailments of that body part. Relates to a cosmology in which the "signature" of the divine is on all things.

herbals in monasteries. It belongs to the family *Boraginaceae*, by which a botanist knows that its habitat demands are similar to the other "borages." "Spiderwort" ("wort" is Old English for "plant") is a plant native to the New World, thought to be a treatment for insect bites, and brought back to England from Virginia by John Tradescant the Younger in 1637. Under the Linnaean system, it is named *Tradescantia virginiana*, in recognition of its discoverer and the location of discovery. It belongs to the family *Commelinaceae*, the family also of daylilies and other plants which lack nectar and are generally bisexual. The advantage of the Linnaean system is that classification is based upon straightforward examination of reproductive organs of plants, and it recognizes lineage, both of which are useful to plant propagators. In a post-Darwinian world, attention to reproductive organs and locating a plant in its "family tree" acknowledges an evolutionary narrative.

Following the publication of *On the Origin of Species* "the concept of an evolutionary 'tree of life' took hold of botanical imagination"<sup>41</sup> and demonstration of lineage became a purpose of classification. When new plant species were encountered, it was by measure of their likeness to other species that their horticultural demands and utility were predicted. Naming plants was in a sense, determining their genealogy, and legitimacy was fervently debated.<sup>42</sup> The variety of systems of nomenclature reflected debate within the scientific community about which features determined family likeness, and within a given system, plant naming varied by individual and collective analogous reasoning concerning the specific characteristics of specimens. The accelerating pace of discovery of new plants and new organisms in zoology kept classification in flux. Each new species was considered and fit into a framework of classification, but of course the system itself needed adjustment at times. Such assimilation and accommodation, debated within the scientific community, meant an ever shifting shape to a collection, so that any plan – of garden or museum – only represented a moment in a system of knowledge which was never static but always dynamic. "...[S]ystems of labelling, classification and positioning tried to present an ordered image of external nature but masked considerable taxonomic disagreements that were particularly acute when placing novel specimens or closely related varieties."<sup>43</sup> In such a way

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<sup>41</sup> von Goethe, Johann Wolfgang (1807) quoted in Naydler, Jeremy (2000) *Goethe on Science*. Floris Books. P 37.

<sup>42</sup> Since a 'discoverer' retained the right to name a new species there was persistent idiosyncrasy in nomenclature and, as in the world of science in general, the broadening of admittance to practice threatened social order and there were efforts to maintain the distinction of social class. "Since correctness was understood in terms of a command of classical languages normally acquired only through elite education (if then), it also served to distinguish zoologists with such backgrounds from those whose expertise had been acquired in less genteel academies. Thus it was asserted, 'the best zoological names are...derived from...Latin or Greek,' and namers were warned against designations that revealed a misunderstanding or half-understanding of classical texts, such as referring to an ancient name for a different animal, or a mythological figure that had no relation to the character of the animal being named."

<sup>43</sup> Elliot, Paul, Charles Watkins and Stephen Daniels (2007) "Combining Science with Recreation and Pleasure: Cultural Geographies of Nineteenth Century Arboretums". *Garden History*. Vol 35. P 11.

classification imposes a bias of interpretation on a collection and contributes to the construction of a framework by which the world is understood.

Collection and display, that is, the concrete assembly and arrangement of objects according to a given classification or taxonomic system, served as an operational model in the construction of knowledge. As a butterfly collection can materialize and stand in for the more abstract idea of “taxonomy,” so an exhibition concretizes the abstraction of “history” or “progress.” The curator of an exhibit acts upon the collection as a scientist constructing an experiment to investigate a hypothesis. Arranging “facts” in such a way as to construct a coherent narrative, the curator is obligated to both the complete set of objects and a reasoned association between them. Geddes writes: “...the curator is thus a philosopher in the concrete mood, and the philosopher but a curator in the abstract one.”<sup>44</sup> For, he says, “we cannot work out these things on paper: we must have a general view of this wealth in the concrete, of those things which 'are in the saddle,' were it only to put them back into their right place – the saddle-bags.”<sup>45</sup>

Throughout the nineteenth century, natural history collections were segregated and reorganized to become the fertile fields of scientific inquiry.

Through the choice and juxtaposition of different objects, early modern naturalists formed ‘mosaics’ that reflected the interpretive process underlying all collecting. Surveying the vast field of knowledge, they selected items that aided them in developing meaningful understanding of the world. Their intellectual presuppositions guided them at every turn, determining which artifacts naturalists found most appealing and regulating the meaning they extracted from them.<sup>46</sup>

Collecting practices had fueled a passion for typological classification systems, and this passion reached across disciplines. Collections of what had been individual anomalies became the basis of generalizations. As Carlo Ginzburg writes:

...there were two possible approaches: to sacrifice understanding of the individual element in order to achieve a more or less rigorous and more or less mathematical standard of generalization; or to try to develop, however tentatively, an alternative model based on an understanding of the individual which would (in some way yet to be worked out) be scientific.<sup>47</sup>

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<sup>44</sup> Geddes, Patrick (1989) “The Index Museum: Chapters from an Unpublished Manuscript”. *Assemblage*. No 10. P 66.

<sup>45</sup> Geddes, Patrick (1885) *Industrial Exhibitions and Modern Progress*. David Douglas. Edinburgh. P14.

<sup>46</sup> Findlen, Paula (1996) *Possessing Nature: Museums, Collecting, and Scientific Culture in Early Modern Italy*. University of California Press. Berkely. P 50-51.

<sup>47</sup> Ginzburg, Carlo (1988). “Clues: Morelli, Freud, and Sherlock Holmes”. *The Sign of Three: Dupin, Holmes, Peirce*. Umberto Eco and Thomas A. Sebeok, eds. Indiana University Press. Indianapolis. Pp 97-98.

Ginzburg cites the examples of Alphonse Bertillon's<sup>48</sup> anthropometric method and the work of Francis Galton<sup>49</sup> and William Herschel<sup>50</sup> who first devised fingerprinting systems for tracking criminals. Galton, who presented a paper alongside Geddes at "The First International Conference on Town Planning" in 1910, was first cousin to Charles Darwin. "Much of nineteenth-century science was involved in reconstructing past events from modern clues. Through induction, scientists reconstructed prehistory. Darwin drew conclusions about adaptation by observing pigeons, Cuvier about the anatomy of prehistoric animals by examining a few surviving bones."<sup>51</sup> Sir John Herschel outlined the inductive method in his *A Preliminary Discourse on the Study of Natural Philosophy*, published in 1831 in which he explains that "...it must not be therefore supposed that, in the formation of theories, we are abandoned to the unrestrained exercise of imagination, or at liberty to lay down arbitrary principles, or assume the existence of mere fanciful causes."<sup>52</sup> Observation and theorizing are necessarily linked through the collection of instances from which one may conclude a cause. Natural History is considered "as an assemblage of phenomena to be explained...our business is to disentangle, to arrange, and to present them in a separate and distinct state – given the effect, or assemblage of effects, to find the causes."<sup>53</sup>

The industrial exhibitions which proliferated in the second half of the nineteenth century, to be known as "World's Fairs" in the 20<sup>th</sup> century, likewise contributed to the restructuring of narrative, in this case at the confluence of technology and commerce. Their temporary nature contributed to their capacity of signification of the "state of progress." Decisions about content, arrangement and display constituted the relation of inquiry, discovery and invention, documenting both residual and incipient conditions. They thus served as both a "snapshot" of the present state of industrial production and knowledge, and suggested paths of progress toward future productivity. Geddes, in *Industrial Exhibitions and Modern Progress*, written in 1885, wrote: "Nor is an exhibition a landmark of progress merely, but a starting-point as well; it is filled not only with the

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<sup>48</sup> Alphonse Bertillon (1853-1914) French police officer who created a system of criminal identification using anthropometry. Measurements of head, and height and body markings were recorded along with photographs which were the first "mug shots."

<sup>49</sup> Francis Galton (1822-1911) English statistician, created the concept of correlation and regression toward the mean. Studied relationship between anthropometry and intelligence. Devised a system for classifying fingerprints and created the first weather map. Wrote on eugenics.

<sup>50</sup> William Herschel (1738-1822) German musician who relocated to England during England's war with France. While pursuing a musical career, he developed an interest in astronomy and recorded observations of binary stars, and also discovered Uranus. His deep space observations led to the discovery of "nebulae."

<sup>51</sup> Lehan, Richard. (1998). *The City in Literature: An Intellectual and Cultural History*. University of California Press. Berkeley. P 84.

<sup>52</sup> Herschel, John Frederick William (1831) *A Preliminary Discourse on the Study of Natural Philosophy: The Cabinet of Natural Philosophy*. Kessinger Publishing Reprint. P 143.

<sup>53</sup> *Ibid.* P 166.

flower of present industry, but with the seed of that of future years.”<sup>54</sup> Such thinking would guide him in the creation of his "Cities and Town Planning" exhibitions and museum at the Outlook Tower.

#### Geddes' First "Museum"

In 1883, Geddes presented a paper to the Botanical Society of Edinburgh, describing a garden of his design (Figure 1.1) which had been implemented the year before at Grange House School, a “private establishment for the board and education of the daughters of gentlemen,” advertisements for which claimed “extensive pleasure grounds and botanical garden.”<sup>55</sup> This, his first museum, is situated within both the culture of exhibition of the time and the advance of botanical science. In describing the layout of the garden, and the arrangement of particular species, he makes clear that the presumed beauty of the garden is subsumed to a larger purpose of “a useful exhibition of the natural orders.”<sup>56</sup> The purpose of this garden was to act as a museum, its order a manifestation of nineteenth century practices of collection and display. “Arboretums were likened to 'living museums' and, particularly those with systematic labelled displays, numbered plans and guides, served, with botanical gardens, as important inspirations for Victorian museums, which also tried to assert their rational objective status through architecture, modes of classification, labelling and display.”<sup>57</sup> Geddes wrote:

The first advantage claimed for a small type garden of this kind is that it exhibits at the glance the general relationships and divisions of the vegetable kingdom, and thus forms a most useful key to the greater botanic gardens, where a beginner is lost in the maze of numerous beds, and where he too often utterly fails to attain any general scientific conception of the plant world...Already a Board school is not to be reported on as first-rate without a museum, and the present experiment shows how easy and reasonable it would be also to recommend the possession of a garden.<sup>58</sup>

Geddes' recommendation presages the guidance of Sir William Henry Flower in his 1889 article in *Nature*, “School Museums: Suggestions for the formation and arrangement of a museum of Natural History in connection with a Public School”:

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<sup>54</sup> Geddes, Patrick (1885) *Industrial Exhibitions and Modern Progress*. David Douglas. Edinburgh. P1.

<sup>55</sup> *The Scotsman*, October, 1883.

<sup>56</sup> Geddes, Patrick (1883) “A Type Botanic Garden”. *Transactions and Proceedings of the Botanical Society of Edinburgh*. June 14, 1883.

<sup>57</sup> Elliot, Paul, Charles Watkins and Stephen Daniels (2007) “Combining Science with Recreation and Pleasure: Cultural Geographies of Nineteenth Century Arboretums”. *Garden History*. Vol 35.P 11.

<sup>58</sup> Geddes, Patrick (1883) “A Type Botanic Garden”. *Transactions and Proceedings of the Botanical Society of Edinburgh*. June 14, 1883.

Everything in the museum should have some distinct object, coming under one or other of the above subjects [zoology, botany, mineralogy, and geology], and under one or other of the series defined below, *and everything else should be rigorously excluded*. The curator's business will be quite as much to keep useless specimens out of the museum as to acquire those that are useful.

...In botany there should be a general morphological collection, showing the main modifications of the different organs in the greater groups into which the vegetable kingdom is divided, and illustrating the terms used in describing these modifications...<sup>59</sup>

Flower is describing dried plant specimens to be maintained in a display setting, rather than a garden of living specimens, but his point is made that merit was seen in providing access to plant collections in support of school curricula. In another essay, "Boy's Museums," he claims that "there is no better way of becoming familiar with a subject than by making a collection of objects illustrating it."<sup>60</sup> He goes on to detail the requirements of an instructional collection:

The value of making a collection of any kind of specimens about which you wish to know something is that you are forced to spend time and thought over them, to look at them, carefully to prepare them, to arrange and name them. In proportion as a collection had had all this done to it will be its value. That a museum depends for its utility, not upon its contents, but upon the mode of arrangement of its contents, is now a trite saying. An ill-arranged museum has been well compared to the letters of the alphabet tossed about indiscriminately, meaning nothing; a well-arranged one to the same letters placed in such orderly sequence as to produce words of counsel and instruction....It matters less what are the contents of a museum than that there should be some definite object in bringing them together. To be a mere 'snapper-up of unconsidered trifles' is not forming a museum. The subject chosen to be illustrated by the specimens collected should not be of indefinite extent, but have some natural limit.<sup>61</sup>

Geddes' plan for Grange House School (Figure 1.1) appears fairly comprehensive of plants tolerant of the Scottish climate. He has divided the garden by plant families and there is no more information about genus or species he intends within each bed. The plants he names are perennials and fairly large trees. In fact, if the scale of his

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<sup>59</sup> Flower, William Henry (1898) "School Museums : Suggestions on the formation and arrangement of a museum of Natural History in connection with a Public School". *Nature* .December 26, 1889. Reprinted in *Essays on Museums*. Macmillan and Co, Limited. London. Pp 58-59.

<sup>60</sup> Flower, William Henry (1898) "Boy's Museums". *Chamber's Edinburgh Journal*. April, 1897. Reprinted in *Essays on Museums*. Macmillan and Co, Limited. London. P65.

<sup>61</sup> *Ibid.*. Pp 65-66.

illustration is correct, it would be hardly likely that the trees he specifies would even fit the space indicated – a chestnut, for instance, depending on the species would require the full forty foot width of the garden at maturity. Also unusual is a lack of shrubs, woody plants of dense structure that mediate between the scale of trees and lower growing perennials, which in good gardening practice would be planted as a foundation surrounding the perimeter to provide some protection for more tender plants. Connie Byrom, in writing of the public gardens of the New Town, Edinburgh of the time writes that, “Evidence from early garden minute books shows that generally first planting concentrated on the provision of trees and shrubs, with flowers and smaller decorative planting being added later.”<sup>62</sup> Though the layout is consistent with pleasure gardens of the Victorian era – formal symmetry and paths for walking between beds of plants was the norm for such gardens – such a large variety of plants arranged in separate beds as well as non-repetition of specific shrubs or trees, as in an *allee* of trees of the same species, indicates that this garden was laid-out with the science of plants as a guiding principle, rather than current notions about beauty in a garden. “Bedding out” was also a fashionable design strategy absent in Geddes’ plan. The rage was for exotic annuals which were not hardy enough to withstand temperate climates, but which became available in the gardening market when, with the repeal of the glass tax, greenhouses were built in which could be grown these tender plants with flamboyant flowers. These plants, which would not survive into a second season, had to be replaced annually, and they were planted in colorful patterns (“carpet beds” was one name for such arrays). John Ruskin condemned the practice, writing:

A flower-garden is an ugly thing, even when best managed: it is an assembly of unfortunate beings, pampered and bloated above their natural size, stewed and heated into diseased growth; corrupted by evil communication into speckled and inharmonious colours; torn from the soil which they loved, and of which they were the spirit and the glory, to glare away their term of tormented life among the mixed and incongruous essences of each other, in earth that they know not, and in air that is poison to them...All dahlias, tulips, ranunculi, and, in general, what are called florist's flowers, should be avoided like garlic.<sup>63</sup>

Though there are annuals in the plant families indicated in Geddes’ plan, and annuals may have been planted in their respective beds, there is no suggestion that Geddes incorporated such a consideration in his plan, instead, he writes, “we might have useful, beautiful and scientific gardens.”

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<sup>62</sup> Byrom, Connie (1995) “The Pleasure Grounds of Edinburgh New Town”. *Garden History*. Vol 23. No.1. P 83.

<sup>63</sup> Ruskin, John (2006) The Project Gutenberg EBook of The Poetry of Architecture. <http://www.gutenberg.org/ebooks/17774>

When he writes of the design, he explains that the groupings of plants are meant to exhibit by proximity the relationship of plants by family. "At the entrance a large rectangular bed is occupied with Thalamiflorals, indicating at a glance the approximate morphological and generic relations of the included orders." According to the plan, these Thalamiflorals are divided into the ordo *malvaceae*, *hypericaceae*, *violaceae*, etc. Geddes is using a system of nomenclature, the de Candolle system,<sup>64</sup> in place before the general acceptance of the Linnaean system. Under that system, Thalamifloral is a subclass of the class Dicotyledoneae, and under the subclass are grouped the ordo. In today's nomenclature system, the ordo is the family of plant. Geddes was using a system in which the anatomical (structural) rather than physiological (functional) characteristics of plants determined their families, and so he would expect a student in this garden to be able to recognize family traits "at a glance." Such recognition was at the heart of botany, as is explained by John Lindley in a commencement address at the Medical Session of the University of London in 1834:

It is not names then, nor arbitrary classifications, nor vegetable physiology, considered as an isolated subject, which constitute the science of botany. The structure, function, and analogy of organs, and the mutual relation of species, are the really grand subjects of inquiry. An exact knowledge of structure enables us to understand distinctly how certain functions are to be performed, a comparison of one plant with another leads to the discovery of the analogy of their organs, and by means of such analogies we determine by what degree of resemblance or difference the affinity of species is to be settled.<sup>65</sup>

Analogical or case-based reasoning is necessary practice in fields where the singularity is to be understood. Medicine, law and architecture are fields, for example, in which case studies figure in the science of practice. Once a "type" of similarity is determined, a class is established, and other similarities or differences can inform knowledge of the

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<sup>64</sup> Augustin Pyramus de Candolle (1778-1841) Swiss botanist who introduced the term "taxonomy" in his *Théorie élémentaire de la botanique* of 1813.

<sup>65</sup> Lindley, John (1834) "Botany and Medicine". Address delivered at the commencement of the Medical Session 1834-5, University of London, October 1, 1834. Reprinted in *John Lindley, 1799-1865: Gardener, Botanist and Pioneer Orchidologist*. (1999) William T. Stearn, ed. Antique Collector's Club in Association with The Royal Horticultural Society. London. P 94.

singularity by analogy. In botany and zoology, the distinction between analogy and homology is paramount. Analogous relationships are determined by function where there is no ancestral link between organism -- for instance, bat wings and bird wings have a similar function, but there is no hereditary connection. Homologous relationships indicate common ancestry, though organs may display dissimilar forms or functions -- a bat wing and a human arm may have different form and function, but they have a common heredity. The Linnaean system was physiologic, considering analogous relationships, the de Candolle system was anatomical, considering homologous relationships. Morphology, on the other hand, through looking at the form or structure of an organism, also considers the relationship between parts. "Whereas physiology considers the function of parts of an organism, and anatomy, practiced through dissection, considers the structures of an organism, morphology demands a consideration of relationships "expressed at the whole plant and organ levels of organization." <sup>66</sup>

"Morphology" is a word first used by Goethe<sup>67</sup> in his 1790 *Versuch die Metamorphose der Pflanzenzuerklaren* (*Attempt to Explain the Metamorphosis of Plants*, later simply, *The Metamorphosis of Plants*). By this term he meant the science of the form taken by a part of a plant and the successive forms it assumed through what he called metamorphosis, "by which nature produces one part through another, creating a great variety of forms through the modification of a single organ."<sup>68</sup> Goethe argued for wholeness in nature which was a regulating principle internal to the organism. Initially he believed that there existed an actual archetypal plant which was the origin of all plant forms, but he came to see the archetype or *Urpflanze* as an *idea* by which he could recognize the quality of an organism to express an inherent unity while also transforming. Growth and reproduction are the actions of a plant, and morphology is

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<sup>66</sup> Kaplan, Donald R. (2001) "The Science of Plant Morphology: Definition, History, and Role in Modern Biology". *American Journal of Botany*. Vol 88. No 10. P 1712.

<sup>67</sup> Johann Wolfgang von Goethe (1749-1832) German Romantic writer, who also studied natural History and published work on morphology and color theory.

<sup>68</sup> von Goethe, Johann Wolfgang (2009) *The Metamorphosis of Plants*. MIT Press, Cambridge. P 5-6.

the observation of the stages of growth to which is applied *Vernunft* (reason) which he contrasted with *Verstand* (understanding): “Reason concerns becoming; understanding what has become,” he wrote.<sup>69</sup>

The Germans have a word for the complex of existence presented by a physical organism: *Gestalt* (structured form). With this expression they exclude what is changeable and assume that an interrelated whole is identified, defines, and fixed in character.

But if we look at all these *Gestalten*, especially the organic ones, we will discover that nothing in them is permanent, nothing is at rest or defined – everything is in a flux of continual motion. This is why German frequently and fittingly makes use of the word *Bildung* (formation) to describe the end product and what is in process of production as well.

Thus in setting forth a morphology we should not speak of *Gestalt*, or if we use the term we should at least do so only in reference to the idea, the concept, or to an empirical element held fast for a mere moment of time.

When something has acquired a form it metamorphoses immediately to a new one. If we wish to arrive at some living perception of Nature we ourselves must remain as quick and flexible as Nature and follow the example she gives.<sup>70</sup>

*Bildung* is a continually constructed identity derived from internal destiny; formation which expresses potentiality. Hans Gadamer explains: “...the result of *Bildung* is not achieved in the manner of a technical construction, but grows out of an inner process of formation and cultivation, and therefore constantly remains in a state of continual *Bildung*.”<sup>71</sup> When Goethe applies this idea to plant morphology he is assuming the apprehension of the idea of the plant by which the stages of formation are recognized as coherent to the plant’s inner unity. He writes, “...metamorphosis...is not the outward alteration of one form into another but the differing outward expressions of an inward idea.”<sup>72</sup> Morphology, then, takes into account the dynamism evident in the natural

<sup>69</sup> von Goethe, Johann Wolfgang (1988) *Scientific Studies*. Douglas Miller, ed and trans. Suhrkamp. New York. P 308.

<sup>70</sup> von Goethe, Johann Wolfgang (1807) quoted in Naydler, Jeremy (2000) *Goethe on Science*. Floris Books. P 50.

<sup>71</sup> Gadamer, Hans-Georg. (2006) *Truth and Method*. Continuum. London. P 10.

<sup>72</sup> Brady, Ronald H. (1998) “The Idea in Nature: Rereading Goethe’s Organics”. *Goethe’s Way of Science: A Phenomenology of Nature*. David Seamon and Arthur Zajone, eds. State University of New York Press. P106.

world. For Goethe, the "morphotype," in a Platonic sense, is an idea in nature which persists in an organism through life cycles and environmental response. It "is neither reducible to the constituent physical parts of an organism, nor can it be identified with any one particular stage of an organism's development, no matter how apparently 'archetypal' this stage may seem."<sup>73</sup> Though Goethe was meticulous in his observations, he defied a strictly empirical approach which regarded the whole organism as a summing of its parts.

Goethe advocated a 'delicate empiricism which makes itself utterly identical with the object.' This mode of inquiry aims to overcome subject/object dualism by endowing detailed sense experience of the outward forms of nature with the enlivening inward power of imagination, while also grounding subjective imagination in objective forms and facts. So, in place of the alienation from the natural world at the center of the conventional Cartesian approach, Goethe proposed a way of identification as the path to a deeper and unifying knowledge of nature.<sup>74</sup>

Reason allows the observer to imagine any stage of growth within a continuum of forms, and is the means by which wholeness confines the particulars of observation. Goethe thus proposes a method of investigation whereby perception and phenomena are contingent. "The ultimate goal would be to grasp that everything in the realm of fact is already theory. The blue of the sky shows us the basic law of chromatics. Let us not seek for something beyond the phenomena – they themselves are the theory."<sup>75</sup>

Goethe, writing in a pre-Darwinian world, anticipated theories of evolution in describing diversification in the biological world:

Whatever appears in the world must divide if it is to appear at all. What has been divided seeks itself again, can return to itself and reunite. This happens in a lower sense when it merely intermingles with its opposite, combines with it; here the phenomenon is nullified or at least neutralized. However, the union may occur in a higher sense if what has been divided

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<sup>73</sup> Naydler, Jeremy (2000) *Goethe on Science*. Floris Books. P 47.

<sup>74</sup> Miller, Gordon L. (2009) Introduction. *The Metamorphosis of Plants*. The MIT Press. Cambridge. Pxxiii.

<sup>75</sup> von Goethe, Johann Wolfgang (1987) "Maxims and Reflections". *Scientific Studies*. Miller, Douglas, ed. Suhrkamp Publishers. New York. P 307.

is first intensified; then in the union of the intensified halves it will produce a third thing, something new, higher, unexpected.<sup>76</sup>

A century later, in his introduction to *On the Origin of Species*, Darwin expresses similar ideas:

I am fully convinced that species are not immutable: but that those belonging to what are called the same genera are lineal descendants of some other and generally extinct species, in the same manner as the acknowledged varieties of any one species are the descendants of that species. Furthermore, I am convinced that Natural Selection has been the main but not exclusive means of modification.<sup>77</sup>

At the beginning of the nineteenth century, creation was understood as a single divine act, with time measuring the unbroken development of culture. It was believed that there was a "chain of nature," with "species constant, permanent and unchanging."<sup>78</sup>

The study of natural history existed within a teleological framework and each specimen was regarded as an expression of divine perfection. As evolution began to be accepted as a force in nature, there persisted a belief that species progressed toward a more perfect, and so divine, form. Aristotle had written, "For the process of evolution is for the sake of the thing finally evolved, and not this for the sake of the process."<sup>79</sup>

Descriptions of exotic creatures encountered by sailors in new lands demonstrated the diversity of creation and lent credence to the biblical story of deluge which could account for the extinction of species in the Old World. When fossils of unknown species were discovered, they were accounted for in a way consistent such a framework of understanding.

Unlike Goethe and other naturalists whose work had preceded his, Darwin did not concede a divine plan or internal unity as the regulating principle for apparent changes

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<sup>76</sup>von Goethe, Johann Wolfgang (1807) quoted in Naydler, Jeremy (2000) *Goethe on Science*. Floris Books. P 52-53.

<sup>77</sup> Darwin Charles (1964) *On the Origin of Species*. Harvard University press. Cambridge. P 6.

<sup>78</sup> Miller, Lillian (1981). "Charles Wilson Peale as History Painter: The Exhumation of the Mastodon". *American Art Journal*. Vol 13.No 1.P 51.

<sup>79</sup> Aristotle. *Parts of Animals*. William Ogle trans.\*

in organisms. He theorized an adaptive quality in organisms and persistence, or survival regulated by external conditions of environment.

For Darwin, evolution was more than change of appearance due to the unfolding of preformed inherent tendencies. His concept of evolution required a real genetic change from generation to generation, a complete break with the so-called evolutionary concepts of Lamarck and virtually all other forerunners. Darwin started from a new basis by completely eliminating the last remnants of Platonism, by refusing to admit the *eidōs* in any guise whatsoever.<sup>80</sup>

Whereas Goethe had concluded that the archetype was an *idea*, Darwin maintained that there was an actual originary organism. "Therefore I should infer from analogy that probably all the organic beings which have ever lived on this earth have descended from some one primordial form, into which life was first breathed."<sup>81</sup> This primordial form he called a prototype and he suggested the relationship of descent as a basis for classification:

Such expressions as that famous one of Linnaeus, and which we often meet with in a more or less concealed form, that the characters do not make the genus, but that the genus gives the characters, seem to imply that something more is included in our classification, than mere resemblance. I believe that something more is included; and that propinquity of descent, -- the only known cause of the similarity of organic beings, -- is the bond, hidden as it is by various degrees of modification, which is partially revealed to us by our classifications.<sup>82</sup>

Geddes' plan for the Botanical Garden for Grange House School, like the plan of any collection, suggests a determinacy of system which belies the fluid, negotiated space of knowledge. The plan is a demonstration of classification of plants based on morphology and of an educational strategy Geddes was to espouse in his lectures on botany which he later published as *Chapters in Modern Botany* in 1911. In his preface he writes: "But, as teacher and student usually end as they begin, let them begin as they would

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<sup>80</sup> Mayer, Ernst (1964) "Introduction". *On the Origin of Species*. Harvard University press. Cambridge. Pxi.

<sup>81</sup> Darwin Charles (1964) *On the Origin of Species*. Harvard University press. Cambridge. P 484.

<sup>82</sup> Darwin Charles (1964) *On the Origin of Species*. Harvard University press. Cambridge. P 413-414.

end; neither with conning an inventory of plant mummies, nor with the tissue-unwrapping of samples of these; but with a childlike watching, scene after scene of the actual drama of nature, in which life interacts with life, and fate with all.”<sup>83</sup> Geddes insisted always on the necessity of observation, and in every field he was to explore he exhorted students to be fulsome in their observation so as to know the drama, by which he meant all the forces at play, by which organisms, from simple plant structures to whole cities, are formed. He viewed "book knowledge" as a reference to be consulted and challenged after drawing conclusions from field study. “He must look how flowers are arranged before ‘reading up *Inflorescence*’; and take them to pieces before reading of sepals and petals, of stamens and ovules; he must puzzle about what pollen and ovules are for, he must watch the bees and butterflies among the flowers, and find out which flowers no insects go to, before reading of insect and wind-fertilisation; then the books of Grant Allen and Sir John Lubbock may be read one summer as pleasant introduction to the larger volume of Hermann Muller for the next.”<sup>84</sup> The influence of the work of Darwin and the evolutionary lens through which Geddes viewed the natural world is explicit in his writing:

The widening knowledge of flower-function will of course involve an increasing minuteness of observation in detail, and the Darwinian interpretation of the utility of even the smallest of these – the shape and relative position of parts, the colour, the markings, the perfume – will give them interest. Thus arises a knowledge of flower form not only far more interesting and more genuine, but more permanent and more intimate and through than that of the conventional ‘anatomy before physiology’ method, against which this little volume is a continuous protest. For it is only when we have first seized the essential parts of the flower (stamens and carpels), and seen how they are adapted to cross- or self-fertilisation, and thereafter the petals and sepals, as at best accessories to this main function, direct or indirect, mechanical or attractive (if not largely subordinate to mere external and protective purposes), that our morphological interpretations can become either safe or clear.<sup>85</sup>

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<sup>83</sup> Geddes, Patrick (1911) *Chapters in Modern Botany*. John Murray. London. P vi.

<sup>84</sup> *Ibid.* P 192.

<sup>85</sup> *Ibid.* P 192-193.

In plainer language, instead of being (as the established programmes have it) an anatomist first, dissecting a dead 'type,' a physiologist afterwards making its parts work, and an evolutionist by getting up Darwin's theory as an external body of dogma last of all, the right course is precisely the opposite: Darwin's habit of observation and interpretation first, physiological details afterwards, with such anatomy as it is wanted to explain them. Thereafter, of course, such pure morphology as you will.<sup>86</sup>

#### Geddes' Exhibitions in Plan

*Town plans are thus no mere diagrams; they are a system of hieroglyphics in which man has written as the history of civilization, and the more tangled their apparent confusion, the more we may be rewarded in deciphering it.*<sup>87</sup>

Geddes brought his ideas from the biology classroom when he turned his attention to town planning. Morphology, as applied to the city, is not the shape of the city, but the forces which shape it. Form is not a final determination, but a stage in the evolutionary progress of a town. Just as his plan for a botanical garden was shaped by relationships between species of plants, organized by morphological consideration, the plan or map of a city reveals the relationship of geographical, historical and social influences. He recommended complete survey, or observation as a first step in the process of town planning, and the town planner, like the botany student in the garden, was first a field researcher. He draws this analogy in his lecture, "Civics as Applied Sociology":

As primarily a student of living nature in evolution, I have naturally approached the city from the side of its geographic and historic survey, its environment and functional change; yet it is but a step from these to the abstract interpretations of the economist or the politician, even of philosopher and moralist. Again, since in everyday practice co-ordinating the literal maps of each civic surveys with even more concretely detailed plans as gardener and builder, I find less danger than may at first appear of ignoring the legitimate demands of the needed practical division of labour in the city's service. When the first mutual unfamiliarity is got over, there is thus also a greatly diminished distance between speculative thinkers and practical men, who at present, in this country especially,

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<sup>86</sup> Ibid. P146.

<sup>87</sup> "Cities and Town Planning Exhibition" catalogue, Dublin, 1911. P 10. T Ged 6/11/4.

stand almost unrelated: the evolutionist student and worker thus begins to furnish the missing link between them.<sup>88</sup>

When “The First International Conference on Town Planning” took place in London in 1910, Geddes was made director. Hosted by the Royal Institute of British Architects to publicize the passing of the 1909 Housing and Town-Planning Act, it included an exhibition, the committee of which was chaired by Raymond Unwin (who was the architect of Ebenezer Howard’s garden city at Letchworth). “Most of the United Kingdom material was to come from the Outlook Tower as no other institution had a comparable collection.”<sup>89</sup> Having long argued for civic museums, the exhibition in London was an opportunity for Geddes to bring his ideas to a larger audience.

The *London Times*, October 10, 1910 reported on the exhibition:

In connection with the Town Planning Conference, which opens today, an international exhibition has been arranged at the Royal Academy...it is on an extensive scale and fills all the galleries at Burlington House...We have no reason to be ashamed of the British section, which occupies three rooms and part of another. It contains the most complete thing in the whole exhibition, and that is the truly remarkable survey of Edinburgh compiled and arranged by Professor Geddes. It occupies the whole of the Water Colour Room to the left of the entrance, and is equally full of instruction to the mind and pleasure to the eye....The British section is also better supplied with models, which are more easily assimilated than plans or drawings, than any other.<sup>90</sup>

The *Times* continued in an article the following day:

People will find in the Royal Academy galleries evidence that Town Planning is far from being, as some appear to suppose, merely a modern device for vexing the souls of comfortable and contented citizens. It is a very old art, practiced from the earliest times with an assiduity and success that put our hasty and careless age to shame. Time has conspired with ancient art to give its products in many cases the air of happy natural accidents; but those who care to look a little more closely into the elements that make up the charm of a beautiful old town, or to dig

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<sup>88</sup> Geddes, Patrick (1904) *Civics as Applied Sociology*. Dodo Press. P 9.

<sup>89</sup> Meller, Helen E. (1990) *Patrick Geddes: Social Evolutionist and City Planner*. Routledge. London and New York. P 175.

<sup>90</sup> *London Times*, October 10, 1910

a little into its history, discover that much thought, public spirit, and sense of dignity and beauty went to the producing of beautiful effects.<sup>91</sup>

After the success of the inaugural exhibition, a second exhibition was staged the following year in Crosby Hall in London in 1911. (Figure 1.2) Geddes describes the exhibition in his 1915 *Cities in Evolution*:

From the 'Survey of Edinburgh,' for many years in progress at the Outlook Tower, a selection had been made and developmentally arranged; so that here, more than elsewhere before, the essential conditions and phases of a city's historic past were shown as determining its qualities and defects in the present. Past and present were also shown as presenting the problems of the city's opening future, and as conditioning their treatment also. This exhibit was therefore felt to present a needed suggestion, and even nucleus for a further exhibition of smaller but more typical and systematic character.<sup>92</sup>

This new exhibition Geddes said, "involved an ordered design; that of presenting a type-selection of housing and town-planning schemes of suggestive character towards city development; and further of working towards the comparative presentment and study of the evolution of cities – historic, actual, and possible."<sup>93</sup> Geddes here borrows the language of comparative anatomy and theories of evolution, reinforcing an understanding of the city as that of an organism. By looking at *types*, he can compare "schemes" across boundaries of time and place, and he seems to understand them in the sense of morphology, which he wrote about in his entry "Morphology" in the 1911 edition of the *Encyclopedia Britannica*: "[with the publication of Darwin's *Origin of Species*] The 'Urpflanze' of Goethe, the types of Cuvier, and the like, at once become intelligible as schematic representations of ancestral organisms, which in various and varying environments, have undergone differentiation into the vast multitude of existing forms."<sup>94</sup> Type is more than an arbitrary formal materialization, but includes functional, geographical, social and cultural responses. That is, these organs within the organism

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<sup>91</sup> Ibid. October 11, 1910.

<sup>92</sup> Geddes, Patrick (1915) *Cities in Evolution: An Introduction to the Town Planning Movement and to the Study of Civics*. Williams and Norgate. London. P 256-257.

<sup>93</sup> Ibid. P 257.

<sup>94</sup> <http://www.1911encyclopedia.org/Morphology>

of the city can manifest differences which express the vagaries of environmental influence, thus expressing a narrative of the city which includes its past and present and suggests a future.

Arrangement is no easy problem, since we are not simply exhibiting town-plans, but aiming towards the indication, in part even the elaboration, of a Science of Cities: hence the need of selecting types, as clear and illustrative as may be, amid the mingled wealth and poverty of available materials.<sup>95</sup>

Geddes describes the London exhibition of 1911 as “typical and systematic” indicating the application of scientific method to the new discipline of town planning, and the arrangement of the display preoccupied Geddes and determined the impact of the exhibition. The collection itself seems to have shocked visitors. Patrick Abercrombie, a planner of Dublin and Sheffield, described the Edinburgh room as “a nightmare of complexity”, and

...a torture chamber to all those simple souls that had been ravished by the glorious perspectives or heartened by the healthy villages shown in the other and ampler galleries...the merest hotch-potch – picture postcards – newspaper cuttings -- crude old woodcuts – strange diagrams – archaeological reconstructions; these things, they said, were unworthy of the Royal Academy – many of them not even framed – shocking want of respect!<sup>96</sup>

In an undated photograph, one sees the “hotch-potch” effect of one of his exhibits. (Figure 1.3) The photograph is of an unidentified exhibition, though the one figure present in the scene is dressed in summer wear -- dark jacket and white pants -- suggesting that this is either the Ghent or Dublin exhibition. There isn't a room sufficiently large at the Outlook Tower to accommodate this setting, so one supposes this is one of the travelling exhibitions. In the foreground is a table upon which rests an architectural model of a building type not likely to be of the contemporary city, but seems rustic. This building is one story with a steep roof, and in front of the building are

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<sup>95</sup> Geddes, Patrick (1915) *Cities in Evolution: An Introduction to the Town Planning Movement and to the Study of Civics*. Williams and Norgate. London. P 270.

<sup>96</sup> Boardman, Phillip (1978). *The Worlds of Patrick Geddes*. Routledge and Kegan Paul. London. P216.

six figures or dolls; they are not be of the scale of the building, so it is not clear if they are part of a "diorama" relating to the building model. A model of a similar building type rests on another, smaller table in the left middle ground of the photograph. On the table, in front of the model and figures are papers, or perhaps guides or pamphlets. It looks as if a chair is drawn up to the table. The back wall of this room is hung with panels of approximately 10 ft in height, and four such panels are angled in such a way as to create display space that juts into the room and creates a bit of an alcove upon which this photograph is centered. To the right and left of the central table, portable panels on stands are arranged to define small "galleries." Upon all of these panels are hung images in various sizes, many mounted on a dark background, but none framed or behind glass. The images all appear to be photographs and drawings, with no diagrams evident. On the far left, behind the small table with model, one panel may be hung with a large map, but the resolution of the picture is insufficient to make this clear. The central alcove, behind the table and standing figure, is hung with a number of bird's eye views of cities, and this area is surmounted with the largest image in the scene, a bird's eye view of what appears to be Great Windsor Park, which by virtue of the composition of the photograph, occupies pride of place. In fact, the composition is rather formally symmetrical, captured with the camera lens at table height, suggesting that this picture was taken to show the exhibition at its very best. The light source is natural and comes from the left where, presumably, there are windows. The exposure time for such a photograph must have been fairly long, and one imagines this lone figure carefully holding his pose. He faces slightly right, toward the light, with his left shoulder toward the camera. Standing off-center of the composition, perhaps he was asked to move to his right so as not to obscure the images behind him. Again, he is dressed in summer wear, a dark jacket, perhaps a waistcoat, white shirt and bow tie. There is a touching mood to the photo, as if volunteers have just completed hanging the exhibit and are hovering behind the photographer as this moment before the public arrives is captured. The formality of the frame also lends a poignancy to the rather homely displays. It is as if the viewer has arrived at a grammar school "history day,"

rather than an exhibition that would be a formative experience in the establishment of town planning. No labels are evident, but a catalogue was available, and Geddes promised "oral explanation during the personal guidance which is a feature of the exhibition."<sup>97</sup>

Geddes described the collection in an undated letter:

The pick of it has always filled a great gallery – from floor and screens and up to frieze pictures, and with screen emergent from the walls, and down the center and sides too: while the balance in its big portfolio envelopes, can be consulted easily, or hung on the minor screens as desired.<sup>98</sup>

The London *Standard* review of the exhibit said that "this collection of models, maps, plans, drawings, and photographs is of quite extraordinary interest and value. It, so to speak, explains the whole exhibition, and prevents its becoming for the unprofessional visitor a collection of unrelated facts and illustrations."<sup>99</sup> Even Abercrombie relented: "But if they chance within the range of Geddes' talk, henceforth nothing could medicine them to that sweet sleep which yesterday they owned. There was something more in town planning than met the eye!"<sup>100</sup>

Evidently, despite the "hotch-potch" display, visitors to the exhibition were able to construe meaning from the collection of images. Within the visual barrage Geddes succeeded in creating a coherent narrative, or at least to provide visitors with the opportunity to compose their own narratives. As with his "thinking machines" a sort of folding and recomposing allowed each visitor to forge new relationships between assembled ideas. His visual methods and the sequence of display allowed the synoptic and synthetic perspective he advocated in describing the utility of his diagrams. Just as he would later do at the Outlook Tower, where visitors were first brought briskly up five flights of stairs to arrive breathless and disoriented on the rooftop, Geddes welcomed visitors to his exhibition with an initially disorienting sight.

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<sup>97</sup> "Cities and Town Planning Exhibition" catalogue, Dublin, 1911. P 3. T GED 6/11/4.

<sup>98</sup> University of Strathclyde Archives. T-GED 6/9/1

<sup>99</sup> Ibid. P 215.

<sup>100</sup> Ibid. P 216.

First of all, our visitor must be made to feel, and this strongly, the profusion and the confusion of the subject. Hence our Entrance Hall is hung, like a private study or corridor, with a medley of things new and old, of pictures, plans and views, architectural or civic, each interesting, but without obvious relation or association to any mind except the owner's.<sup>101</sup>

To initiate visitors with “profusion and confusion” takes advantage of the desire of the mind to construe meaning -- a maelstrom of images begs one to “make sense of it all.” Geddes describes Room 1 of the exhibition: “Old Engravings of regions and cities of the whole earth, picturesquely but confusedly grouped under course of sun and planets. Here as a comprehensive suggestion of the world-wide study of cities, and of their interest and beauty.”<sup>102</sup> The collection itself stands merely as a nebulation, and the viewer of the collection discovers for himself through analogous reasoning the tenets of coherence. When Geddes suggests that this entrance is “like a private study” there is a sense that, upon entry, the visitor has accessed the thought-world of the “owner,” in this case Geddes. What follows then is a procession through a thinking machine wherein the particular arrangement of the collection exploits the associative capacity of visitors so as to allow them to follow Geddes’ thought-path.

In a plan of the exhibit at Crosby Hall (Figure 1.4), it appears that the space of exhibition occupied three stories. According to the accompanying guide, visitors began on the floor labeled “III: Introduction to the Study of Cities.” First is a room titled “Geographic Origins” and next is “Hellenic Cities” then “Roman,” “Medieval,” and “Renaissance Cities.” This chronological arrangement belies a non-linear strategy, but the accompanying guide repeatedly refers historic images to contemporary conditions, and the narrative jumps back and forth in time, blurring the boundaries between past, present and future. In the area of “Geographic Origins,” visitors are directed to an overhead image of Geddes’ “Valley Section” and the guide-book explains: “As the merchant nobles of Venice sprang from the fishing-boat, or the millionaires of Pittsburgh

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<sup>101</sup> Geddes, Patrick (1915) *Cities in Evolution: An Introduction to the Town Planning Movement and to the Study of Civics*. Williams and Norgate. London. P 270.

<sup>102</sup> Geddes, Patrick and M.C. Mears (1911) *Cities and Town Planning Exhibition Guide-book and Outline Catalogue*. Brown and Nolan Limited. Dublin. T-GED 6/11/4

now arise beside the forge, so surely also do their cities retain the essential character, that conditioned by their environment and occupation.”<sup>103</sup> In the description of “The Survey of Edinburgh,” included at each exhibition, the guidebook warns: “Natural environment is thus never to be neglected without long enduring penalties. Neither can historic phases be considered as past and done with; their heritage of good, their burden of evil, are each traceable in our complex present City: and each as a momentum, towards betterment, or towards deterioration respectively.”<sup>104</sup> The narrative thus overcomes what the arrangement of every collection confronts: the exigency of display space. By referring visitors to and fro among displays, Geddes is not restricted to a linear perspective, and the past can reside with the future or possible.

The accompanying diagram of the layout of the exhibit for Dublin in 1911 indicates a space greatly simplified from that of Crosby Hall, and the exhibition appears to be contained on one floor only. (Figure 1.5) The procession remains the same, and the text of the guidebook is a reprint from the London exhibition. The plan for the exhibition in Ghent of 1913 shows that the collection has been reconfigured again for a new space, though the particular “rooms” retain their titles. In July of 1913, “The Cities and Town Planning Exhibition” was presented at the *Exposition Internationale* in Ghent. Geddes’ exhibit was in contrast with the German exhibits which “were all beautifully framed and labelled, arranged with typical Prussian method in spacious galleries, as befitted an exhibition subsidised by the Prussian state to show its achievements in urban reconstruction...Like the Edinburgh Room at the royal Gallery, [Geddes’] exhibits lacked such niceties as gilt frames and printed labels.”<sup>105</sup>

Geddes, who had been in Scotland during the weeks of preparation, and who had left his son Alasdair with instructions for the hanging, arrived the day before the exhibition opening. A volunteer described the scene which met her that morning: Geddes was surrounded by workmen and “on the floor were scattered many of the pictures and

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<sup>103</sup> Ibid.

<sup>104</sup> Ibid.

<sup>105</sup> Ibid. P 240.

diagrams that Alasdair and his helpers has so painstakingly hung during the previous weeks.” When asked if they had made so many errors, Alasdair replied, “No. Daddy had an inspiration on the train last night. He saw all at once a way to make things clearer.”<sup>106</sup> The jury awarded the Cities and Town Planning Exhibition the *Grand Prix*. “The Germans may have the frames and labels...but we have the ideas,” was Geddes’ response.<sup>107</sup>

The configuration of the area at Ghent does not lend itself to as linear a progression as in London or Dublin, and no doubt visitors processed through the exhibition in a variety of sequences. This was Geddes’ intent, and he explains that visitors should re-circulate through the exhibition, finding new perspectives and relationships through a new sequence of viewing:

Suppose, instead of beginning with the gallery of Civic Affairs, or at the Great Cities, with the body of the public, we follow our children. These are interested in simple natural conditions to start with – in stories of hunter and shepherd, of miner and woodman, or peasant and fisher. So we enter the gallery devoted to “Geography”; not as a mere gazetteer, but as yielding and illustrating the fertile principle of Geographical Control.<sup>108</sup>

He then recommends, “Moreover, from this gallery we may return to that of Classic Cities, as scholars everywhere are doing, and with new interest of fresh light.” Later, “...we may now cross over to revisit that devoted to the Renaissance...” and, “...return once more to this gallery of Wars and their results.”<sup>109</sup> Again, one sees Geddes overcoming the limitation of a specified arrangement of the collection by encouraging visitors to range about the galleries, and by so doing, recompose the order of the collection.

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<sup>106</sup> Ibid. P 241.

<sup>107</sup> Ibid. P 242.

<sup>108</sup> Geddes, Patrick (1915) *Cities in Evolution: An Introduction to the Town Planning Movement and to the Study of Civics*. Williams and Norgate. London. P 280.

<sup>109</sup> Ibid.

Once the collection is arranged, its internal coherence assumes an obligation of external reference by which the thesis, which for Geddes was the incipient city, adheres to the world beyond the display. Gazing at the collection, one composes a narrative that exists outside of the collection of objects but which is linked associatively to the objects by their inherent meaning. The viewer brings a set of associations which are initiated not only by the objects in the collection, but in their arrangement, the juxtaposition of objects. Seeking coherence and adherence, the viewer operates inferentially, devising hypotheses to reconcile an assemblage of associations. In such a way, the collection is a laboratory and visitors are scientists conducting experiments. The role of visitor is one of active investigation. A letter written to Geddes by a visitor to the London exhibition describes the experience:

...I conducted Father round the exhibition, with which he was much impressed. We went through the orders of Chiefs, People, Intellectuals and Emotionalists and when we came to the financial age, he was startled at the result. We also paused considerably before the revolutions of the [elevated stand]. The prompt questions you have raised round the little child made him look into the mystery of that hexagonal formations as he has never done before.<sup>110</sup>

As a rigorous scientist by training, Geddes carefully constructed the experiment, arranging samples of cities as a botanist might arrange samples of plants. Where samples are highly similar, one seeks their differences, and where samples are highly dissimilar, one naturally seeks their commonality. Geddes' insistence on "types" and the described "hotch-potch" of images in his exhibition suggest that he hoped the visitor would recognize universal principles of town-planning in the collection, thus synthesizing a broad range of information into a coherent pattern of "city." In this way, the exhibition defines a paradigm of city in which each object stands beside each other object, each a paradigm (*paradigm* means "standing beside"), so that out of the collection could be generated an idea of city without the necessity of first stating exactly

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<sup>110</sup>T-GED 9/979. Correspondence from Florence Hamilton, dated February 13, 1911. The "hexagonal formation" is nowhere else described, but a hexagonal figure appears in the plan of the exhibition for Crosby Hall (Figure 1D) and it may be to this that she refers.

what qualities the idea of city requires. This is quite different from a map or a matrix or a spread sheet for which parameters must be initially determined, and the filled-in cells a foregone conclusion. Giorgio Agamben writes about paradigm in *The Signature of All Things on Method*: “A paradigm entails a movement that goes from singularity to singularity and, without ever leaving singularity, transforms every single case into an *exemplar* of a general rule that can never be stated a priori.”<sup>111</sup>

To let the objects of the collection stand in relation to one another without implied hierarchy or linearity allows a fluid, or as Geddes would say, a synthetic arrangement. For Geddes, in the paradigm is the operational cognizance of relationship. As Geddes had learned with classification strategies of taxonomy, the *ordo* or *family* is not a rule for the *genus*, but the collective set of *genus* establishes the rule for the *family*. Likewise, a collection of species coheres to determine the *genus*. In his exhibition, many species of cities collectively determine the *genus* "City." As in morphology, the relationship between the structure and function within cities allows them to be scrutinized, like any organism, and to belong to an evolutionary framework that proposes a future. With each example “standing beside” every other example, the dilemma of chronological or teleological hierarchy is removed. Out of these fluid relationships, it is possible to gain insight that doesn’t necessarily redefine the collection. Since the adherence of the collection is derived from subtle qualities, the search-space is infinitely large, allowing for the recognition of subtle clues. Having established the paradigm "City," it is then possible to propose a condition and test it for coherence to the established set. In this way the town-planner sets out a hypothesis which has some hope of being tested. Once images of the city are removed from their originary context (though objects in a collection always cleave in some way to an external reference) they become intelligible only through their belonging together. Agamben explains that a paradigm is a hypothesis “If we recall that the knowability of the paradigm is never presupposed, and

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<sup>111</sup>Agamben, Giorgio (2009) *The Signature of All Things on Method*. Luca D’Isanto, Kevin Attel, trans. Zone Books. New York. P 22.

that on the contrary its specific operation consists in suspending and deactivating its empirical givenness in order to exhibit only an intelligibility...”<sup>112</sup>

Geddes' regional survey, diagrams, and exhibition are all data sets which in a paradigmatic manner function as a hypothesis which will link the past and present of a city to its future. Geddes often called this future the "possible" which emphasizes the conjectural nature of his role as investigator. He rarely proposed a specific outcome, but saw his work as establishing the paradigm out of which future possibility could arise. The filled-in categories of his thinking machine diagram, or the images and models of his exhibition stood in analogously for the cities of his experience, creating a sort of *Urcity*, as when the objects in a natural history collection stand in for the natural world. By collecting the city, creating a paradigm of city through the setting-apart of its recognized qualities, Geddes gave it an operational capacity not present in the actual city.

In an undated card, titled "A Type Museum," (Figure 1.6), he explores ideas for a museum. Beginning with situation, he has two categories -- "Cathedral Building" and "Fair Exhibition." Beneath "Cathedral" he has listed "Louvre" and "Vatican." To the right, beneath an indecipherable abbreviation ("Spl"), he has written "Temple." Next appears a quote from Alfred Tennyson's *Ulysses*: "Always Roaming with a hungry heart," below which he has written "Reverent Traveller." Below that he has written "Past Gallery: I also am a painter,"<sup>113</sup> "We also are museum matter," below which is written "I also am a curator." The card then is divided vertically into two cells, the left of which is titled "Encyclopedia," though that cell is not further developed. The right side begins with the words "Professor du Allalu Wissenschaft." *Wissenschaft* is German for "science", and *Allalu* is the Irish Gaelic for "hail," and appears in an anonymous Gaelic poem "Allalumowauleen" which translates as "hail my little purse." In the poem, the purse contains all that a beggar treasures, and is referred to as "a bag of bags."

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<sup>112</sup> Ibid. P 25-26.

<sup>113</sup>The painter Correggio is said to have exclaimed upon seeing Raphael's Sistine Madonna "*Anch' io son pittore*" (I also am a painter).

Possibly, Geddes use of the word “allalu” is a misappropriation, by which he is associating the museum with a “bag of bags,” for beneath that he has written “Evolution of Life” and further developed that cell. The sub-categories are “Sex” and “Evolution” which he leads to “plants,” “culture,” “City Life Drama,” and “history.” Below this again he has written “Evolution and classification” which he links to “Physical history” and “Heredity and classification” which opposes an empty cell. Beneath this again he has written “Culture – shaping of city.” Finally, he begins another section titled “Problems,” under which is written “walls: my museum” and a final diagram the top left cell of which contains “(Socialism Museum) is a geoscope” with three cells to the right – “chronoscope,” “technoscope” and “bioscope,” under which is written “an Outlook.” While this card is somewhat confounding, and hardly clarifies the content or layout for a museum, it demonstrates the synthetic manner of Geddes’ exploration, and the range of thinking behind his idea of museum. Like most of his “thinking machines,” cells remain incomplete and the diagrams seem to lead to no conclusion. However, if the cards are regarded as tools for Geddes’ thinking, that is “notes to self,” they reveal the process by which he developed his ideas. In this case, one sees how large the search field for museum Geddes creates, and the associative capacity his diagrams yielded. Though there are moments when he seems to be establishing some hierarchy, overall, ideas appear to float in such a way that unforeseen connections can be made. Of particular interest are the two literary references and the Correggio quote because, through association they open up especially rich fields that illustrate his intent. As Semper notes, “the relations between existing things are innumerable and very complicated,” and Geddes appears to allow those conditions to reside within his diagram, rather than assert a more limiting strategy. His insistence on the “synoptic view”, which makes it so difficult to realize his schemes, results in a paradigmatic strategy that proves a force in forging unexpected relationships. He describes this view of the whole in his description of the “Index Museum”:

But all these we have been speaking of hitherto as six rooms – physical, organic and social on one side, and, parallel to these, the halls of art,

education and morals – are practically one. They unite into a single whole, and might be viewed as such from their roof apex or central dome, say from the widest gallery, that of philosophy, and with its outlooks and inlooks open to all who care to climb so far.<sup>114</sup>

Determined to bring town planning into the fold of scientific inquiry, Geddes spoke in the language of the trained biologist that he was, but he uniquely proposed that synthesis complement analysis and the particular arrangement of his collection of the city provided he said, “what is so often missed by scientific and philosophic minds, that the synthetic vision to which they aspire may be reached more simply from the aesthetic and the emotional side, and thus be visual and concrete.” Through collecting and arranging and exhibiting the city, Geddes established a rich field for investigation. In July 1914, Geddes travelled again to Dublin with the exhibition, which for this venue included “local exhibits from every town in Ireland.”<sup>115</sup> The four week exhibition at the Linnen Hall was supplemented by a two week “School of Civics” which conducted a survey of Dublin and its region. At the end of the fourth week, it was announced that Britain had declared war on Germany. Geddes had been solicited by Lord Pentland, Governor of Madras, to bring his exhibition to India in October. In September, Alasdair and Geddes sailed for India. “At about the same time the exhibition, its maps, photographs, and documents carefully packed in bulky cases, left Liverpool on board the freighter ‘Clan Grant’”.<sup>116</sup> “In the latter part of 1914 the strategy of the German surface fleet was to disperse around the globe and wreak havoc amongst Allied Shipping. In just one cruise in the Indian Ocean, Germany’s *SMS Emden* sailed into the history books, reportedly capturing or destroying 23 Allied ships.”<sup>117</sup> One of the ships was the *Clan Grant*, which sank off the coast of Madras, carrying Geddes’ Cities and Town Planning Exhibition into the deep.

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<sup>114</sup>Geddes, Patrick (1989) “The Index Museum: Chapters from an Unpublished Manuscript”. *Assemblage*. No 10. P69.

<sup>115</sup> Ibid. P 244.

<sup>116</sup> Ibid. P 248.

<sup>117</sup> <http://newlinks.blogspot.com/2006/10/warship-wednesday-sms-emden.html>

Like his plan for a Botanical Garden for Grange House, Geddes' presentment of the Cities and Town Planning Exhibition was meant to show "at a glance" the forces that shape the City. Assembled, as though collected specimen, the fluid arrangement of images, diagrams, maps and models in-formed town planning. Applying evolutionary theory to morphology, Geddes expected visitors to operate as comparative anatomists, whereby the collection of known parts suggested the past of the city, and also its future. For Geddes, a thorough knowledge of every component part would allow town planners to propose the next stage in the development of a town which maintained constancy with its past development. He saw the city as a "drama in time," and preserved its future in the situation of its present and past. The organization of his exhibitions encouraged visitors to discover for themselves "treatment" derived from "diagnosis." His method was consistent with his training as a biologist and Spencer's *synthesis of science*, yet frustrating to empiricists who sought simple causal relationships. Geddes' methods accounted for the complexity of the organism *city*, without abandoning the rigor of laboratory research. Implicit in his approach is the demand of hypothesis to account for observed phenomenon, and the capacity of hypothesis to generate the possible, or future. His recommendation for survey makes sense only when one imagines the survey as a collection of the complete field of evidence which then supports a claim for action. Just as the arrangement of a collection, or the choreography of visitors at an exhibition presents a coherent narrative determined by the curator, the arrangement of a city composes the narrative of place . By proposing that the city be investigated through a method which obligates the visitor to seek relationships between various aspects, Geddes encouraged an approach to the design of cities which allowed the city to stand as a collection cohesive with its past and future.

**IMAGES: CHAPTER ONE**

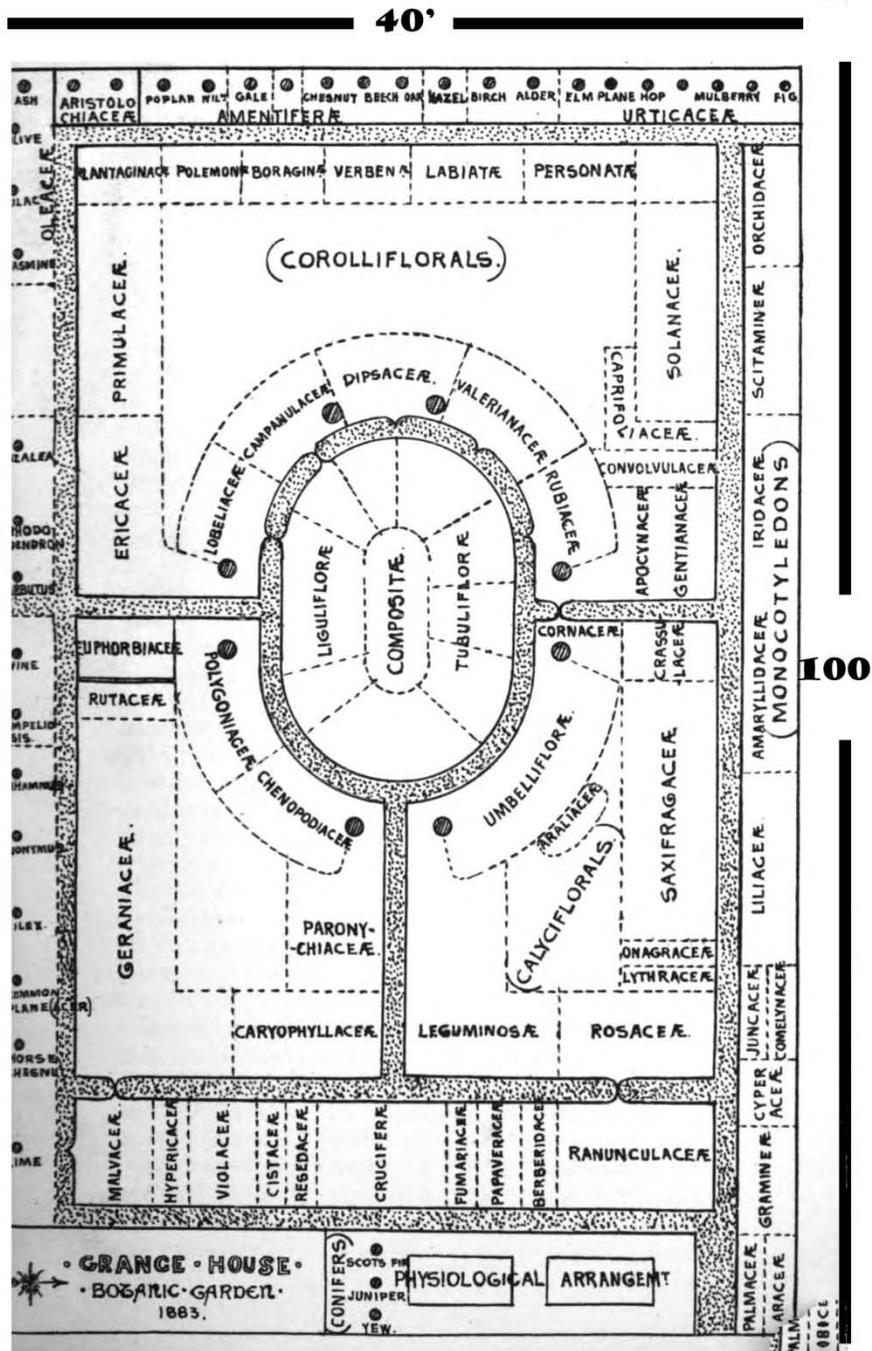


Figure 1.1: Plan for Grange House School, c 1883  
 Source: Geddes, Patrick (1883) "A Type Botanic Garden". *Transactions and Proceedings of the Botanical Society of Edinburgh*. June 14, 1883.

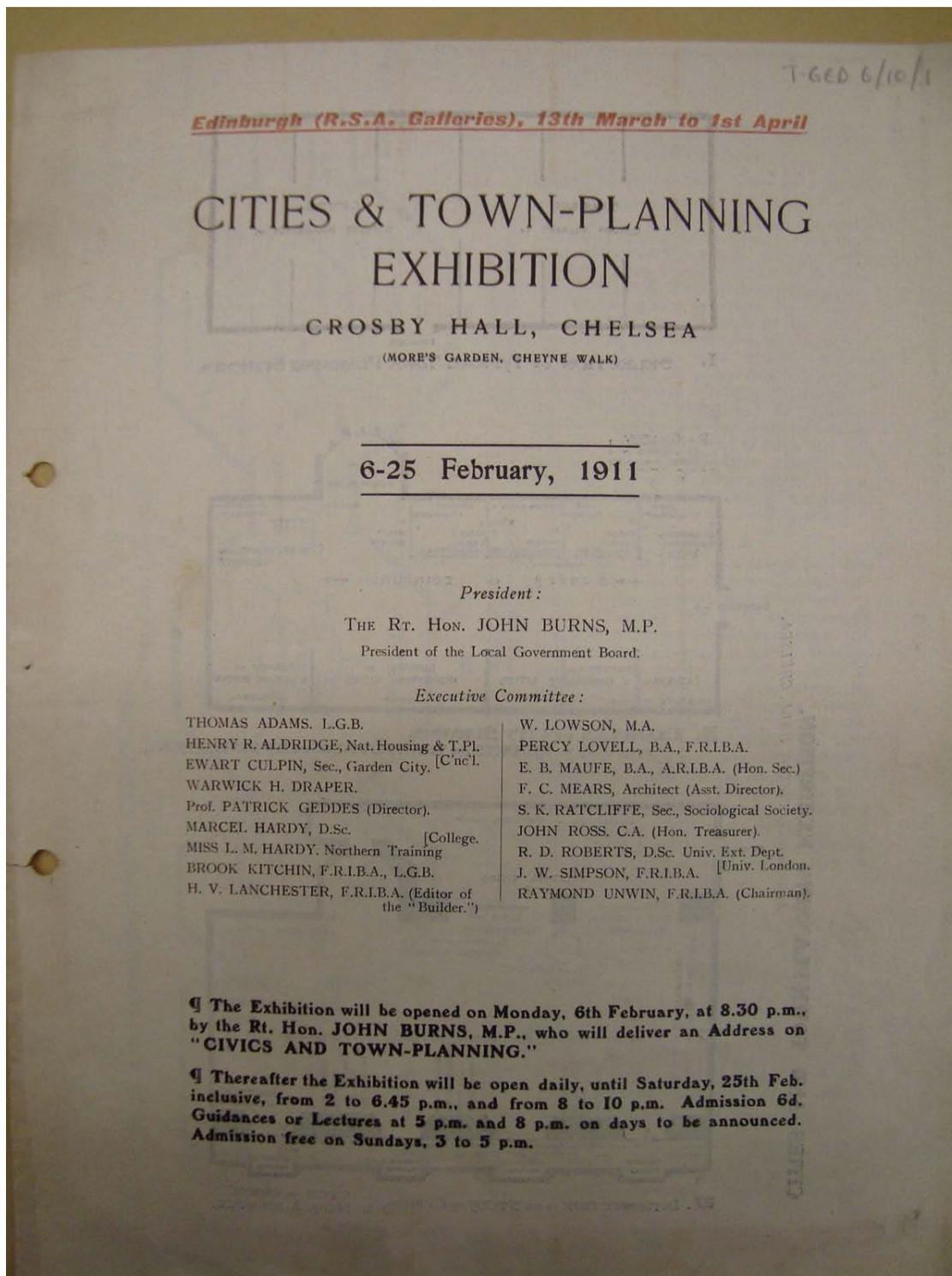


Figure 1.2: Cover, exhibition catalogue, 1911

Source: University of Strathclyde Archives



**Figure 1.3:** *Photograph of unidentified exhibit, undated*  
Source: University of Edinburgh Archives.

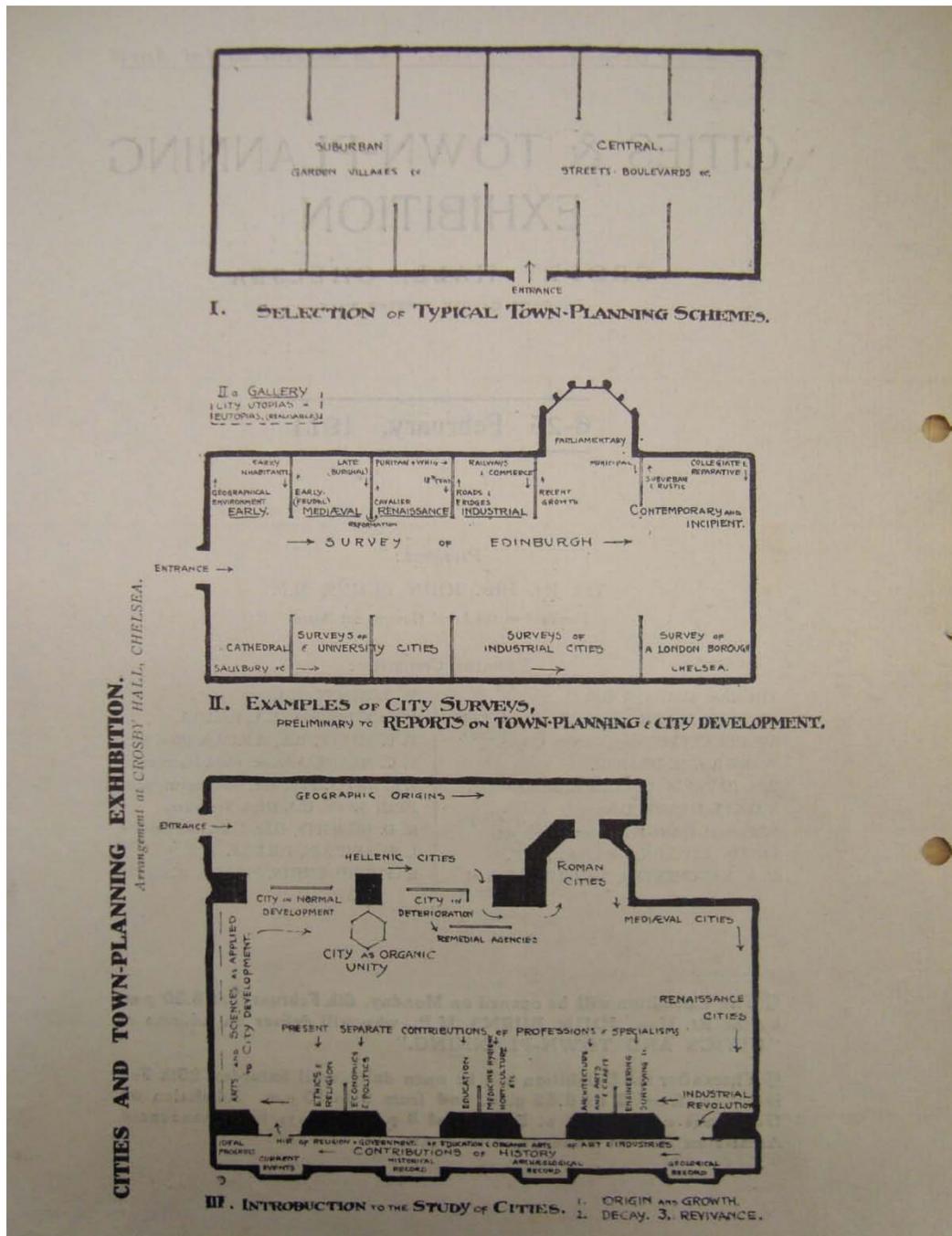


Figure 1.4: Map, "Cities and Town Planning Exhibition," Crosby Hall, London, 1911  
Source: University of Strathclyde Archives

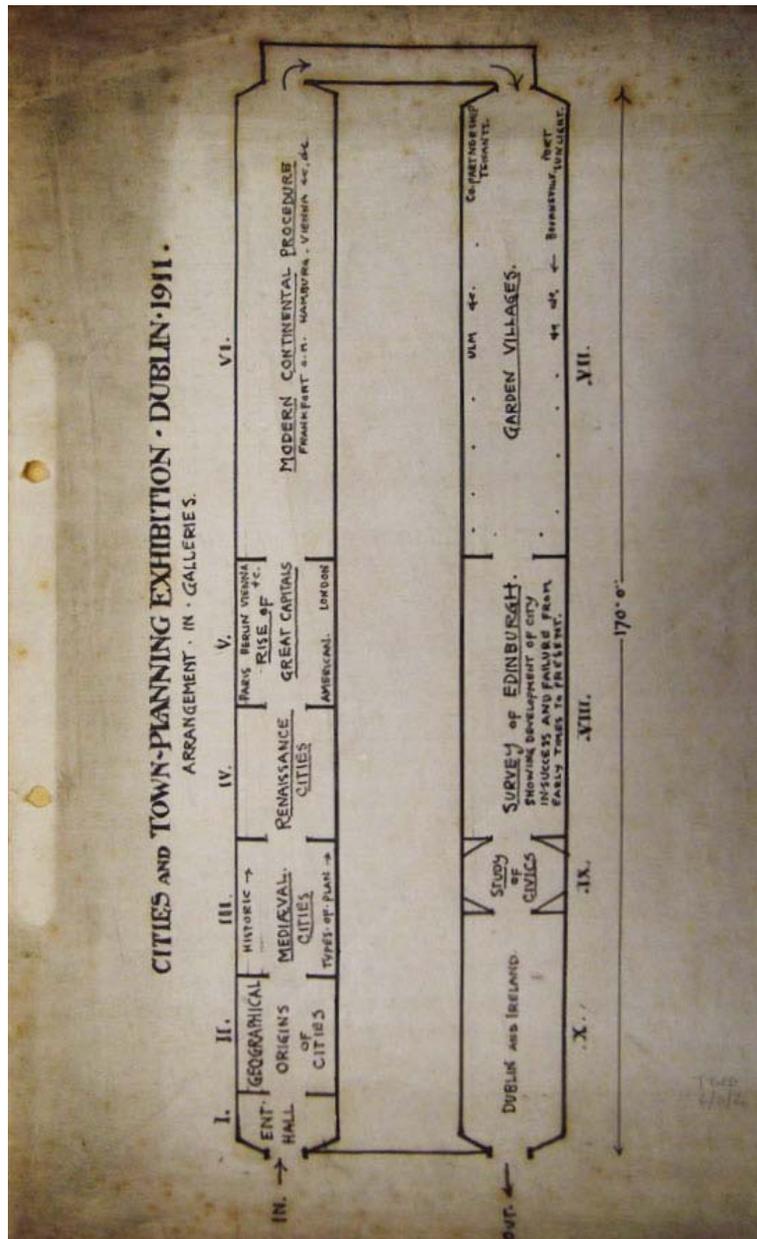


Figure 1.5: Map of "Cities and Town Planning Exhibition," Dublin, 1911  
Source: University of Strathclyde Archives

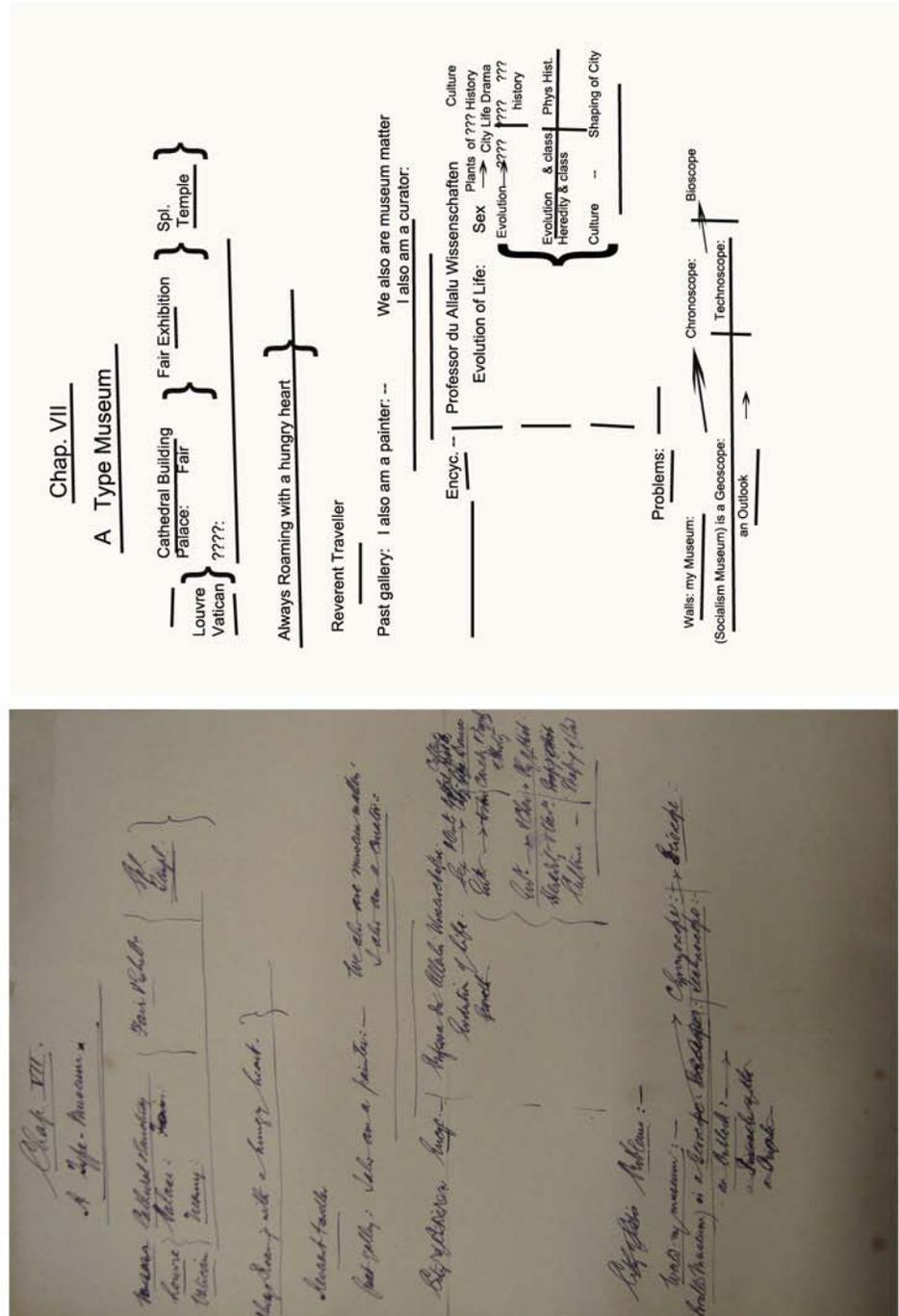


Figure 1.6: "A Type Museum" thinking machine, undated  
 Source: University of Strathclyde Archives



## **CHAPTER TWO: THE SECTION**

*Nothing is more surprising to me than to find a number of instructed persons coming up here for scientific education, and to discover that they cannot observe. They have been so accustomed to take statements on credit from books and word of mouth that they have almost lost the faculty of seeing things for themselves. I remember after having given a lecture, accompanied in my ordinary way by drawings on the blackboard, that I went to look through the microscope, and see what one of the students who had heard this lecture was drawing. To my astonishment, I saw that his drawing was the thing I had drawn on the blackboard not the thing under the microscope. I said to him, What is this? this is not at all like what is under the microscope. No, he said, that is what is on the blackboard. He did not believe nature, he believed me; and the great lesson I have tried to teach, which is the fundamental basis of scientific teaching, is do not put too much faith in your teacher, but do believe nature.*

- T. H. Huxley, 1882

As a biologist expanding his interests to include what he called "applied civics," Geddes sought a method of investigation which would account for the complexity of the city which he understood as like any organism. In this effort he drew from his early training in the microscopical laboratory, embracing also the restructuring of science in the wake of Darwin's theory of evolution which necessitated the inclusion of *time* as a variable. His ideas of collection and arrangement, which served so well to provide the discovery of unanticipated relationships in his exhibitions, were complemented by a strategy of borrowing the techniques and graphics of disciplines which examined the processes of change. While type analysis revealed both analogous and homologous relationships, subsumed under morphology, if Geddes was to understand the city as "a drama in time," he would need to temporally situate the organism. Whereas a plan, or plan drawing, accords primacy to spatial relationships and the associations discovered through juxtaposition, section drawings are more open to temporal relationships. The opening field of geology contributed both the graphic language of section and the use of section to interpret the passage of time. Additionally, the use of sections for microscopical investigations lent itself well to the science of cities, in which structural and functional relationships could best be understood through the cross and transverse cut. Geddes' notes, illustrations, writing, and exhibition at the Outlook Tower all provide evidence that he was thinking "sectionally."

### Time and the Geologic Section

Geddes' most famous illustration, "The Valley Section," (Figure 2.1) appeared in print in at least two versions, appears in his notes, and often as a symbol in his many "thinking machines." (Figure 2.2, 2.3) Geddes says of the illustration: "This is no longer our mere school-book, with its image of a 'country' as a colored space on a flat map, with only 'boundaries' and 'capital,' and so on; it is first of all the essential sectional outline of a

geographer's 'region,' ready to be studied." <sup>1</sup> Though called a section, it is in fact an elevation drawing, with perspective at that. In the background, three rather idealized mountains rise at the left and slope down across to the right of the drawing where they end at a calm body of water. There is a suggestion of terrain on the mountains -- the closest may be snow-capped -- and a hint of vegetation at some intervals along the slopes. In the background, at "sea level" appears what might be first a town and then a city in silhouette. In the middle ground are stylized details of site: a rock out-cropping; coniferous trees; deciduous trees; some indeterminate agriculture; and, finally, a body of water upon which is a boat with two men. In the foreground appear "tools" for each of these sites, with an occupational label for each along the bottom of the image. Thus Miner is paired with a pick, Woodman is paired with an axe, Hunter with a bow and arrow, Shepherd with a crook, and Crofter, Farmer or Peasant (depending on the version) with a hoe, plow and shovel, and Fisher appears at the end with a symbol for fish in a net. It is variously labeled "The Valley Section," "The Geography of Education," "The Nature Occupations," and "The Flowering of Occupations." In a later, 1926 publication of the drawing, (Figure 2.4) an additional illustration is added which shows what appears to be Edinburgh from a bird's-eye view, with drawings below of the different laborers.

Only in his writing does he explain that these occupations develop over time: "...the Miner, of course not yet of coal, but first of the flints with which civilization so essentially began...In later times, he finely shaped and polished those 'neolithic' implements ... Flints, coarse and fine; bronze iron and steel...the chronology of the miner, as at length the metallurgist. And is he not in these times anew significant -- with new alloys, with aluminum, even with radium?" <sup>2</sup> A botanist would know that a particular organism would be located in a site or climate suited to its needs, but what Geddes advocates here, and which is consistent with a post-Darwin understanding, is the adaptive response of an organism to change in environment. "On one side we have to trace out for each given region more and more completely how far nature can be shown to have determined man. On the other side we have to inquire how far the given type of man has reacted, or may yet react, upon his environment." <sup>3</sup> Such adaptation is the fit of an organism to its situation, and the success of an organism in adapting more so than competitors is the basis of Darwin's "natural selection", later called "survival of the fittest." Thomas Huxley clarifies the point:

'Fittest' has a connotation of 'best'; and about 'best' there hangs a moral flavour. In cosmic nature; however, what is 'fittest' depends upon the

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<sup>1</sup> Geddes, Patrick (1925) "The Valley Plan of Civilization: The Third of the Talks from the Outlook Tower". *The Survey*. June 1. P 289.

<sup>2</sup> Geddes, Patrick (1925) "The Valley Plan of Civilization: The Third of the Talks from the Outlook Tower". *The Survey*. June 1. P 290.

<sup>3</sup> Geddes, Patrick (1898) "The Influence of Geographical Conditions on Social Development". Abstract of paper read at an afternoon meeting of the Royal Geographical Society. May 25.

conditions. Long since I ventured to point out that if our hemisphere were to cool again, the survival of the fittest might bring about, in the vegetable kingdom, a population of more and more stunted and humbler and humbler organisms, until the 'fittest' that survived might be nothing but lichens, diatoms, and such microscopic organism as those which give red snow its colour; while, if it became hotter, the pleasant valley of the Thames and Isis might be uninhabitable by any animated beings save those that flourish in a tropical jungle. They, as the fittest, the best adapted to the changed conditions, would survive. <sup>4</sup>

When Geddes says of his "Valley Section," "...men were quietly cultivating the plants and domesticating the animals, and thus were themselves being cultivated by their plants, and domesticated by their animals," <sup>5</sup> he is reflecting the writing of Darwin and Huxley who both made extensive use of examples from crop cultivation and animal husbandry in composing their arguments. This reciprocal relationship of organism to environment and the adaptive response of both is what Huxley calls the "cosmic process," and a great amount of time is necessary for the subtleties of this process to become evident. This revolution in thought was central to Geddes' work. His insistence on complete "regional survey" and so "diagnosis before treatment" stems from an understanding of the organism's adaptive response to environment, and the reciprocal potential of the environment to be shaped by the needs of the organism. If one could make a complete survey of existing conditions, which for Geddes included the history of place, one could see the "possible," as Geddes called the future. Time was a framework in which organic processes would inevitably shape the culture of place, resulting in a "eutopia" provided the conditions of "fitness" were preserved. "[I]n the social sciences, as with biological and evolutionary studies, the essential is to have as clear an understanding as we may of normal life-processes before we come to pathological interruptions," <sup>6</sup> he writes, before tracing the development of each occupation to its modern equivalent.

So, back to our valley diagram which called up for us the main make-up of the great world. Hunter and shepherd, poor peasant and rich: these are our most familiar occupational types, and manifestly successive as we descend in altitude, and also come down the course of social history. Hence it was long the bookish habit to speak of them not only as main types in civilization (which they do broadly represent) but as if each had succeeded the other in successive 'stages,' and for good and all. and these too as but 'phases before the present predominance of the industrial

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<sup>4</sup> Huxley, Thomas H. (1893) "Evolution and Ethics: The Romanes Lecture".  
<http://aleph0.clarku.edu/huxley/CE9/E-E.html> 5/30/13

<sup>5 5</sup> Geddes, Patrick (1925) "The Valley Plan of Civilization: The Third of the Talks from the Outlook Tower". *The Survey*. June 1. P 288.

<sup>6 6</sup> Ibid.

and commercial urban order; since which, to many of whose writers they have seemed henceforth insignificant, if not practically negligible. But all these fundamental occupations we have always with us. and as our urban studies progress, we shall find them, even in every city; and there not simply with their produce in the open market-place, or in the resulting shop rows which are its modern development; but also as evolved into correspondingly developed urban vocations. Against the background of our valley section we shall understand them better than has the economist or the lawyer, the politician or the historian.<sup>7</sup>

Like a paleontologist, or Darwin examining types of finches, Geddes finds the homologous characteristics which recount origin and indicate incipient adaptation. In his "Valley Section" Geddes succeeds in communicating this evolutionary process and relating it to man's settlements. In using the "section," he is able to introduce time which was central to Darwin's and Geddes' theses.

Darwin was not the first to propose a theory of evolution. Naturalists had long wrestled with proposals that would account for the variety of species, variation within species, the apparent "extinction" of some species, and the geographic distribution of species. Plant and animal breeders had always used knowledge of inherited traits in "selective breeding." What Darwin introduced was the mechanism, "natural selection," by which the success of a species and variety within species depended on competitive adaptation to conditions of habitat. Since only successful organisms would "survive" from one generation to the next, there was a slow change in the characteristics of a given species, resulting in variety of species according to the demands of environment. What was needed was vast time, for "the number of intermediate and transitional links between all living and extinct species, must have been inconceivably great,"<sup>8</sup> and the discovery of "deep time" at the beginning of the nineteenth century made possible Darwin's theory.

Aboard *The Beagle* on his momentous journey in 1831, Darwin read Charles Lyell's<sup>9</sup> *Principles of Geology*, which had been published in 1830. Lyell, a comprehensive observer, proposed that the action of natural processes had been constant over time and that the geologic record was a narrative which explained biological diversity. Since these natural processes, erosion and sedimentation, interrupted by the occasional cataclysmic event of landslide, volcanic eruption or earthquake, were slow in action, an extensive timeline was required for the creation of familiar geologic formations. Darwin acknowledges Lyell in his *Origin*:

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<sup>7</sup> Geddes, Patrick (1925) "The Valley Plan of Civilization: The Third of the Talks from the Outlook Tower". *The Survey*. June 1. P 325.

<sup>8</sup> Darwin, Charles (1859) *On the Origin of Species by Means of natural Selection or the Preservation of Favoured Races in the Struggle for Life*. John Murray. London. P 282.

<sup>9</sup> Charles Lyell (1797-1875) Scottish lawyer and geologist

He who can read Sir Charles Lyell's grand work on the Principles of Geology, which the future historian will recognise as having produced a revolution in natural science, yet does not admit how incomprehensibly vast have been the past periods of time, may at once close this volume. Not that it suffices to study the Principles of Geology, or to read special treatises by different observers on separate formations, and to mark how each author attempts to give an inadequate idea of the duration of each formation or even each stratum. A man must for years examine for himself great piles of superimposed strata, and watch the sea at work grinding down old rocks and making fresh sediment, before he can hope to comprehend anything of the lapse of time, the monuments of which we see around us.<sup>10</sup>

While Lyell's contribution was significant in relating organic and inorganic processes, hence its value to Darwin, his work was presaged by that of James Hutton<sup>11</sup> who was able to propose an age for the Earth far in excess of that understood by orthodoxy. Before Hutton and the advent of geological study, the sources for determining the age of the planet were the cultural narratives which had been preserved. Examining, for instance, the book of Genesis, scholars, in tracing biblical genealogy found the age of the earth to be approximately six thousand years. This was too short a time span in which erosion and sedimentation could create the varied strata of geologic formations, and so explanations of deluge and cataclysm were necessary. The prevailing notion of the time, advanced by Abraham Gottlob Werner<sup>12</sup> and called "Neptunism," maintained that a vast ocean had covered the Earth, and that observable strata had formed as sedimentary layers before this ocean receded. Neptunism had the advantage of accommodating biblical stories of the flood, and so, while there were doubters, the theory did not challenge church orthodoxy. Trained in medicine, chemistry and farming, Hutton surmised that erosion, sedimentation, heat and pressure were the formative processes of the Earth's surface, and that these processes repeated over vast time. What he needed was geologic evidence in the form of a layer of younger sedimentary rock on top of an older, eroded layer of rock. This he found on a day's boating excursion off the coast of Scotland in 1788. (Figure 2.5) His work, published in 1795 as *Theory of the Earth; or an Investigation of the Laws observable in the Composition, Dissolution, and Restoration of Land upon the Globe*, established that the Earth was at least millions of years old. This understanding, further developed by Lyell, was the kind of time that Darwin needed for the slow process of natural selection to have effect.

Hutton, like Geddes, was a Scotsman by birth, and so spent his early years in a region of topographical extremes, removing to Edinburgh when he commenced his university

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<sup>10</sup> Darwin, Charles (1859) *On the Origin of Species by Means of natural Selection or the Preservation of Favoured Races in the Struggle for Life*. John Murray. London. P 282.

<sup>11</sup> James Hutton (1726-1797) Scottish physician, naturalist, chemical manufacturer, farmer and geologist.

<sup>12</sup> Abraham Gottlob Werner (1749-1817) German geologist who coined the term "Neptunism."

education. Edinburgh was founded on an unusual geologic formation that forced a pattern of development which could not help but promote a "sectional" appreciation of place. The original settlement, a hill fort, was situated atop the remains of a volcanic plug formed around 300 million years ago. This plug of basalt resisted the scraping force of glaciers, and the final retreat of glaciers at the end of the last ice age 15,000 years ago, created a craig and trail field of debris on the lee side of the plug, which forms a mile-long ridge now known as "The Royal Mile." (Figure 2.6, 2.7) As the town grew, defensive strategy demanded dense development clinging to the ridge. The narrow ridge accommodated a "high street" with buildings facing the street at typical elevations, but falling quickly down the ridge behind. The Flodden Wall, built after a Scottish defeat by the British in 1513, contained development for a population of 10,000 within 140 acres. Such high density resulted in buildings, called "lands" that rose to six stories on the front, but might have as many as four additional stories stretching down the ridge of the back side. "Wynds," or narrow courtyards provided access and some ventilation from the high street to the backs of these buildings, and it was into these narrow courtyards that human waste was thrown from upper windows to trickle down the steep passageways to the bottom of the ridge. The filth of such a system was often commented on by travelers, and earned Edinburgh the local nickname of "Auld Reekie." With the arrival of political stability in the eighteenth century, Edinburgh began to expand beyond the defensive walls, and bridges were built to span ridges to the north of town. (Figure 2.8) Again, at the upper elevation, buildings fronted the street and rose to three or four stories, but their foundations fronted streets below the bridges, creating eight to ten story structures. (Figure 2.9) To navigate Edinburgh, one must think "in section" because a map which shows the aerial view of the city doesn't indicate the many passages that pass underneath roadways. Often, there is no internal connection between upper and lower stories of the same building which may front two different elevations. Sometimes, steep stairways connect abrupt endings to upper streets with those that are lower. From most parts of the city one may experience long vistas, either out over the region, or of towering church spires and monumental architecture seen from below. Like ancient seafarers, visitors orient themselves by sighting this or that spire. The topography and building pattern created an underground of commercial and residential space, some of which was sealed during outbreaks of plague (condemning poor residents) and only in recent years have city works excavations unearthed some of these subterranean spaces. There are thus two faces to the city, and it is no wonder that Robert Louis Stevenson, who was from Edinburgh, could here imagine Dr. Jekyll and Mr. Hyde. This is the city Hutton chose to make his home and which nurtured his desire to look beneath the surface.

Hutton, born in Edinburgh in 1726, entered the University of Edinburgh to study medicine in 1740. He studied there for three years, then relocated to Paris where he continued his studies at the University of Paris, and then went on to the University of Leyden where he completed his medical degree in 1749. Known for its anatomy theater, Leyden was also the preeminent school of medicine for nearly two centuries. At the

time that Hutton studied there, botany and medicine were still linked disciplines. A knowledge of "herbals," or the plants cultivated for healing purposes, was necessary for a practicing physician. Some plants were efficacious alone, but others, known as "simples" were combined, sometimes with a remarkable number of others, to make medicinal concoctions.

Theriaca Andromachi of the Pharmacopoeia Collegii Regalis Londini of 1721 contained 62 ingredients, the Mithridatium 58 ingredients, the Confectio Raleighana 39 ingredients, and so on. The last-named, in addition to scrapings of deer antler and the flesh, hearts and livers of vipers, included flowers of borage, rosemary, marigold, sundew, etc., leaves of germander, blessed thistle, balm, Cretan dittany, mint, marjoram and betony, seeds of cardamom, fruits of juniper, etc., roots of angelica, valerian, burning bush, etc. Whatever the psychological if not physiological efficacy of such concoctions, their making called for much herbalistic and indeed botanical knowledge in order to identify the simples used.<sup>13</sup>

The study of botany was included in the medical curriculum through the middle of the nineteenth century. In a letter home, dated 1843, Henry Acland describes his studies at St. Georges Hospital in London: "In addition to Dr. Nairn's Clinical Clerkship I shall then have a lecture daily on Botany, one on Medicine -- besides some on Anatomy, Insanity, and Chemistry."<sup>14</sup>

The botanical garden at Leyden was founded in 1587, and botanical research conducted there informed the field for the next two hundred years. Carl Linnaeus visited Leyden ten years prior to Hutton's arrival, and while there secured the financial support of leading botanist Jan Frederik Gronovius<sup>15</sup> for publication of *Systema Natura*, which introduced Linnaeus' system of plant classification. British botanist, and later fellow-member with Robert Hooke<sup>16</sup> of the Royal Society, Nehemiah Grew<sup>17</sup> studied there in 1671. The botanic garden in Edinburgh was established in 1670 by John Sibbald, also a Leyden graduate. The restriction of admission until 1871 at the universities of Oxford and Cambridge to Church of England members meant that many English students traveled to Leyden to pursue studies in medicine, and so there was broad dissemination in England of the knowledge gained in Holland. The affinity of medicine, botany and the example of the theater of anatomy certainly linked the utility of

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<sup>13</sup> Stearn, William T. (1962) "The Influence of Leyden on Botany in the Seventeenth and Eighteenth Centuries". *The British Journal for the History of Science*. Vol 1. No 2. P 146.

<sup>14</sup> Atlay, James Beresford (1903) *Sir Henry Wentworth Acland: A Memoir*. Smith, Elder and Co. London. [http://books.google.com/books/about/Sir\\_Henry\\_Wentworth\\_Acland\\_bart\\_K\\_C\\_B\\_F.html?id=g\\_kRAAAA YAAJ](http://books.google.com/books/about/Sir_Henry_Wentworth_Acland_bart_K_C_B_F.html?id=g_kRAAAA YAAJ)

<sup>15</sup> Jan Frederik Gronovius (1686-1762) Dutch botanist.

<sup>16</sup> Robert Hooke (1635-1703) English natural philosopher and curator of experiments for the Royal society.

<sup>17</sup> Nehemiah Grew (1641-1712) English plant anatomist and physiologist.

dissection for men of science, and for Hutton dissection would be applied also to the body of the Earth.

For Darwin, observable phenomena -- flora and fauna, land forms, and the diversity of all -- represented a text containing mysteries which required interpretive care. He makes frequent reference to "the geological record," or "the fossil record." He comments on the "incompleteness" of this record and the necessary role of conjecture in forming a coherent narrative. The mysteries and incompleteness of this text fueled a range of endeavors as geology emerged as a discipline from natural history. Those who studied the text of the Earth fell loosely into three main groups: the botanists and comparative anatomists such as George Cuvier,<sup>18</sup> Comte de Buffon<sup>19</sup> and deCandolle, who sought explanations for distribution of species over space and time; engineers and mineralogists whose mapping served the interests of industry; and those who sought evidence to support theoretical or theological narratives of Earth's formation. The interests and goals of each of these groups influenced the gradual development over the nineteenth century of a graphic language for geology. Stratigraphy, which depicted proposed stacking of layers of rock formation seen in section, best served geologists in all three groups. Cuvier and Alexandra Brongniart<sup>20</sup> published *Essai sur la géographie minéralogique de environs de Paris* in 1808, and their illustrations indicate the utility of the section drawing in locating mineral veins. (Figure 2.10) Brongniart was a mineralogist and instructor at the *Ecole des Mines* at the beginning of the 19th century, and also developed a system of fossil markers for dating strata. Cuvier's work and interest in the distribution of fossils among strata led him to propose the first theory of "extinction." The "dating," or at least the successive order, of strata was performed by either mineralogical examination of apparently similar layers of rock, or by identification of similar fossils located within strata. Both mineral and fossil evidence lent support to theories that processes were uniform across time and space, and that species of flora and fauna were specific to conditions of habitat. Working with Cuvier in Paris was Augustin Pyramus de Candolle, whose publication in 1813 of *Principes élémentaires de botanique* proposed a "natural system" of taxonomy in contrast to the Linnaean system.<sup>21</sup> He introduced the term "taxonomy," and also developed the distinction of homologous and analogous relationships in morphology. He proposed botanical "regions" in which plants, suited to the region, competed for resources, which was

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<sup>18</sup> George Cuvier (1769-1832) French naturalist, zoologist and comparative anatomist. Completed the first survey of the geologic strata of the Paris basin. Director of the *Jardin des Plantes* and Permanent Secretary of the Department of Physical Sciences. Member of the Royal Society.

<sup>19</sup> Comte de Buffon, nee Geroges-Louis Leclerc(1707-1788) French naturalist, cosmologist. Published 36 volume *Histoire naturelle*, 1749-1788. Director of the Jardin du Roi which became the Jardin des Plantes.

<sup>20</sup> Alexandra Brongniart (1770-1847) French mineralogist. With Cuvier completed the first survey of the geologic strata of the Paris basin. Director Sevres Porcelain Facotry.

<sup>21</sup> This is the system referenced in Chapter One which Geddes employed in his botanical garden at the Grange School.

fundamental to Darwin's theory of "natural selection" and obviously influenced Geddes' "flowering of occupations." This understanding of species distribution is what made geographic and hence geologic location of fossils useful in identifying and dating strata. William Smith's <sup>22</sup> 1815 geological map of England, Wales and (parts of ) Scotland was the first map to fully inventory the geology of a country. (Figure 2.11) In a surprisingly short period of time, he completed a survey of Britain and mapped its geology. While conceptually the map explains sections of the Earth as though excavated, in practice no such cuts were made. Geologists for the most part hypothesized underlying strata based on observations of surface conditions.

It is perhaps worth describing in more detail what is meant by surface features, before discussing Smith's use of them. Associated with each stratum, and dependent on it, is a particular type of relief and soil, which in turn gives rise to characteristic agricultural and architectural features. For example, the oolitic limestone of the Jurassic period is fairly hard in southern England, and forms the well-known Cotswold uplands. Its pervious nature means that there are few rivers running across the outcrop, and, in Smith's time, the soil was inadequate to support anything other than flocks of sheep. Houses in the region were built and roofed with the local stone. By contrast the nearby outcrop of Oxford Clay gave rise to well-watered valleys, supporting dairy farming, with villages containing woodframed houses with thatched roofs. Assuming he was already familiar with the surface features of the strata in a type area, the geologist could travel through much of England and identify the underlying strata without ever looking at any exposures. As Smith, for example, covered the country by stage coach, he could confirm his predictions about the distribution of the strata, at least to his own satisfaction, without ever looking at any exposures. When he did climb down from the open seat on top of the coach, in order to look at a particular quarry, he had already decided which stratum was exposed, and grouped the fossils accordingly. <sup>23</sup>

Opportunities to observe actual cuts were limited to examination of existing mine shafts, chalk pits, canal works, quarries, and of course natural outcroppings. As mentioned, Cuvier and Brogniart's surveys related to coal and clay deposits. Hutton had observed canal works in the Edinburgh region in the years 1767-1674, and his discovery of an evidential strata arrangement took place off the coast of Scotland where exposed cliffs revealed the Earth's narrative. Smith was an assistant to a surveyor and worked for eight years for the Somerset Coal Canal by which coal was transported from mines in Wales to Bath. Those who illustrated geologic formation through the use of stratigraphy

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<sup>22</sup> William Smith (1769-1839) English geologist.

<sup>23</sup> Laudan, Rachel (2007) "William Smith: Stratigraphy without Palaeontology.  
[http://www.academia.edu/768684/William\\_Smith.\\_Stratigraphy\\_without\\_Palaeontology](http://www.academia.edu/768684/William_Smith._Stratigraphy_without_Palaeontology)

made observations where that was possible but interpolated results for vast areas and depths under consideration. Section drawings were an imaginative proposal and the acceptance of the interpretation they proposed was as much due to the persuasiveness of drawings as the persuasiveness of theoretical underpinnings.

William Buckland,<sup>24</sup> who was Lyell's teacher at the University of Oxford, is shown in a lithograph published in the 1820's. (Figure 2.12) the illustration commemorates a Special Lecture given at the Ashmolean Museum in February of 1823. Buckland stands before his audience holding a fossil perhaps selected from those arrayed upon the table before him. Above and behind Buckland is suspended what appears to be William Smith's 1820 map of England and Wales. (Figure 2.11) On the wall opposite Buckland, along with mounted antlers, tusk and bone, is an illustration of "Adam's mammoth," a mammoth unearthed in 1806 in Siberia and reconstructed by German draftsman and paleontologist Wilhelm Gottlieb Tilesius von Tilenau.<sup>25</sup> The image appeared in an 1815 publication, *Memoires de l'Academie imperiale des sciences de St. Petersbourg*. (Figure 2.13) The other illustrations on the walls are of geologic formations, and of note is an image to the left of the windows which could be the model for Geddes' "Valley Section." (Figure 2.14) Rock specimens rest on shelves in the room. A board behind Buckland displays five stratigraphical sections, and two more are mounted on the wall behind that. One sees in this illustration the complete array of instruments of learning by which the then new field of geology was defined. The Geological Society had been founded in 1807, and Buckland elected as a fellow in 1818. The following year he assumed the first Readership in geology and combined those responsibilities with that of Fellow of Corpus Christi College, Oxford, Anglican priest, and curator of the Ashmolean Museum. He stood a middle ground between the uniformitarianism<sup>26</sup> of James Hutton and Charles Lyell and the more conservative catastrophism.<sup>27</sup> The setting of Buckland's "Special Lecture" portrays the world of science which still limited entry to "gentlemen" but also indicates the changes wrought by methods of inquiry that would within decades open this world to professionalism. The visual array of stratigraphy illustrated here represents cutting-edge method and graphic technology for its time, but also admits of the acceptance such means had already found. The section drawing, so apparently central to Buckland's lecture, would hereafter serve geology as it had served botany and anatomy before. Geddes' "Valley Section" one hundred years later would acknowledge the development of thought concerning processes at work in the formation of cultural geography. He borrowed the graphic language of geology in so

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<sup>24</sup> William Buckland (1784-1856) English theologian, geologist and paleontologist. Member of the Royal society and President of the Geological society of London.

<sup>25</sup> Wilhelm Gottlieb Tilesius von Tilenau (1769-1857) German naturalist, physician and draftsman.

<sup>26</sup> Uniformitarianism was a doctrine proposed by Hutton which claimed that natural processes have been uniform over time

<sup>27</sup> Catastrophism was a doctrine that proposed that sudden and catastrophic events, such as floods, account for disruption in the geologic and fossil record. Cuvier was a proponent.

doing, but this is a relative macro-world, and the influence of section would come to him also from the micro-world.

### The Microscope

*A few senior men came in from time to time, but could not force their minds into the new groove. Dr Ogle, applying his eye to microscope, screwed a quarter inch right through the object; and Dr Kidd after examining some delicate morphological preparation, while his young colleague [Acland] explained its meaning, made answer first that he did not believe it, and secondly, if it were true he did not think God meant us to know it.<sup>28</sup>*

In the course of the nineteenth century, as science itself departed the realm of natural philosophy to become a profession of codified practices, its instruments too were relieved of magical qualities which were replaced by transparent technique. The eye, long held in abeyance, gained privilege along with the scalpel revealing a world hitherto mysterious and unseen. The microscope, originally a toy of the curious amateur, had become an instrument of science, contributing and subject to discourse in which experimentation displaced conjecture. At the same time that discoveries in the *kleinewelten* challenged orthodoxy, developments in microscopy paralleled debate concerning objective truth and truth to nature. Situated at the cleavage of rationalism and empiricism, microscopical science sought instrumental techniques which reduced the effects of mediation to achieve mechanical neutrality. Numerous publications reported, not only the discoveries of this viewing lens, but promoted discourse on improved techniques for its utilization. By the time that Geddes arrived in London to study biology with Thomas Huxley in 1875, the microscope was a standard instrument of the laboratory, and Geddes' initiation to methods of science centered around this tool of inquiry and its means of utility. It is here argued that the techniques of microscopy inform Geddes' approach to the science of cities -- his Outlook Tower in particular is in a sense a microscope writ large -- and so an examination of the specific concerns of the use of the microscope supports an understanding of his later work.

Early microscopes had appeared in the 17<sup>th</sup> century. In his diary, Samuel Pepys<sup>29</sup> notes the purchase of a microscope in August of 1664: " There comes also Mr. Reeves, with a microscope and scotoscope. For the first I did give him L5 10s., a great price, but a most curious bauble it is, and he says, as good, nay, the best he knows in England, and he makes the best in the world." That same evening he adds, "Thence home and to my office, wrote by the post, and then to read a little in Dr. Power's book of discovery by the Microscope to enable me a little how to use and what to expect from my glasse."<sup>30</sup> The book to which he refers is Henry Power's 1664 *Experimental Philosophy*

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<sup>28</sup> Tuckwell, William (1908) *Reminiscences of Oxford*. Cassell. London. P 46.

<sup>29</sup> Samuel Pepys (1633-1703) English Member of Parliament and Secretary to the Admiralty. A diarist, his journal provides significant detail of the fire of London of 1666 and the plague years.

<sup>30</sup> Pepys, Samuel (1942) *The Diary of Samuel Pepys*. Henry B. Wheatley, ed. the Heritage Press. New York. Pp 211-212.

*in three books containing new experiments Microscopical, Mercurial, Magnetical.* Powers writes in his preface,

...this advantageous Artifice of Glasses...furnish'd our necessities with such artificial Eys, that now neither the fineness of the Body, nor the smalness of the parts, nor the subtilty of its motion, can secure them from our discovery... without some such Mechanical assistance, our best Philosophers will prove empty Conjecturalists, and their profoundest Speculations herein, but gloss'd outside Fallacies; like our Stage-scenes, or Perspectives, that shew things inwards, when they are but superficial paintings.<sup>31</sup>

His microscopical observations are of common household pests and insects, bringing to the eye, with the advantage of magnification, the details of such organisms. There seems to be no reference to cutting sections, though he does mention that he has severed a spider's head before placing it on the viewing platform. One year later, in 1665, Robert Hooke published *Micrographia*. In this book he described cutting a section of cork for examination:

I took a good clear piece of cork, and with a pen-knife sharpened as keen as a razor, I cut a piece of it off, and thereby left the surface of it exceeding smooth, then examining it very diligently with a microscope, me thought I could perceive it to appear a little porous...I with the same sharp pen-knife, cut off from the former smooth surface an exceeding thin piece of it, and placing it on a black object-plate, because it was itself a white body, and casting the light on it with a deep plano-convex glass I could exceeding plainly perceive it ...<sup>32</sup>

Hooke's description of slicing a section is a rare example in his *Micrographia*; more often, his examinations are of the surface of objects. (Figure 2.15) Only when he examines marble and charcoal does he observe the interior of specimen, breaking the stone to see below the surface: having boiled marble in turpentine, "and then break off a part of it, you shall find the unctuous body to have penetrated it to such a determinate depth every way within the surface.." <sup>33</sup> And when he examines charcoal: "...if you take a small round charcoal, and break it short with your fingers, you may perceive it to break with a very smooth and sleek surface...this surface, if it be look'd on with an ordinary microscope,

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<sup>31</sup> Power, Henry (1664) *Experimental Philosophy in three books containing new experiments Microscopical, Mercurial, Magnetical*. London. Preface.

<sup>32</sup> Hooke, Robert (1665)(1961) *Micrographia or Some Physiological Descriptions of Minute Bodies Made by Magnifying Glasses with Observations and Inquiries thereupon*. Dover Publications, Inc. New York. P 112-113.

<sup>33</sup> *Ibid.* P 97.

does manifest of those pores which are also visible to the eye in many kinds of wood, rang'd round the pith, both in a kind of circular order, and a radiant one.”<sup>34</sup>

Departing the examination of surface appearance, one of the earliest publications to include illustrations of microscopical examination of sections was Nehemiah Grew's *The Anatomy of Plants begun as a philosophical history of plants*, published in 1682. Grew was a contemporary of Robert Hooke, and they were both members of the Royal Society. Grew was hired by the Society to investigate plant anatomy, and his methods established the standard for observation in botany. Significantly, his detailed observations of the inner structures of plants led to a proposal that plants, like animals, are organisms with internal organs, the functions of which can be understood without resort to notions of sympathy.<sup>35</sup> In writing of the *means* of plant anatomy, he dismisses the *end* of the pleasure found in outward appearance, since, without the aid of dissection, inward structures remain unseen by most, and argues that these inward structures have as an end the function of the plant:

...for when upon the dissection of Vegetables, we see so great a difference in them, that not only their Outward Figures, but also their Inward Structure, is so elegant; and in all so Various; it must leads us to Think, that these Inward Varieties, were either to no End, or if they were, we must assign to what...which, are, therefore, such as have respect to Vegetation: That the Corn might grow, so; and the Flower, so, whether or no Men had a mind, leisure, or ability, to understand how.<sup>36</sup>

This mechanistic view would be the basis for plant morphology. He described his method of observation in which the section cut is key:

...to do all this by several ways of section, oblique, perpendicular, and trans-verse; all three being requisite, if not to observe, yet the better to Comprehend, some things. And it will be convenient Sometimes to Break, Tear, or otherwise Divide, without a Section. Together with the Knife it will be necessary to joyn the Microscope; and to examine all the Parts.<sup>37</sup>

Grew's publication details his observations of plants, "having thus begun with the bare Eye, I next proceeded to the use of the Microscope," and carefully describes their inner structures. He draws analogies to animals, and, often, lace or other needlework in proposing the function of structures:

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<sup>34</sup> Ibid.P 100.

<sup>35</sup> Bolam, Jeanne (1973) "The Botanical Works of Nehemiah Grew, FRS". *Notes and Records of the Royal Society of London*. Vol27. No 2. Pp 219-231.

<sup>36</sup> Grew, Nehemiah (1682) *An Idea of a Philosophical History of Plants Read before the Royal Society January 8 and January 15, 1672*. W. Rawlins, London. P 9.

<http://biodiversitylibrary.org/item/12#page/22/mode/1up>

<sup>37</sup> Ibid.

I come next to observe the several Parts, whereof the leaf is composed: and first the skin. This being striptd off the leaf, although to the bare eye it looks no otherwise than a skin of Issinglass: yet being viewed through a good glass, with a clear and true Light, and with an advantageous Position, it appears to consist not only of Organical Parts, as do the skins of Animals; but these also regularly mixed together; that is, of Parenchymous and Lignous fibres, all very curiously interwoven as it were, into a piece of admirably fine white sarcinet; as in Flag, Tulip, and the like.<sup>38</sup>

Like Hooke in his *Micrographia*, Grew included illustrations, and these are the first illustrations of sections of plants to appear in print. (Figure 2.16, 2.17, 2.18, 2.19) The format of his illustrations became the standard for botanical illustrations, and he describes in his writing the choice he made in the layout:

In the plates, for the clearer conception of the part described, I have represented it, generally, as entire, as its being magnified to some good degree, would bear. so, for instance, not the Barque, Root, or Pith of a Root or Tree by itself; but at least some portion of all three together: Whereby both their Texture, and also their Relation one to another, and the Fabricke of the whole may be observed at one view.<sup>39</sup>

Geddes would use a similar format for the illustration of his first published paper two hundred years later. (Figure 2.20) As with stratigraphical sections in geology, the section cut and illustrations in botany established a graphic language for the discipline, and Geddes would incorporate this visual language as he devised the new science of town planning.

By the late nineteenth century the microscope was fixed in the laboratory, but for most of the seventeenth and eighteenth centuries, the expense of microscopes and quality of lenses meant it was, as Pepys had described "an expensive bauble," more like a toy for the wealthy and then a device for entertainment, than a tool of scientific inquiry. In a mid-eighteenth century treatise, Louis Joblot provides an illustration of the natural philosopher in his study, examining specimen by microscope in the light of his study window (Figure 2.21). By the early decades of the nineteenth century, the microscope and display of its wonders had joined the culture of exhibition, as an announcement for a public exhibition of "The Wonders of Nature" in 1827 shows. (Figure 2.22) In 1844 Henry Acland was made Reader of Anatomy at Christ Church, Oxford University and introduced the microscope to study there:

In Oxford or out of it, Invertebrate Zoology was a subject little studied, and while microscopes were costly and imperfect, could not be generally carried out. A comparative anatomist, however, Dr. Acland determined to

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<sup>38</sup> Ibid.. P 153.

<sup>39</sup> Ibid.

be...Appointed to the Christ Church Chair, he amassed slides and preparations, introducing the first microscope which had been seen in Oxford....The [anatomy] lectures began in 1845; they were delivered in the downstairs theater, whence we ascended to the room above, to sit at tables furnished with little railroads on which ran microscopes charged with illustrations of the lecture, alternately with trays of coffee.<sup>40</sup>

The setting of zoological instruction had changed little by 1875 when Geddes arrived in London to study under Thomas Huxley at the London School of Mines. Author H.G. Wells followed Geddes as a student of Huxley, arriving in 1884. To Wells we owe descriptions of the setting and the particulars of the routine of study:

Outside the laboratory windows was a watery-grey fog, and within a close warmth and the yellow light of the green-shaded gas lamps that stood two to each table down its narrow length. On each table stood a couple of glass jars containing the mangled vestiges of the crayfish, mussels, frogs, and guinea-pigs upon which the students had been working, and down the side of the room, facing the windows, were shelves bearing bleached dissections in spirits, surmounted by a row of beautifully executed anatomical drawings in white-wood frames and overhanging a row of cubical lockers. All the doors of the laboratory were panelled with blackboard, and on these were the half-erased diagrams of the previous day's work. The laboratory was empty, save for the demonstrator, who sat near the preparation-room door, and silent, save for a low, continuous murmur and the clicking of the rocker microtome at which he was working.

In the course of study of zoology, students attended lectures, followed by practical demonstrations in the adjacent laboratory. A demonstrator guided students through techniques of dissection, slide preparation and microscopical examination, which was documented by drawings of observations.

When I had gone into the zoological laboratory upstairs, I had been confronted by a newly killed rabbit; I had begun forthwith upon its dissection and in a week or so I had acquired a precise and ample knowledge of mammalian anatomy up to and including the structure of the brain, based upon my dissections and drawings and a careful comparison with prepared dissections of other types.<sup>41</sup>

At night, students transcribed their lecture notes. Geddes' transcription records Huxley's lectures of 1875 (Figures 2.23, 2.24) and include section drawings,

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<sup>40</sup> Tuckwell, The Rev. W (1900) *Reminiscences of Oxford*. Cassell and Company, Ltd. London. P 45.  
<http://archive.org/stream/reminiscencesof00tuck#page/n9/mode/2u>

<sup>41</sup> Wells, H. G. (1934) *Experiment in Autobiography: discoveries and Conclusions of a Very Ordinary Brain (since 1866)*. The Macmillan Company. New York. P 171.

presumably copied from those drawn by Huxley. (Figures 2.25, 2.26, 2.27, 2.28, 2.29, 2.30, 2.31). These section drawings show the interrelatedness of systems within an organism, as explained by J. G. Woods (who had been Acland's "dissector" at Oxford) in *Common Objects of the Microscope*, first published in 1899: "No method of examination can equal, for usefulness, that of section-work. The relation of the parts to each other being preserved, it is possible to draw conclusions as to their actual relations which no other mode will allow."<sup>42</sup>

Using the microscope to examine specimen, Geddes would have learned to adjust the focal length of the apparatus to reveal layers within even shallow samples. A drawing of such an examination appears in his first publication of 1878, *On the Life-history of Spirillum*, (Figure 2.20) where he notes that "by careful focussing, the apparent spore is resolved..."<sup>43</sup> At the microscopic scale, layers come into view as the microscope is finely adjusted. While only one layer may be in focus at a time, it is easily observed that objects within the sample remain in layers above and below, obscured as they exit the focal depth. Observation is of successive horizontal sections, just as one might compare successive floor plans in an architectural set. Wells described the significance of microscope adjustment in his short story, "A Slip Under the Microscope":

It was a preparation under the microscope, a little glass slip, held in its place on the stage of the instrument by light steel clips, and the inscription set forth that the slip was not to be moved. Each student was to go in turn to it, sketch it, write in his book of answers what he considered it to be, and return to his place. Now, to move such a slip is a thing one can do by a chance movement of the finger, and in a fraction of a second. The professor's reason for decreeing that the slip should not be moved depended on the fact that the object he wanted identified was characteristic of a certain tree stem. In the position in which it was placed it was a difficult thing to recognise, but once the slip was moved so as to bring other parts of the preparation into view, its nature was obvious enough.<sup>44</sup>

Use of the microscope demanded particular skills, not the least of which was learning to "see" through this device of mediation. Equally important were a number of steps involved in the preparation of specimen for viewing. So that specimen were not destroyed, that is crushed or distorted, by cutting, it was necessary to treat material with some agent that would preserve rigidity. Paraffin and alcohol were among those agents, and the method of freezing also had adherents. Staining enhanced contrast for

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<sup>42</sup> Wood, J. G. (1949) *Common Objects of the Microscope*. Routledge and Kegan Paul. London. P 179.

<sup>43</sup> Geddes, Patrick and J. Cossar Ewart (1878) "On the Life-history of Spirillum". *Proceedings of the Royal Society of London*. Vol 27. Pp 481-485.

<sup>44</sup> Wells, H. G. (1896) (2004) "A Slip Under the Microscope". *The Selected Stories of H. G. Wells*. The Modern Library. P 5.

<http://www.online-literature.com/wellshg/2877/>

viewing a specimen, but also reacted chemically with a specimen to reveal the composition of structures under study, and various staining agents were promoted.<sup>45</sup> These agents could be introduced before or after the section was cut, and before the section was mounted on a slide.

To examine the test of an Ascidian for cellulose, I find the best way to be, to take a very thin section and moisten it with a strong solution of iodine in iodide of potassium. After being thoroughly impregnated with the iodine, the superfluous fluid should be drained off, and the segment carefully *blotted* with the finger (or hair pencil). A handkerchief or blotting-paper may readily give rise to error by leaving behind small fragments or vegetable fibre. A drop of sulphuric acid, as strong as can be procured, should now be added. If much cellulose is present a deep blue colour will appear immediately, beginning at the edges of the slice if there be but little, the colour will not appear for some time. The application of the test requires some care; and while its success is most valuable evidence of the *presence* of cellulose, its failure is not by any means negatively conclusive, unless the experiment has been frequently and carefully repeated.<sup>46</sup>

Even the cutting of specimen was subject to technical debate. The microtome was invented in the late 18<sup>th</sup> century and was a device by which thin sections of specimen could be cut. Previously, sections had been cut by hand, and that practice continued, with debate regarding the efficacy of method: "Such great manual dexterity was developed in cutting free-hand sections, that mechanical instruments were thought to be only for those who could not make good free-hand sections."<sup>47</sup> Sections prepared for examination under the microscope had to be sufficiently thin that light could pass through them, so as to illuminate structures of the organism. Wells refers to this necessity in a short story, "A Slip Under the Microscope": "...in the afternoon was the practical examination, when sections had to be cut and slides identified... Hill was depressed because he knew he had cut a thick section..."<sup>48</sup> The mechanical microtome allowed the operator to set the thickness of cut, like a plane in the wood shop, and also allowed a means of making multiple cuts of consistent thickness:

The microtome consisted of three parts a central block and a separate carrier for the material and the knife. The central block had a base

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<sup>45</sup> Smith, Gilbert Morgan (1915) "The Development of Botanical Microtechnique". *Transactions of the American Microscopical Society*. Vol 34. No 2.

<sup>46</sup> Huxley, T.H. (1853) "Observations on the existence of cellulose in the Tunic of Ascidians". *The Journal of Microscopical Science*. January.

<sup>47</sup> Smith, Gilbert Morgan (1915) "The Development of Botanical Microtechnique". *Transactions of the American Microscopical Society*. Vol 34. No 2. P 93.

<sup>48</sup> Wells, H. G. (1896) (2004) "A Slip Under the Microscope". *The Selected Stories of H. G. Wells*. The Modern Library. P 5.

measurement of 16 by 6 cm, and a height of 6 cm. On either side of this block there were wedge shaped grooves so that the middle upper portion was only 13 mm. in thickness. The groove at the left had a slope of 1:100, whereas the right hand groove was parallel to the top of the instrument. On the top of the middle portion there was a scale parallel to the sloping left hand groove, and this was divided so that each division corresponded to a vertical elevation of 1:100 of a millimeter. A block that was fitted in the right hand groove carried the knife and another in the left hand sloping groove carried the object holder... The microtome was operated by drawing the knife towards the operator and then shoving ahead the block in the inclined groove the desired distance, the height which the block was raised being computed from the scale at the top of the micro-tome. After drawing the knife forward the process was repeated.<sup>49</sup>

The glass slide originated as a piece of ivory or bone upon which specimen were then covered with a thin slip of mica. The specimen was then slid between the stage of the microscope and the viewing lens, hence “sliders” which were then called “slides” by the time that the Royal Microscopical Society introduced glass as the mounting platform. The selection of preservation and mounting media was based upon refractive qualities similar to glass, as transparency was the objective. Once preserved, stained, cut, and applied to a glass slide, the specimen was then sealed, and various methods of sealing mountings were promoted in the professional literature of the nineteenth century. Commercially prepared slides could be purchased by both the amateur hobbyist and professional microscopists, and were covered by decorative papers which served to seal the slip in place over the specimen. These papers might indicate the name of the preparer as well as the name of the specimen. Though the slip was typically a square piece of glass, the viewing “window” as revealed by an opening in the paper, was most often circular.<sup>50</sup> Author H. G. Wells describes the setting of production:

...I made my sketches under the Bloomsbury Dome and enlarged them as diagrams in a small laboratory Jennings shared with a microscopist named Martin Cole in 27 Chancery Lane. Cole, at the window, prepared, stained and mounted the microscope slides he sold, while I sprawled on a table behind him and worked at my diagram painting. Cole's slides were sold chiefly to medical students and, neatly arranged upon his shelves were innumerable bottles containing scraps of human lung, liver, kidney

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<sup>49</sup> Smith, Gilbert Morgan (1915) “The Development of Botanical Microtechnique”. *Transactions of the American Microscopical Society*. Vol 34. No 2. P 107-108.

<sup>50</sup> It is unclear why this should be so. The literature includes descriptions and illustrations of tools which allow for ease in rotating slides for the circular application of sealing cements, but there appears to be no justification for this practice. Perhaps it was simply “easier” to apply cement uniformly in a circular manner, or the practice involved a particular understanding of a relationship between the circular lens and the specimen on view.

and so forth, diseased or healthy, obtained more or less surreptitiously from post mortems and similar occasions.<sup>51</sup>

Far from being a device of "objective truth," the microscope required the viewer to make a number of determinations which colored the outcome of observation. Geddes would readily acknowledge this mediation when he described his efforts to teach visitors "to see" at the Outlook Tower. "We only see what we bring the means of seeing," he quoted in a 1905 publication.<sup>52</sup> Preparation of specimen and techniques of microscopy would be performed on a larger scale at the Outlook tower, and the section was a particular means put to use by Geddes as he developed the new science of town planning.

A series of sections in Geddes' 1875 lecture notes show the stages of development of an aquatic plant, *N. flexilus* (Figure 2.29). Similar drawings appear in a series of notes from 1902, titled "Social Notations." Here, Geddes has borrowed the graphic language of botanical sections as he develops relationships between social systems. (Figure 2.32 - 2.46) Like drawings of flowers in section, he has instead labeled "plant parts" as though they are components in social organization. Again, the sections serve to indicate relationships both temporal and geographical, illustrating historical and regional evolution of social constructs. These sets of drawings show the way in which Geddes made use of the section drawing to organize his ideas and the effectiveness of the section to indicate spatial and temporal relationships. Like his earliest biology section drawings, they show the interrelatedness of systems within an organism, whether that organism is a plant, or a larger social structure. The drawings are notated and it is evident that here he is working on an organization of thought which correlates principles from botany with those of his developing ideas of sociology. The first, title page includes a diagram of a tree, labeled "Arbor Saeculorum," which is variously translated as "tree of generations," or "tree of centuries." (Figure 2.32) The diagram is not unlike Darwin's "tree of life" illustration from his notebook, which was the basis of the only illustration to appear in *On the Origin of Species*. (Figure 2.47). Darwin's notes indicate that the diagram illustrates gaps between generations, the necessary extinction which would occur in those gaps, and a relation between branches. For Geddes, too, the symbol serves to stand in for an evolutionary process. To the left of the drawing he has paired "muscle" with "labour," "circulation," "heart," "furnace" and "money," and "nerve" with "thought." He notes then, "compare Organicists" over "Schaffle." Albert Schaffle was a German political economist who, like the organicists of the late nineteenth century, chose to consider the political body as like the physical body.

There are amorphous connective tissues, social bonds that reflect common ethnicity, territory, language, beliefs, and the like. And there are

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<sup>51</sup> Wells, H. G. (1934) *Experiment in Autobiography: Discoveries and Conclusions of a Very Ordinary Brain (since 1866)*. The Macmillan Company. New York. P 257.

<sup>52</sup> Geddes, Patrick (1905) *The World Without and the World Within: Sunday Talks with My Children*. Saint George Press. Bournemouth. George Allen. London. P 4.

functionally differentiated tissues. Networks of residential communities correspond to skeletal tissues. Police and fortifications comprise protective tissues like the epidermis of animals. Households, which circulate nutritive materials, comprise society's capillary tissues. Social formations that mobilize the body social for external action correspond to muscular tissues. Nerve fibers are represented by various means of symbolic communication. Societal organs are formed from varying combinations of these five types of functional tissues.<sup>53</sup>

Geddes frames his notes on social development with this organic metaphor, continuing to diagram ideas by use of section drawings. On a page labeled "Classification of the Sciences -- The Flowering of Thought," he has drawn vaguely organic shapes which suggest the cross section of neuron or plant embryo, triangular in shape so as to accommodate his "place, work, folk" triad. (Figure 2.34) In the second image, he has paired "physical" with "place," "organization" with "work," and "social" with "folk." To the right he has drawn a diagram with "physical, organization and social" connected by arrows, then connected again to "aesthetic, psychological and ethical." The arrows suggest a dynamic relationship between these forces, and he then experiments with the diagram of a plant stem, the divisions of the earlier diagram becoming the growth nodes of the stem. Finally, "physical, organization, social, ethical, psychological and aesthetic" are written along the stem. Geddes continues to explore this organic metaphor through the set of "Social Notation" sheets, drawing a flower in transverse section, and applying the labels "aesthetic, physical, social, hygienic, industrial" to interior layers. (Figure 2.40) On the bottom right of this image he has called out "ethical, social, psycho-physical, biol." To the right of this is a cross-section in which he has labeled layers "physical, social, ethical, psych., art." Finally, he has diagrammed "pl/wk/fa/fa/work/pl." Presumably, though abstracted, the flower-parts in these drawings represented specific functions and processes known to Geddes, and he is working out an analogous relationship between biological organs and social organs, likening the biological organism to the social organism. Using a flower, the diagrams can be understood to be dynamic, with the relation of specified forces resulting in growth. By use of the section, he can peer into the organism and indicate the interrelatedness of organs, while also representing time.

On another sheet he departs the use of the flower diagram (Figure 2.38), and like Darwin's "tree of life" uses a branching diagram to oppose "life" and "death" forces. As in Darwin's diagram, the forces of "death" result in extinction, with those of "life" continuing to branch out. So here, "persistence" is opposed to "decay," "permanent" to "denudation," "helpful" to "retardative." "Helpful" leads to "supreme idealism Parthenon," and along another branch, "fundamental ability megalithic stones to brick buildings. bench walls at Alexandria. Celtic crosses to Cathedrals." In the middle of the

<sup>53</sup> Levine, Donald N. (1995) "The Organism Metaphor in Sociology". *Social Research*. Vol 62. No 2. Pp 248-249.

page he has written "Decay," branching to "fert.?" and "poisonous," beside his "Valley Section" symbol, under which is written "Levant." At the bottom of the sheet he has written "Hence the extraordinary value and significance of art.-criticism to historian and biologist." Beside this he has added, in red crayon, "Biol. Haddon & ornament."<sup>54</sup> Consistent with a broad range of thinkers of the time, Geddes equates development with progress from the primitive to the "cultured." This is evident in another sheet (Figure 2.41) wherein he has labeled successive plant layers with "Animal Life," "Animal Societies," "Primitive Societies," and "Cult. Societies." On the opposite side of the diagram his successive labels are "physical, biological, psycho-physical, social, ethical, psychological, artistic." As with his branching diagram, progress and culture lead to material and artistic expression.

His organic triad appears again in a later sheet (Figure 2.44) with "aesthetic, ethical, psychological" appearing inside the organism, and "physical, social, organic acting" corresponding externally. Beneath "organic acting," is written "will" with an arrow pointing outward, and beneath that "vivendo discimus" (by living we learn), and beneath that "ago ergo cogito" ( I act therefore I think). Clearly, the social organism is not a "passive " inheritor of qualities, but an organism actively engaged in the construction of self. The idea of the organism "progressing" over time while also having an active role in development, is a blend of the theory of evolution proposed by Jean-Baptiste Lamarck and the social theory of Herbert Spencer. While Darwin proposed that diversity of species was a result of adaptive response to environmental conditions with success governed by natural selection of those species best fitted for their environments, Lamarck viewed diversity as an indicator of the increasing complexity of organisms and their adaptability, both driven by internal forces. For Lamarck it was in the nature of the organism to favor the inheritance of increasing complexity and to respond adaptively to conditions of habitat. For Geddes this was a convenient construct which allowed for the "culture" associated with ethics and aesthetics. Spencer proposed the social organism as "super organic," in which like any organism "...from the lowest living forms upward, the degree of development is marked by the degree in which the several parts constitute a co-operative assemblage." As Geddes blends these two proposals to describe "Cultural Societies," the section serves to describe internal forces as well as progress over time.

The parallels between plant, animal, man and cities is illustrated in an undated "thinking machine." (Figure 2.48) Folded paper creates four vertical columns, each one headed

<sup>54</sup> Alfred Cort Haddon (1855-1940) was a biologist who studied geology and zoology and founded the school of Anthropology at Christ's College Cambridge. His time as a student at Cambridge in 1875 coincided with Geddes' time there, and both did research at the zoological station at Naples at approximately the same time. Haddon collected ethnographical specimen on the Torres Islands and at the time of these notes of Geddes' (1902) he had published *Decorative Art of New Guinea* (1894), *Evolution in Art* (1895), *The Study of Man* (1898), *Head Hunters: Black, White and Brown* (1901). In 1900 he was made Lecturer in Ethnology at Cambridge University. He later published work on the study of "cat's cradle" string figures.

"Evolution of Flowering Plants," "Evolution of Animals," "Evolution of Life and Man," and "Evolution of Cities," respectively. In the first, "flowers" column, he has written, "What are flowers?" "Why beauty? and whence fruit?" "Past theories. Process of reproduction and sex. Arab. to Guilds."<sup>55</sup> "Sprengel"<sup>56</sup> to Darwin and successors." "How continue evolution?" In the next, "animals" column is written "What are animals? How did they arise? Pre-Darwinian theories: Lamarck to Chambers. Darwin and the Darwinians (Huxley, Haeckel)<sup>57</sup>. Weisman<sup>58</sup> and Neo-Darwinians. Spencer and Neo-Lamarckians. Personal theories: Evolution of Sex and its consequences. How continue animal evolution?"

The third, "Life and man" column begins with "What is life? What is mind" How are these related? Some recent advances in bio-psychology. Suggested methods of study: KR and personal Ø. How continue the evolution of life and mind whither? Education. Social hygiene. Eugenics. Education. Possibilities of human life: Animal. Individual. Citizens."

The final column, "Evolution of Cities" begins like the others, "Where towns and cities arise, and how?", followed by "What has been the mainstream of this historic solution? How shall we interpret this? Methods of study. Personal schemes [or themes]. Civic evolutions -- whither? How we are influence this on up-grade or down? Civic evolution - - whither -- [ward]: How we are influencing this, on up and down grade. The history of sociology: Civics is applied Sociology."

This card shows most clearly Geddes' endeavor to cross disciplines with methods familiar to him from the biological sciences. He was engaged in the formation of a new science, that of sociology, and since cities and towns were, for him, the "flowering" of the evolution of man, town planning should lend itself to the methods of science. It is noteworthy that though he readily acknowledges "theories" in both the "Evolution of Flowering Plants," and "The Evolution of Animals," he refers to no theories but those of the personal for both "The Evolution of Life and man" and "The Evolution of Cities." No doubt he was developing his own theory, and the working out of that has been seen in his "Social Notations." His willingness to borrow and apply the graphical language of one discipline to another is consistent with the tenets of Positivism as outlined by

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<sup>55</sup> It is not quite clear what Geddes intends by "Arab. to Guilds." The Koran mentions plant pairs and he may be referring to that. "Guilds" in the world of plant pollination are types of pollinators (bees, spiders, etc.).

<sup>56</sup> Christian Konrad Sprengel (1750-1816) German who study the pollination of plants by insects, published *The Mystery of Nature Discovered in the Construction and Pollination of Flowers* (1793).

<sup>57</sup> Ernst Haeckel (1834-1919) German biologist. Professor of comparative anatomy at University of Jena where Geddes met him in 1886.

<sup>58</sup> August Weisman (1834-1914) German evolutionary biologist. Rejecting Lamarck's theories, he was initially a supporter of Darwin's theories of inheritance, but then devised the theory of germ plasm. Publications: *Essays Upon Heredity* (1889), *Germ Plasm: A Theory of Heredity* (1893)

Auguste Comte in his *Cours de Philosophie Positive* of 1830-42.<sup>59</sup> John Stuart Mill claims for philosophy that Comte was “the first who has attempted its complete systematization, and the scientific extension of it to all objects of human knowledge.”<sup>60</sup> Comte’s *Classification of the Sciences* was to influence Herbert Spencer and Charles Sanders Peirce. A hierarchy of disciplines begins with astronomy and successively moves through physics, chemistry, physiology, and culminates in the new science of social physics. Each successive discipline is characterized by diminished abstraction and increased complexity, and he claims an inverse relationship between determinacy and subjectivity.

Thus we have before us five fundamental sciences in successive dependence – astronomy, physics, chemistry, physiology, and finally social physics. The first considers the most general, simple, abstract, and remote phenomena known to us, and those that affect all others without being affected by them. The last considers the most particular, compound, concrete phenomena, and those which are the most interesting to man. Between these two, the degrees of speciality, complexity, and individuality are in regular proportion to the place of the respective sciences in the scale exhibited. This – casting out everything arbitrary – we must regard as the true filiation of the sciences; and in it we find the plan of this work. As we proceed, we shall find that the same principle that gives this order to the whole body of science arranges the parts of each science; and its soundness will therefore be freshly attested as often as it presents itself afresh. There is no refusing a principle that distributes the interior of each science after the same method with the aggregate sciences...<sup>61</sup>

Classification was a fundamental practice in botany, and its relevance here is that the “classification of the sciences” was sought to provide an overarching system with consistent method. As has been shown in the application of systems of taxonomy, and general strategies of classification, various disciplines, when organized as “types,” could define a field, “the sciences.” With the field defined, Geddes seized the opportunity for the inclusion of the social sciences in the *schemata*. Making use of the visual language of geology and the technique of the section to demonstrate relationships between systems, as well as borrowing the protocols of the microscopy laboratory, this new science was organized by practices which lent it legitimacy. Town planning, which for Geddes was inexorably linked to sociology, could be advantageously positioned by adherence to the prescribed methods of science. By

<sup>59</sup> Comte, Auguste (1998) *The Essential Writings: Auguste Comte and Positivism*. Gertrud Lenzer, ed. Transaction Publishers. New Brunswick and London.

<sup>60</sup> Mill, John Stuart (1965) *Auguste Comte and Positivism*. University of Michigan Press. Ann Arbor. P 2.

<sup>61</sup> Comte, Auguste (1998) *The Essential Writings: Auguste Comte and Positivism*. Gertrud Lenzer, ed. Transaction Publishers. New Brunswick and London. P 96.

applying these methods he was establishing a framework of investigation consistent with the other sciences. He could well have been inspired by the words of Robert Knox, the great Scottish anatomist who is more famous as the client of the notorious body snatchers Burke and Hare:

Anatomy is not a science, but merely a mechanical art, a means to an end. It is pursued by the physician and surgeon for the detection of disease, and the performance of operations; by both to discover the functions of the organs; and by the philosopher with the hope of detecting the laws of organic life, the origin of living beings, and the transcendental laws regulating the living world in time and space.<sup>62</sup>

Like Knox, Geddes used the tools of science to investigate the laws of "organic life," and they served his philosophical bent of understanding the city within a larger social unity. By graphic and material means, he developed instruments for the study of this organism, and promoted a methodology by which the macro and micro city was brought into view.

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<sup>62</sup> Knox, Robert (1852) *Great Artists and Great Anatomists: A Biographical and Philosophical Study*. John van Voorst. London. Pp 141-142.  
<http://archive.org/stream/greatartistsand00knoxgoog#page/n160/mode/2up>

**IMAGES: CHAPTER TWO**

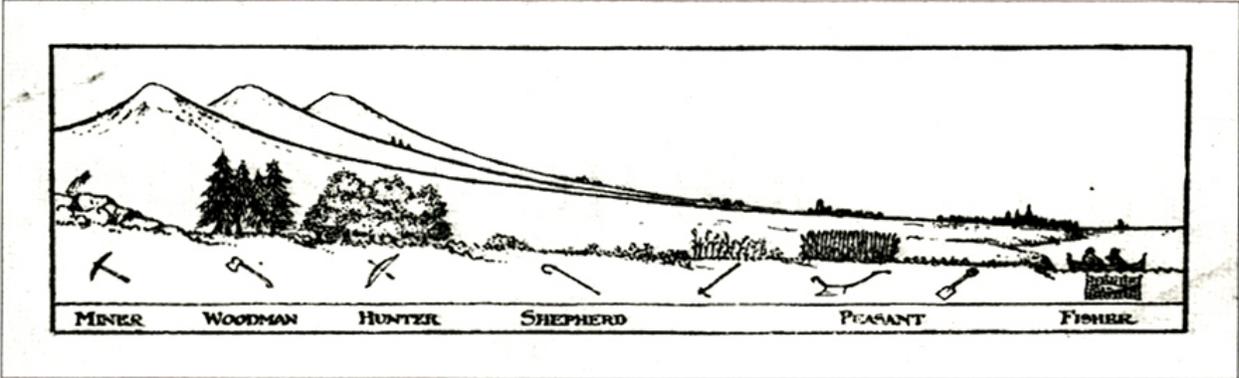


Figure 2.1: "The Valley Section"  
Source: University of Strathclyde Archives

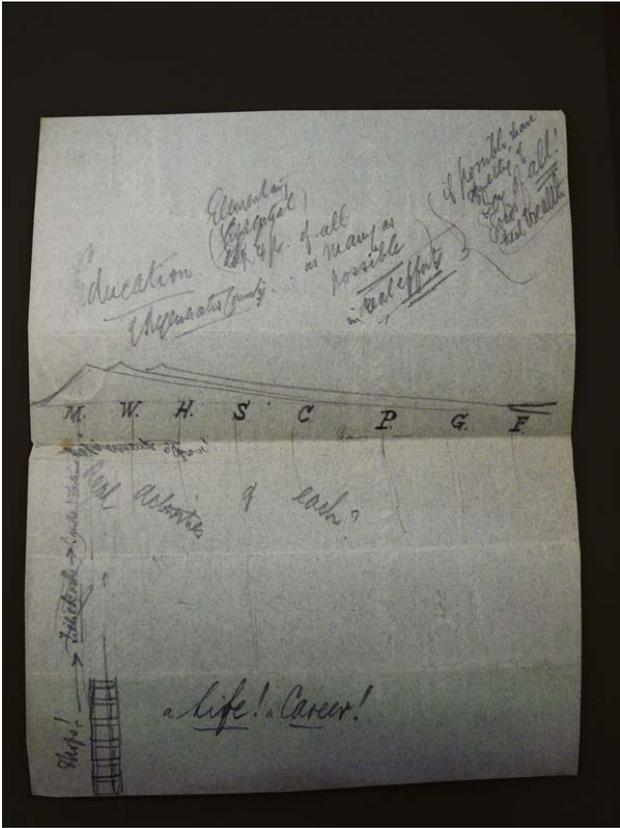


Figure 2.2: Valley Section thinking machine  
Source: University of Strathclyde Archives

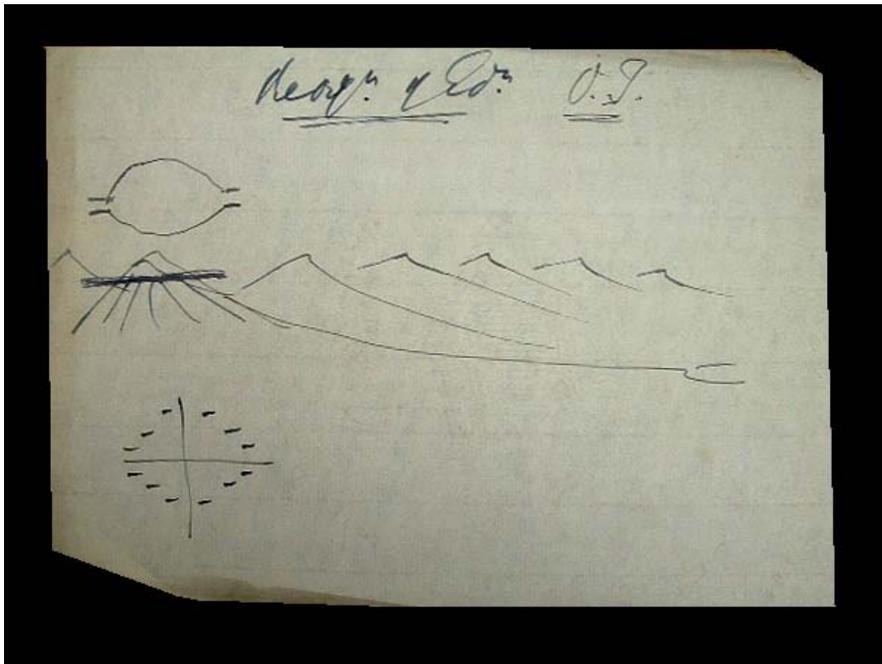


Figure 2.3: Valley Section thinking machine  
Source: University of Strathclyde Archives

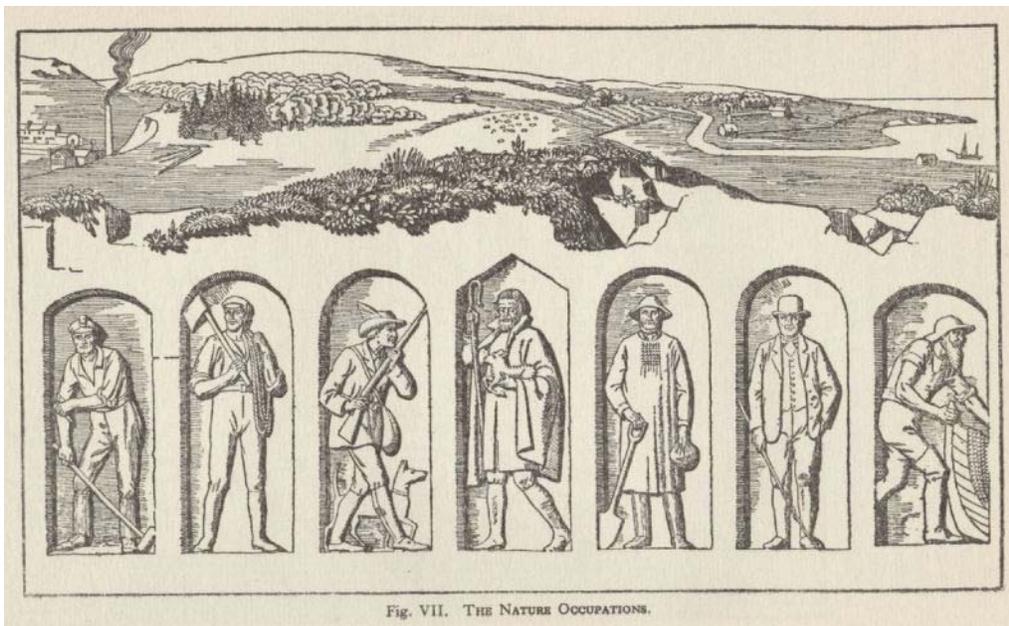
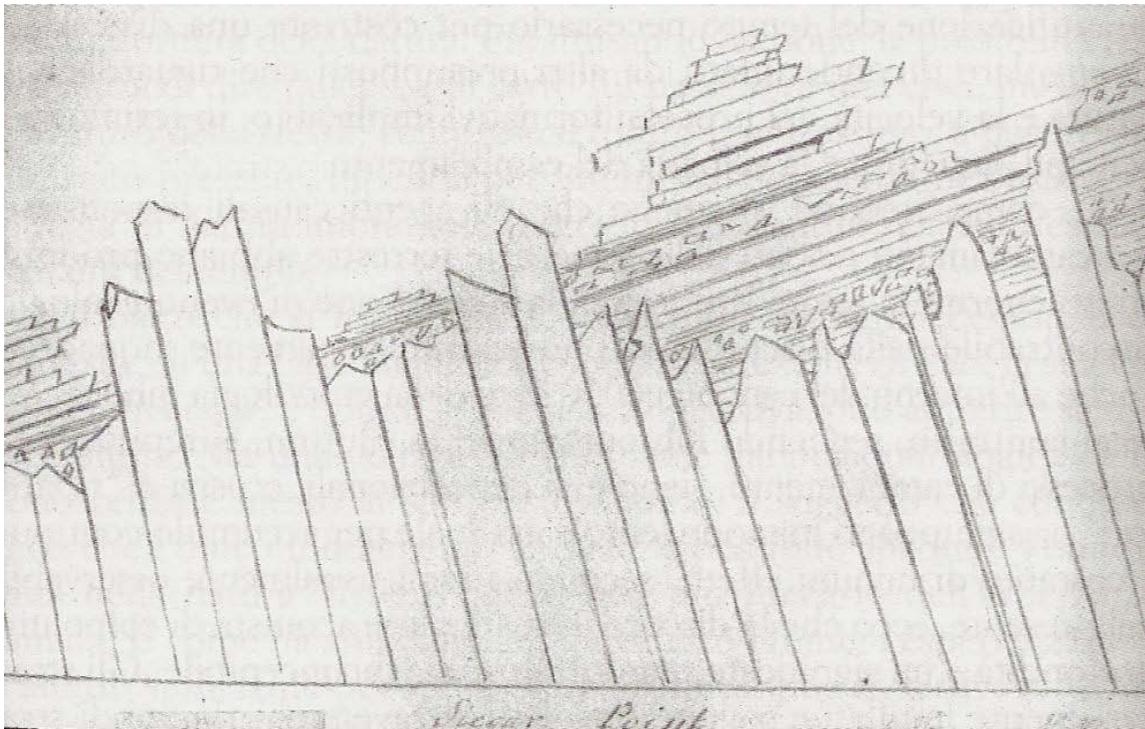
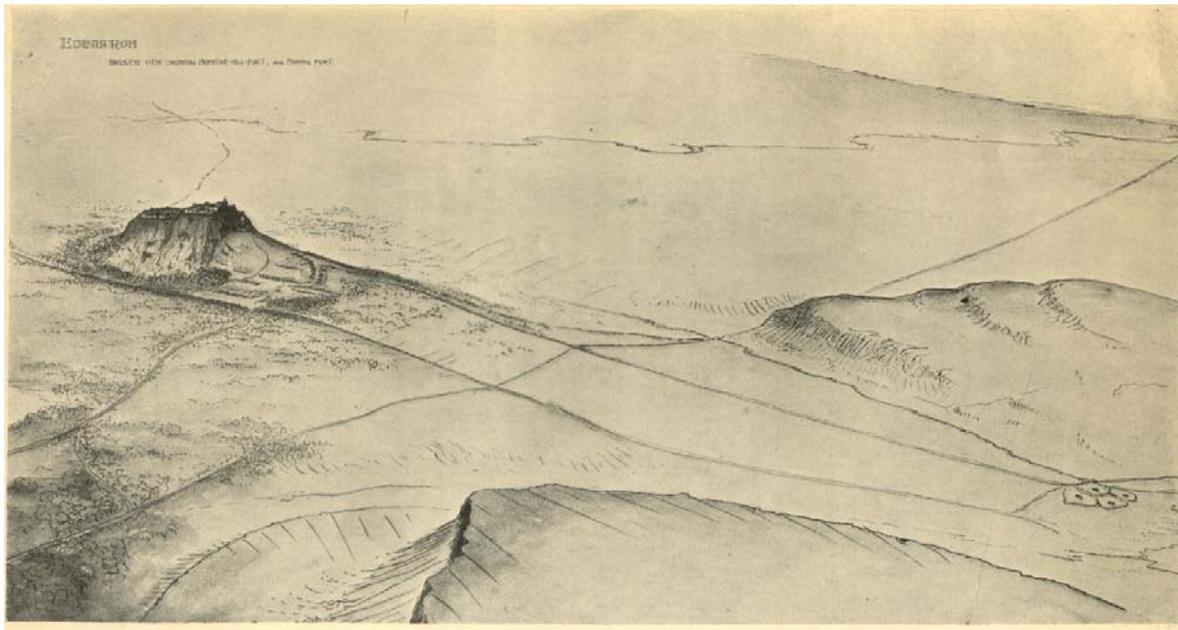


Figure 2.4: Valley Section occupations, *The Coal Crisis and the future*, 1926  
Source: Montpellier University Archives



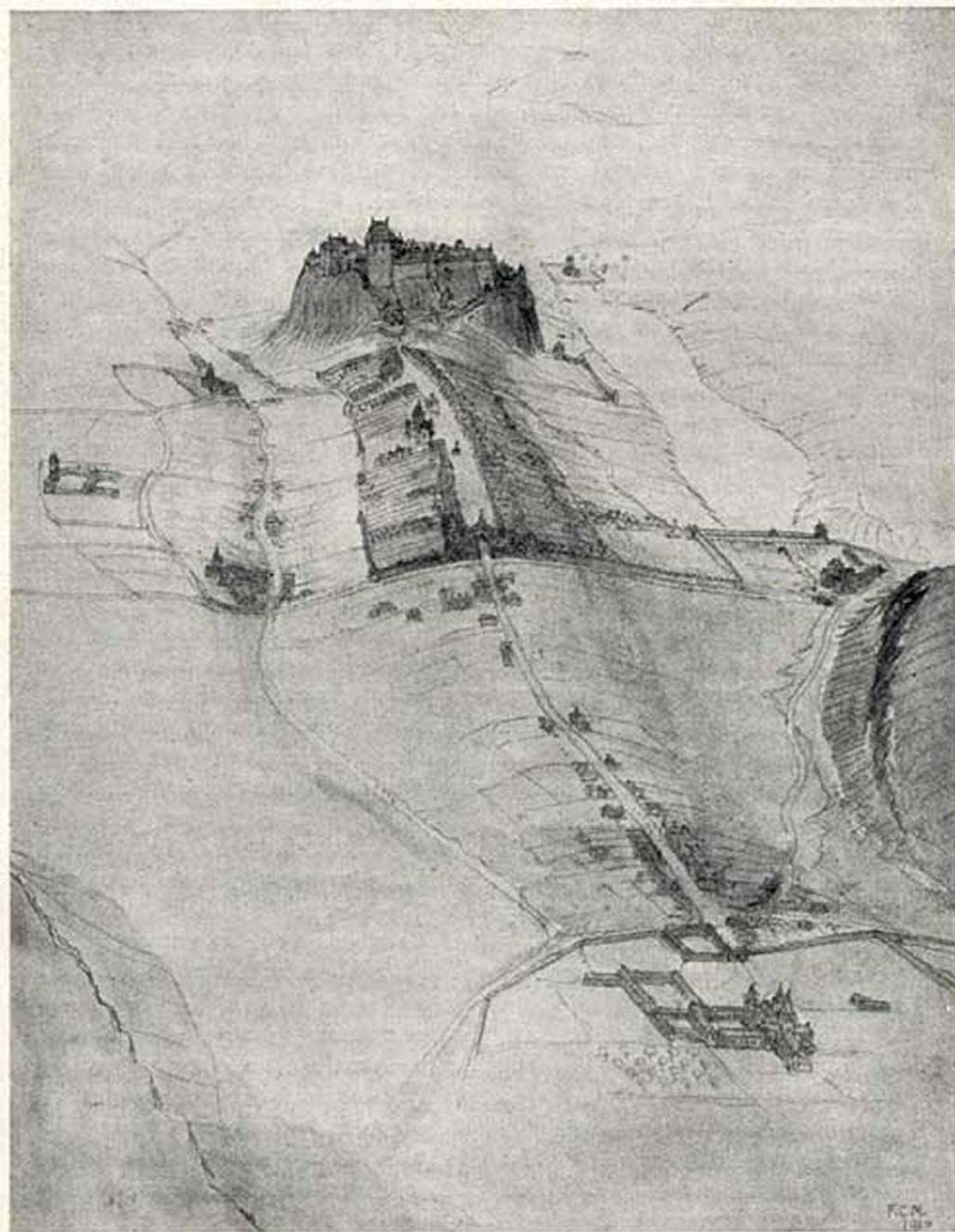
**Figure 2.5:** James Hull sketch, Siccar Point, from Hutton's expedition, 1788

Source: <http://blogs.scientificamerican.com/history-of-geology/2012/09/03/save-siccar-point/>  
Retrieved 11/5/13



**Figure 2.6:** Frank Mears, Civic Survey of Edinburgh, 1911

Source: [http://openlibrary.org/books/OL7068966M/The\\_civic\\_survey\\_of\\_Edinburgh](http://openlibrary.org/books/OL7068966M/The_civic_survey_of_Edinburgh)  
Retrieved 11/5/13



**Figure 2.7:** Frank Mears, *Civic Survey of Edinburgh*, 1911

Source:[http://openlibrary.org/books/OL7068966M/The\\_civic\\_survey\\_of\\_Edinburgh](http://openlibrary.org/books/OL7068966M/The_civic_survey_of_Edinburgh)  
Retrieved 11/5/13



**Figure 2.8:** Edinburgh North Bridge, c. 1809.

Source: [http://www.edinphoto.org.uk/0\\_eng\\_one/0\\_engraving\\_-\\_one\\_1\\_337-\\_north\\_bridge.htm](http://www.edinphoto.org.uk/0_eng_one/0_engraving_-_one_1_337-_north_bridge.htm)

Retrieved 12/17/13

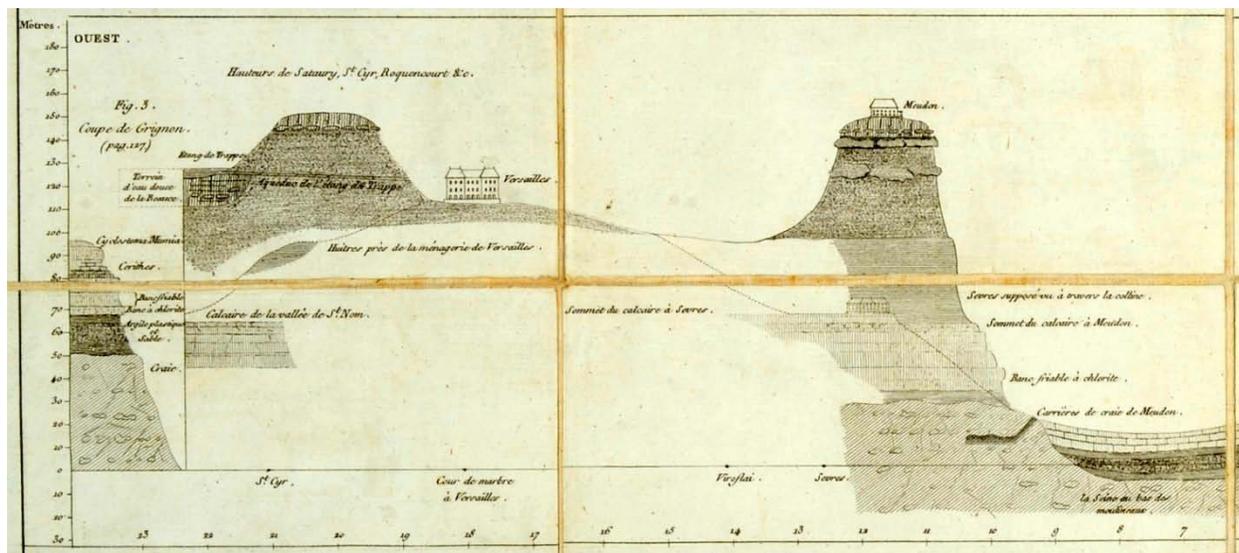


**Figure 2.9:** Cowgate, passing under South Bridge, c.1829

Source:

[http://www.edinphoto.org.uk/0\\_eng\\_ma\\_060/0\\_engraving\\_\\_ma\\_086+a\\_south\\_bridge\\_from\\_cowgate.htm](http://www.edinphoto.org.uk/0_eng_ma_060/0_engraving__ma_086+a_south_bridge_from_cowgate.htm)

Retrieved 12/17/13



**Figure 2.10:** Cuvier and Brogniart survey of Paris basin, *Essai sur la géographie minéralogique des environs de Paris*, 1811

Source: [http://libweb5.princeton.edu/visual\\_materials/maps/websites/thematic-maps/quantitative/geology/geology.html](http://libweb5.princeton.edu/visual_materials/maps/websites/thematic-maps/quantitative/geology/geology.html)

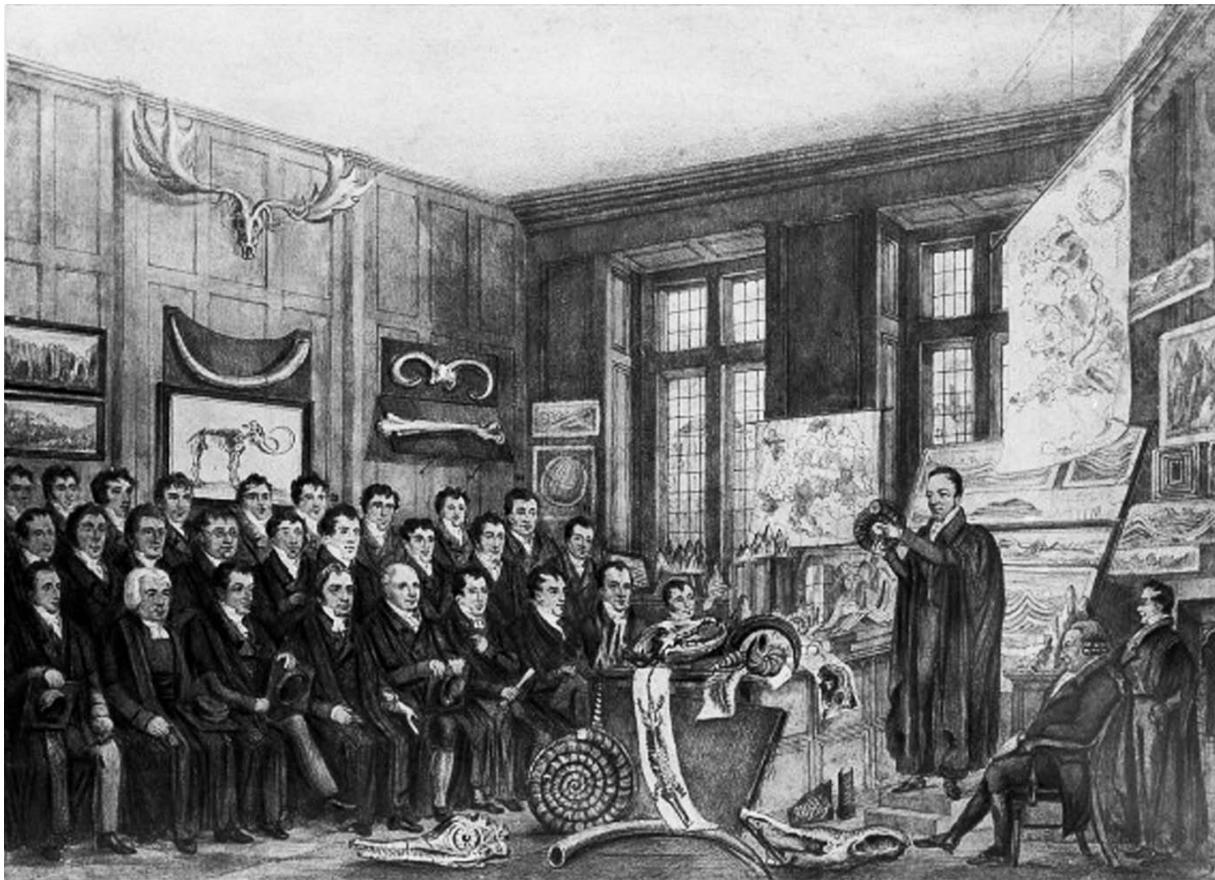
Retrieved 12/17/13



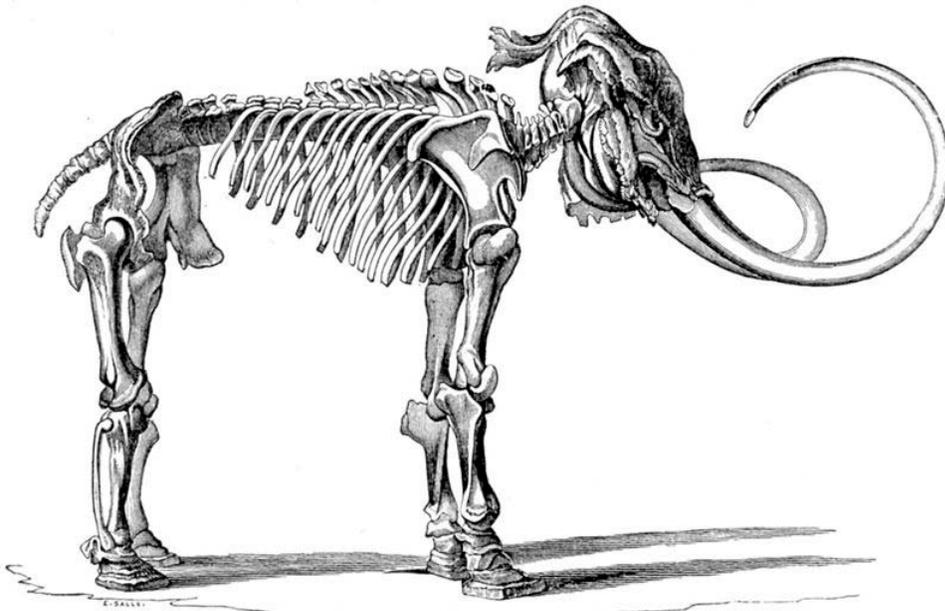
**Figure 2.11:** William Smith, “A Delineation of the Strata of England and Wales with a Part of Scotland, Exhibiting the Collieries and Mines, the Marshes and Fen Lands Originally Overflowed by the Sea, and the Varieties of Soil According to the Variations in the Substrata, Illustrated by the Most Descriptive Names” , 1815

Source: [http://libweb5.princeton.edu/visual\\_materials/maps/websites/thematic-maps/quantitative/geology/geology.html](http://libweb5.princeton.edu/visual_materials/maps/websites/thematic-maps/quantitative/geology/geology.html)

Retrieved 12/17/13



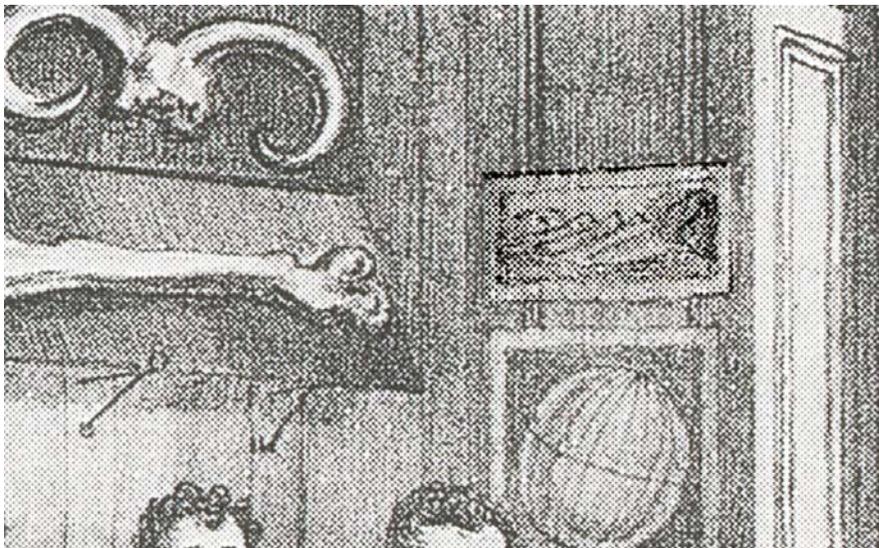
**Figure 2.12:** *William Buckland Delivering a Geological Lecture at the Ashmolean Museum*, by N. Whitlock. Printed by C. Hullmandel. London, c 1820.  
Source: [http://www.earth.ox.ac.uk/about\\_us/history](http://www.earth.ox.ac.uk/about_us/history)  
Retrieved 12/17/13



**Figure 2.13:** Wilhelm Gottlieb Tilesius von Tilenau, *Memoires de l'Academie imperiale des sciences de St. Petersburg*, 1815

Source: [http://en.wikipedia.org/wiki/File:Mammuthus\\_primigenius.jpg](http://en.wikipedia.org/wiki/File:Mammuthus_primigenius.jpg)

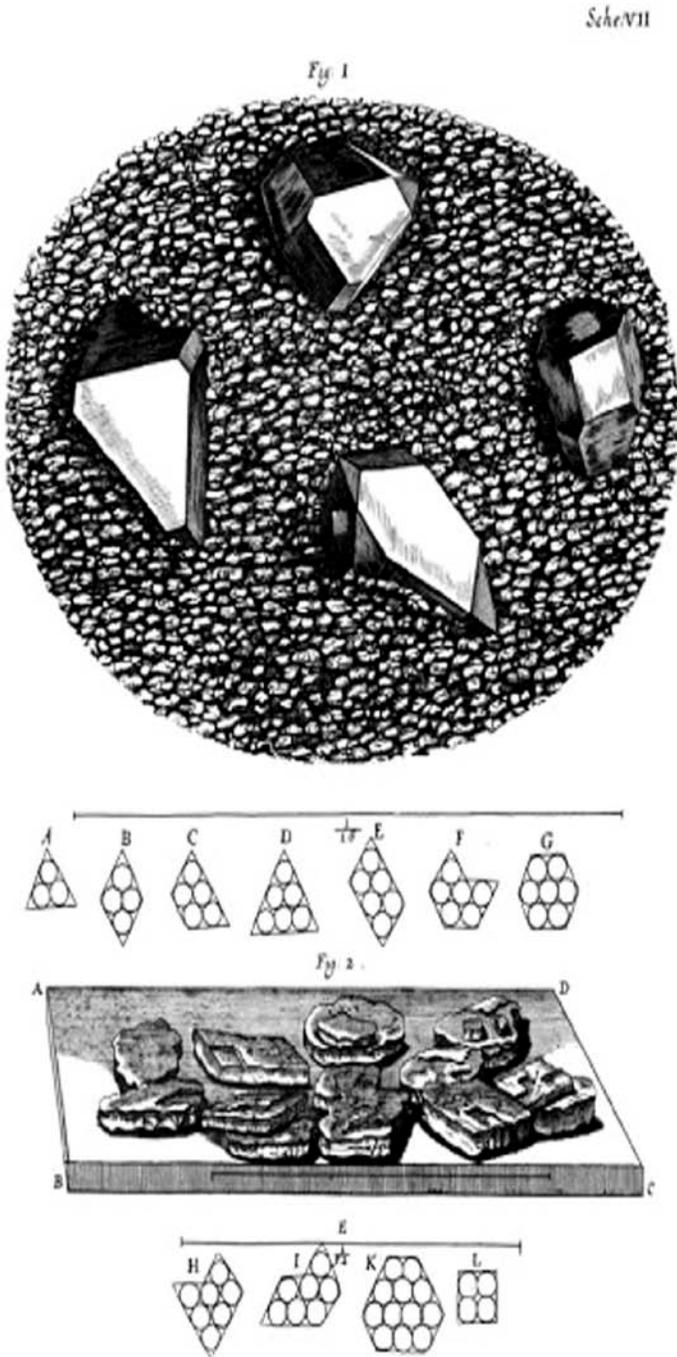
Retrieved 12/17/13



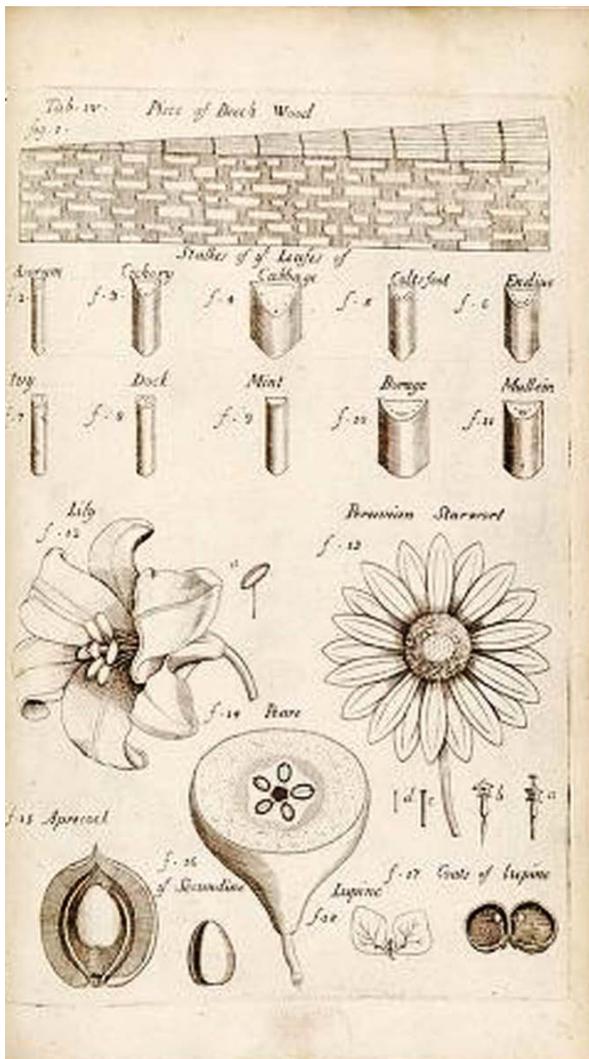
**Figure 2.14:** detail, *William Buckland Delivering a Geological Lecture at the Ashmolean Museum*, by N. Whittock, Printed by C. Hullmandel, London, c 1820

Source: [http://www.earth.ox.ac.uk/about\\_us/history](http://www.earth.ox.ac.uk/about_us/history)

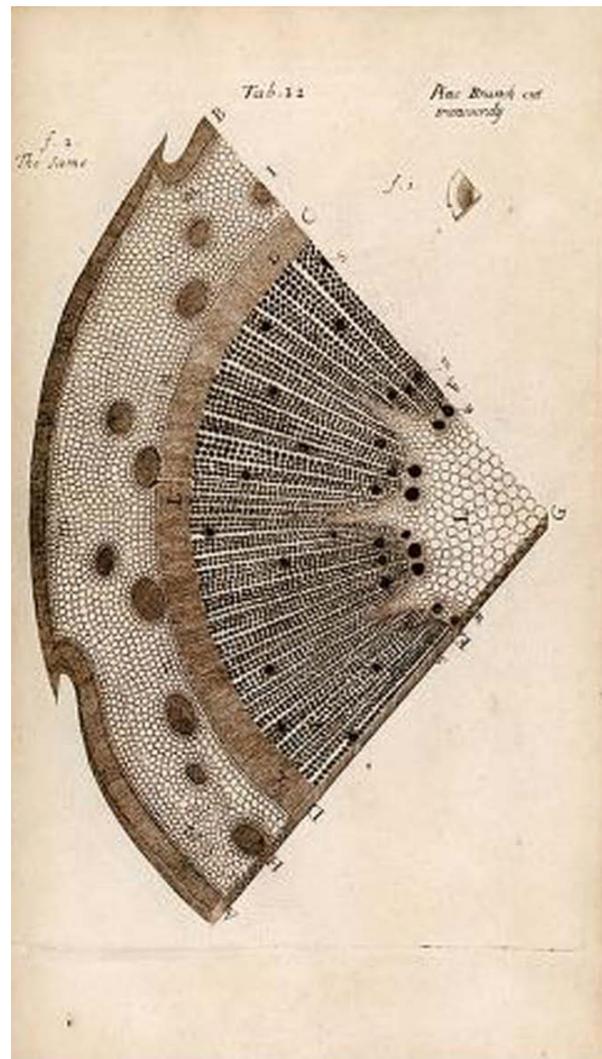
Retrieved 12/17/13



**Figure 2.15:** Robert Hooke, *Micrographia*, 1665  
Source: <http://iopscience.iop.org/1402-4896/87/4/048103/article>  
Retrieved 12/17/13



**Figure 2.16:**  
 Nehemiah Grew, *The Anatomy of Plants begun as a philosophical history of plants*, 1682  
 Source: <http://www.botanicus.org/item/31753000008869>  
 Retrieved 12/17/13



**Figure 2.17:**

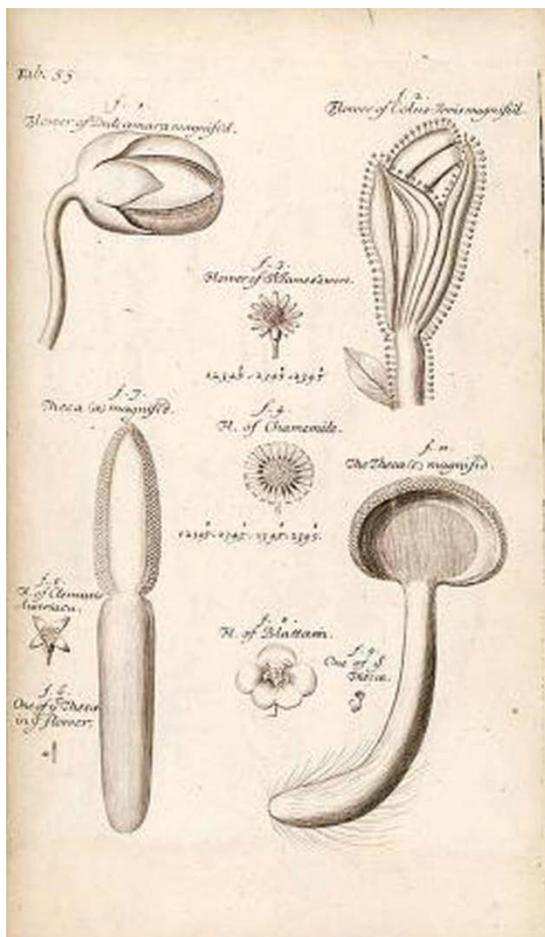
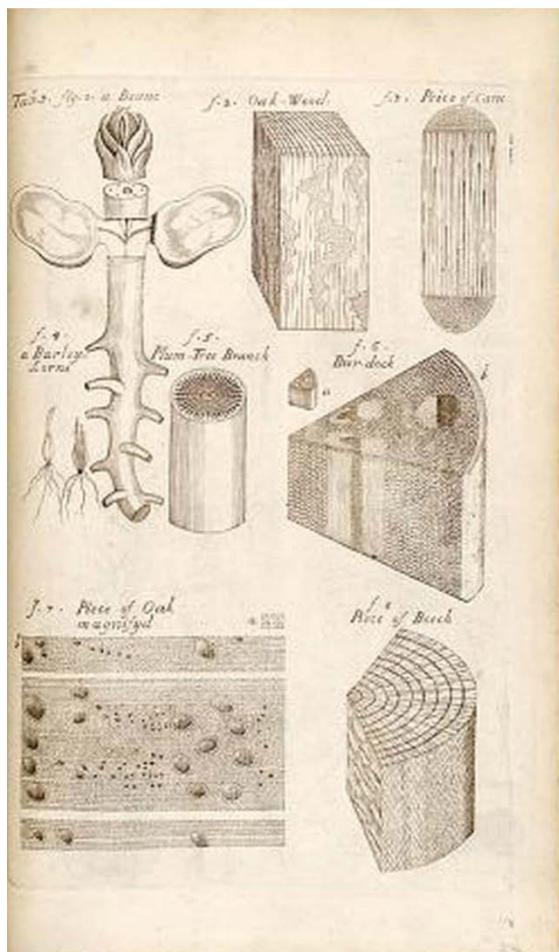


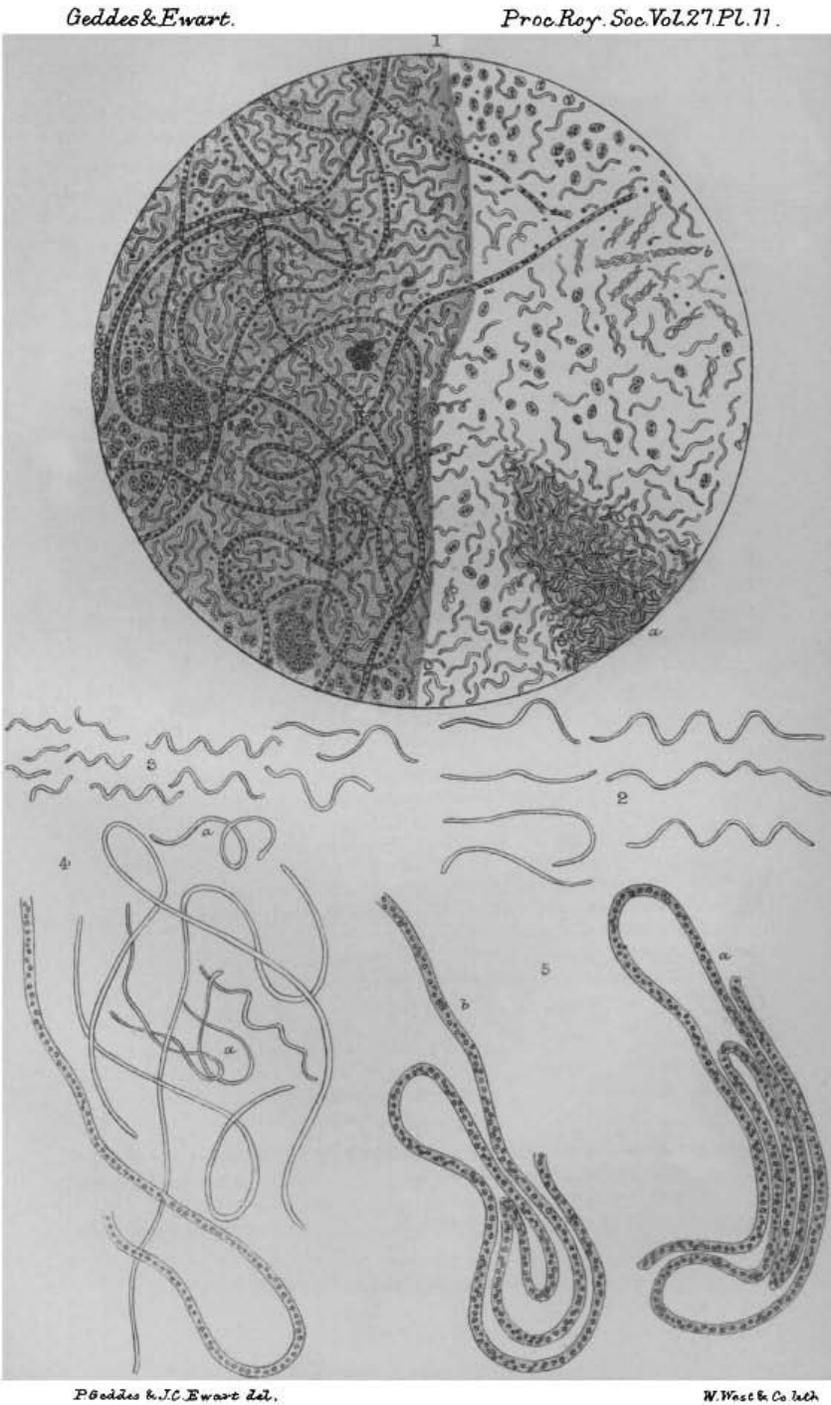
Figure 2.18:

Nehemiah Grew, *The Anatomy of Plants begun as a philosophical history of plants*, 1682

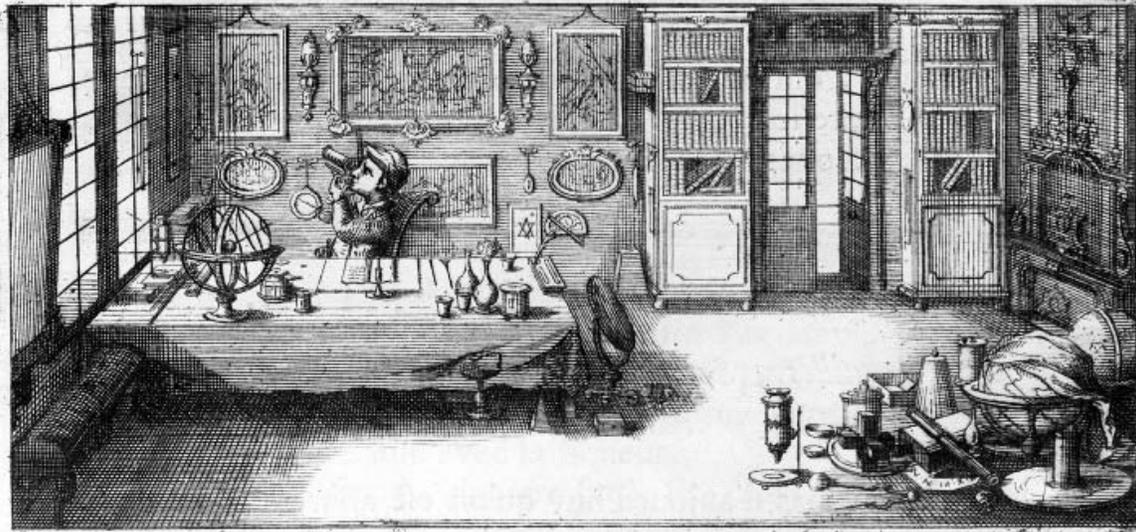
Source: <http://www.botanicus.org/item/31753000008869>

Retrieved 12/17/13

Figure 2.19



**Figure 2.20:** Patrick Geddes, J Cossar Ewart, "On the Life-History of Spirillum." 1878  
Source: <http://archive.org/details/philtrans06807547>  
Retrieved 12/17/13



# NOUVELLES OBSERVATIONS,

Wellcome Images

**Figure 2.21:** Louis Joblot, *Descriptions et usages de plusieurs nouveaux microscopes*, 1718  
Source: <http://wellcomeimages.org>  
Retrieved 12/17/13

**MICROCOSM**  
a Grand Display of the  
**Wonders of Nature.**  
by means of 44 Lateral and Bursal  
**MICROSCOPES.**  
including the New Reflecting and Achromatic ones.  
The whole has been contrived and constructed  
by Philip Carpenter, Optician,  
on a Scale of Magnitude never before attempted,  
and is open to the Public in an elegant Room,  
on his Premises  
*24, Regent Street.*  
4 Doors from Piccadilly  
From Eleven till dusk & by Gas Light from dusk till Eight  
& Clock  
Admission 1/6

Terms of Subscription			
	Half Year	Year	Year
Single Admission	0 5 0	0 9 0	0 12 0
Subscriber & Friend	0 8 0	0 6 0	1 1 0
Family Ticket	0 12 0	1 1 0	1 14 0

*The Number of Objects exhibited is about 40 & these  
are frequently changed. The surrounding Figures are  
some of them on a reduced Scale the circles appear-  
ing in the Microscopes from 5 Inches to 5 Feet  
in Diameter*

*We respectfully recommend this Exhibition to all those who are  
willing to look into the secret places of Nature through the  
Spectacles of Art, or who are anxious to find a source of  
amusement for their parties that can yield itself  
graciously without the interposition of  
Attendants which usually accompanies such  
gratifications.  
New Monthly Magazine.*

*Printed by C. Baldwin.*

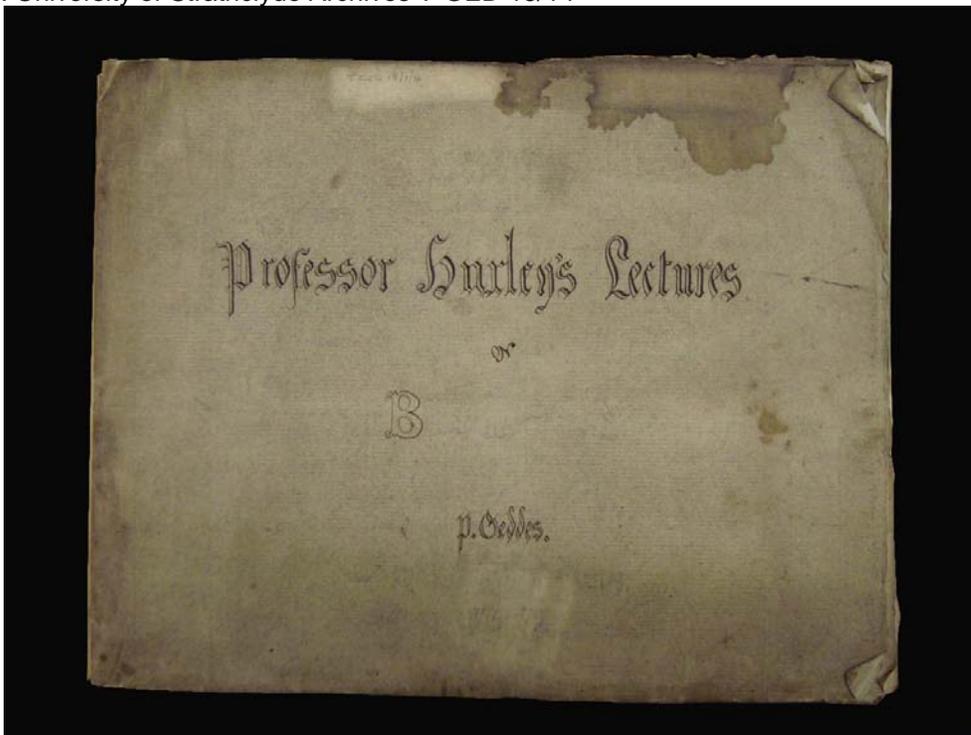
Figure 2.22: "Wonders of Nature" exhibition advertisement, 1827

Source: <http://www.memoryprints.com/image/96612/scharf-g-microcosm-a-grand-display-of-the-wonders-of-nature-c-1827>

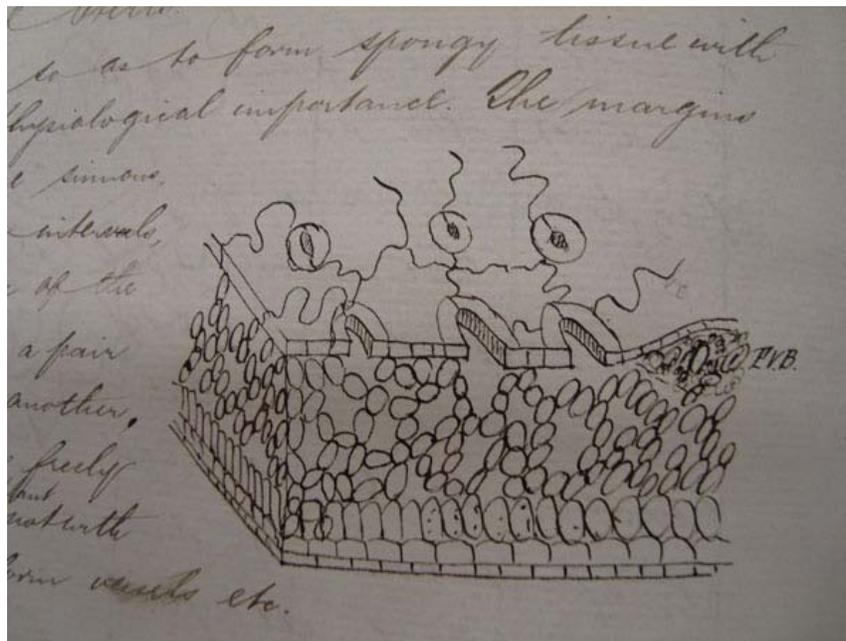
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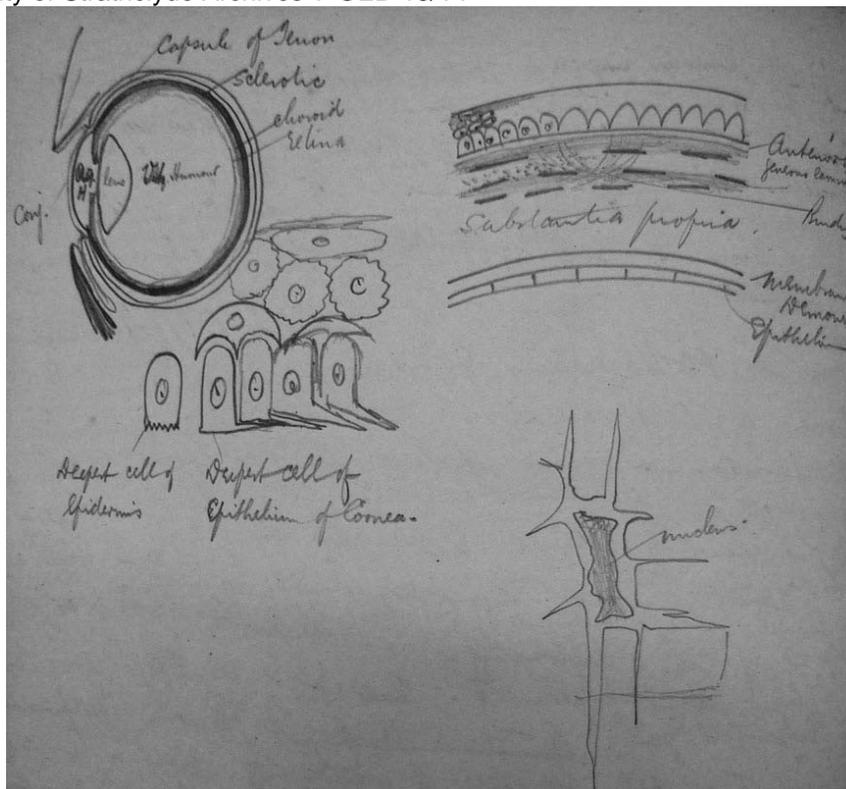
**Figure 2.23:** Geddes' lecture notes, 1875  
Source: University of Strathclyde Archives T-GED 18/14



**Figure 2.24:** Geddes' lecture notes, 1875  
Source: University of Strathclyde Archives T-GED 18/14



**Figure 2.25:** Geddes' lecture notes, 1875  
Source: University of Strathclyde Archives T-GED 18/14



**Figure 2.26:** Geddes' lecture notes, 1875  
Source: University of Strathclyde Archives T-GED 18/14

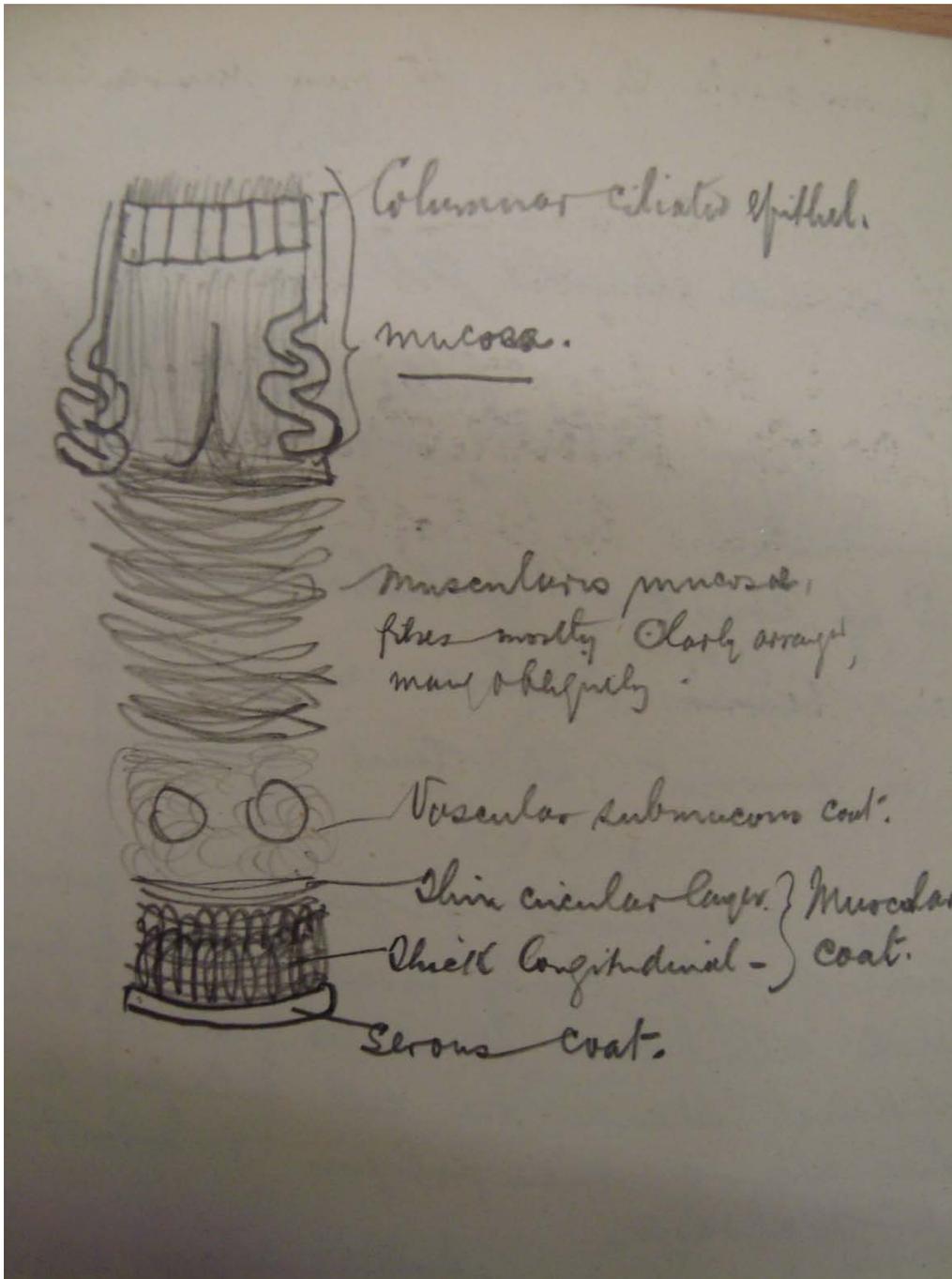


Figure 2.27: Geddes' lecture notes, 1875  
Source: University of Strathclyde Archives T-GED 18/14

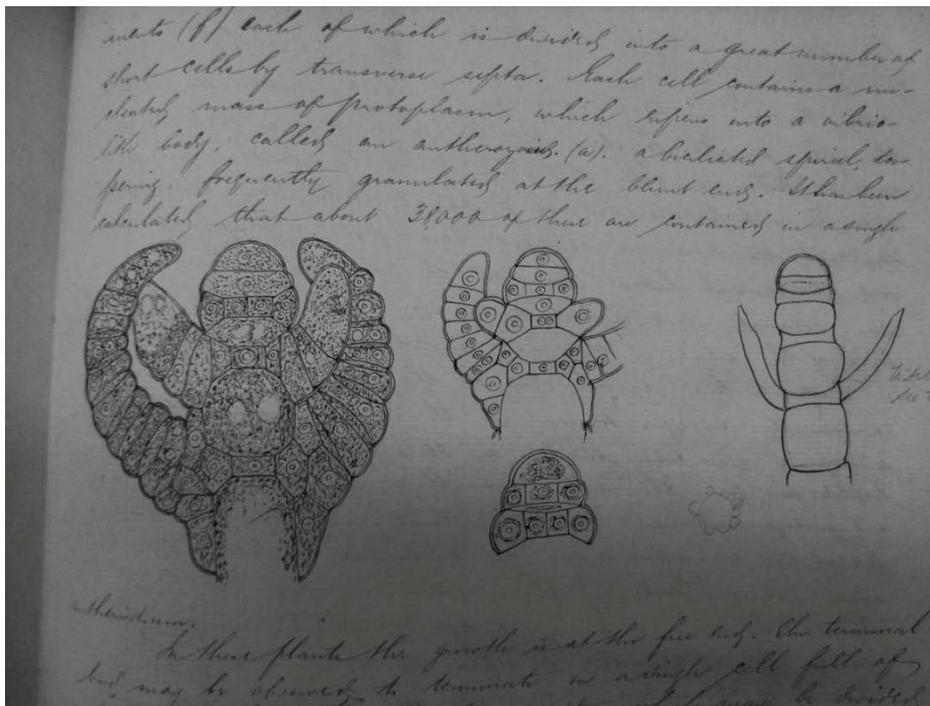


Figure 2.28: Geddes' lecture notes, 1875  
Source: University of Strathclyde Archives T-GED 18/14

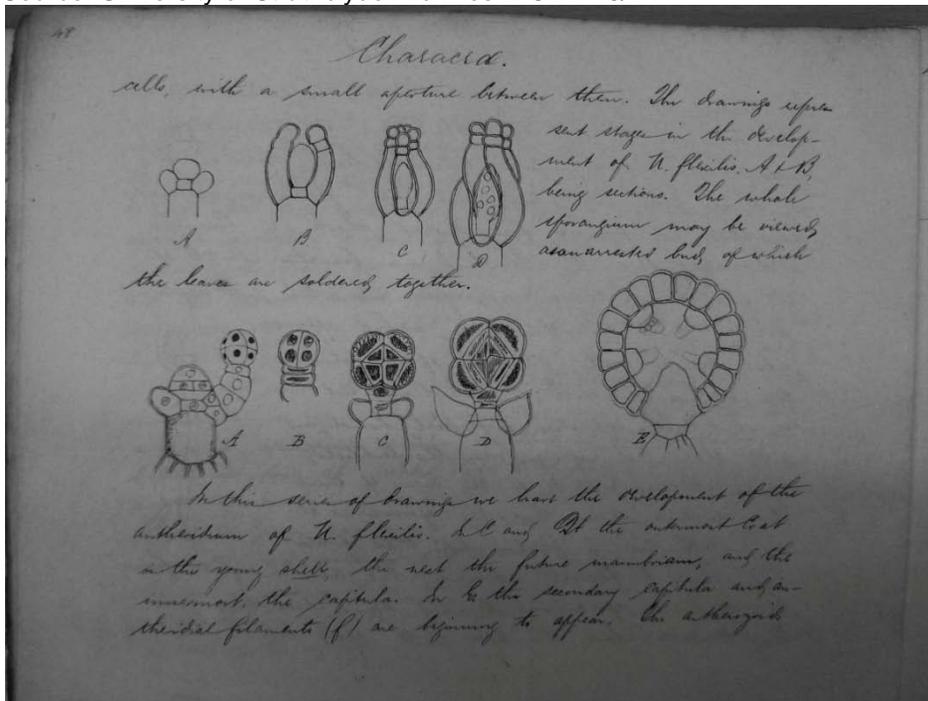


Figure 2.29: Geddes' lecture notes, 1875  
Source: University of Strathclyde Archives T-GED 18/14

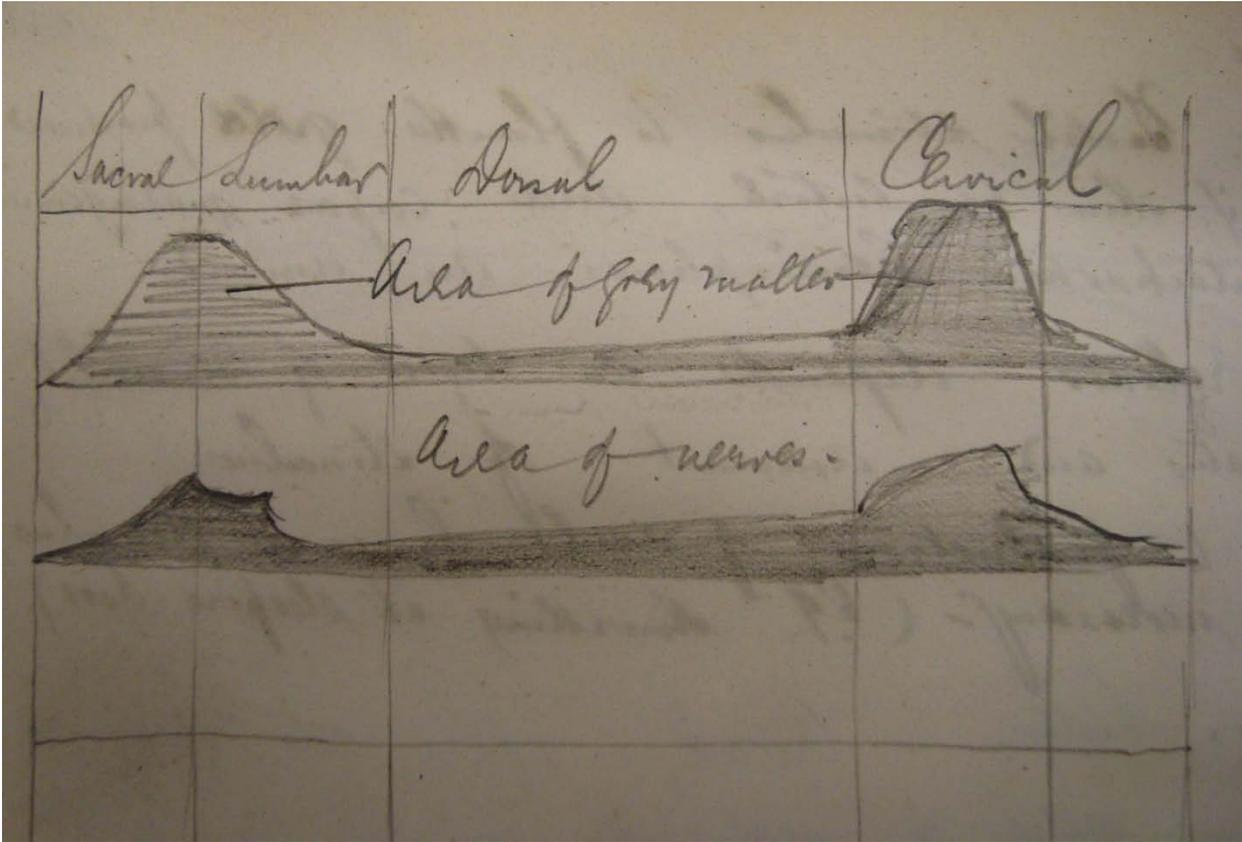
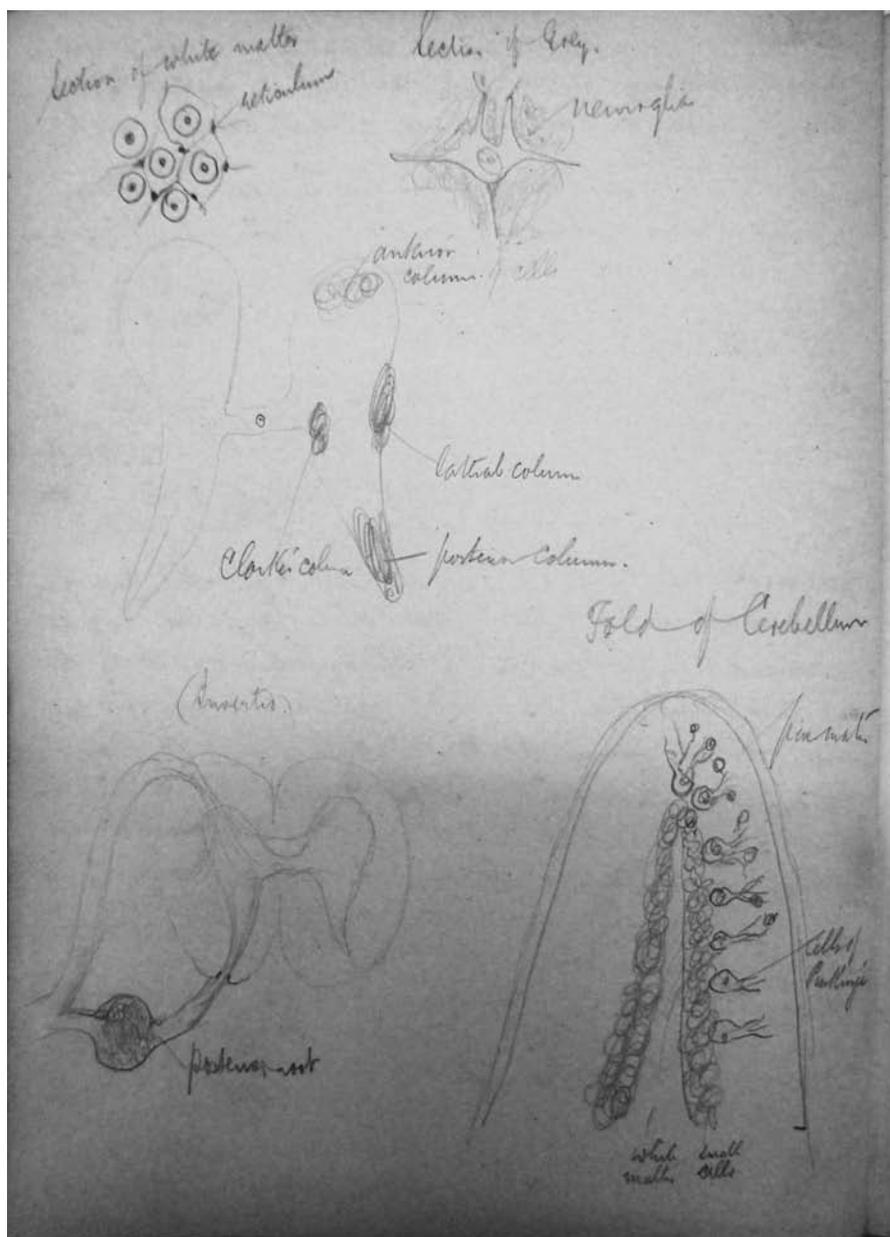


Figure 2.30: Geddes' lecture notes, 1875  
Source: University of Strathclyde Archives T-GED 18/14

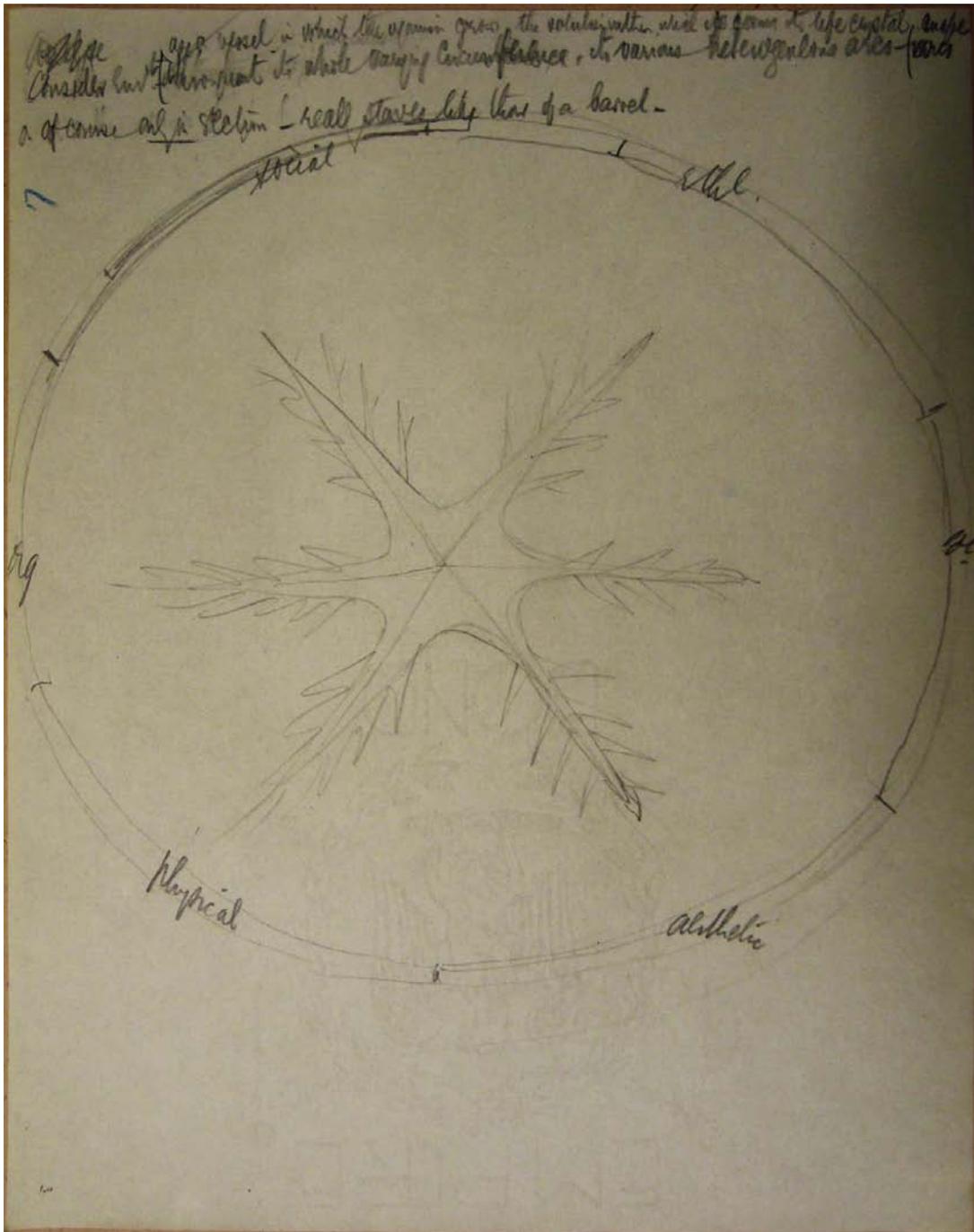


**Figure 2.31:** Geddes' lecture notes, 1875  
Source: University of Strathclyde Archives T-GED 18/14









**Figure 2.36:** "Social Notations", 1902  
Source: University of Strathclyde Archives T GED 18/1/203

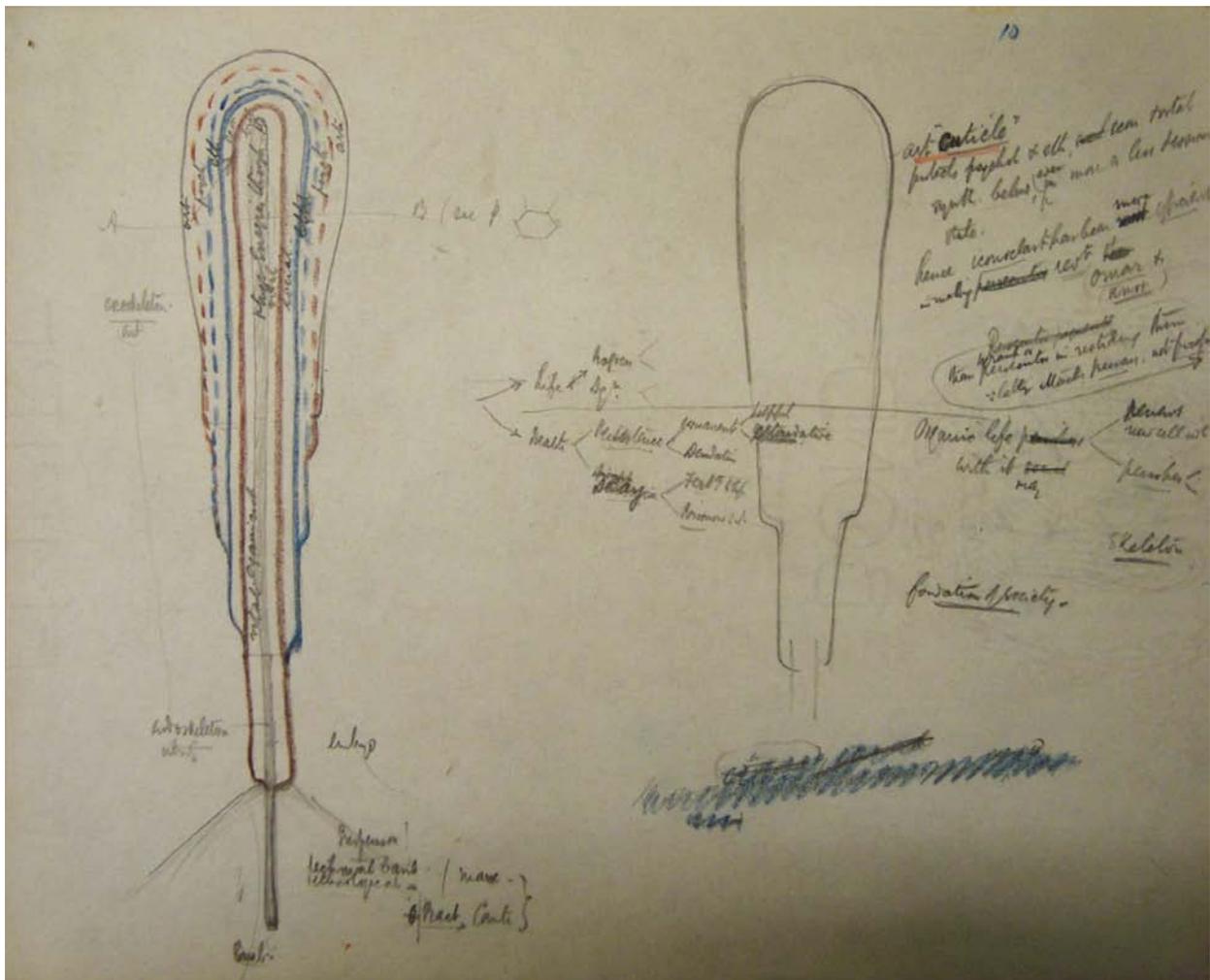


Figure 2.37: "Social Notations", 1902  
Source: University of Strathclyde Archives T GED 18/1/203

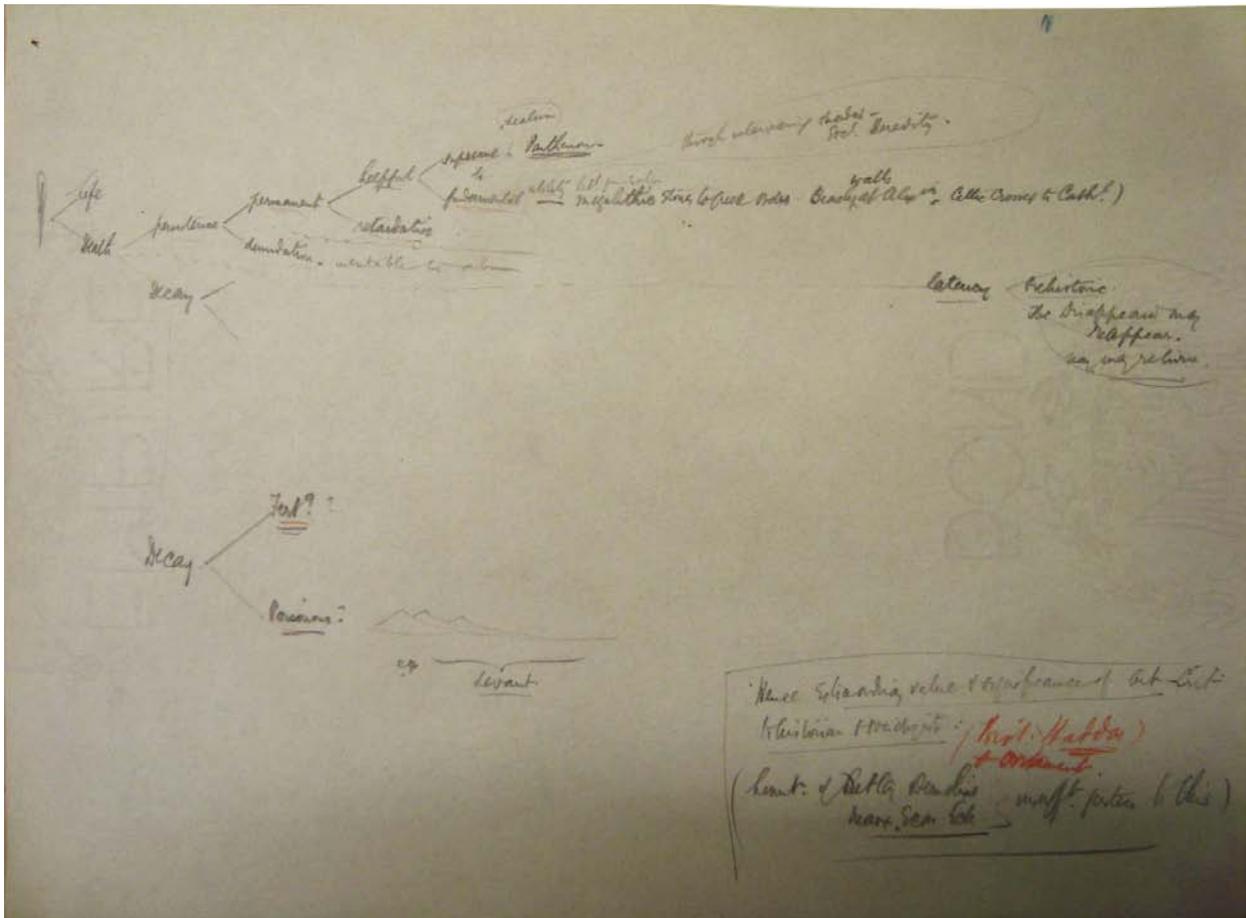


Figure 2.38: "Social Notations", 1902  
Source: University of Strathclyde Archives T GED 18/1/203



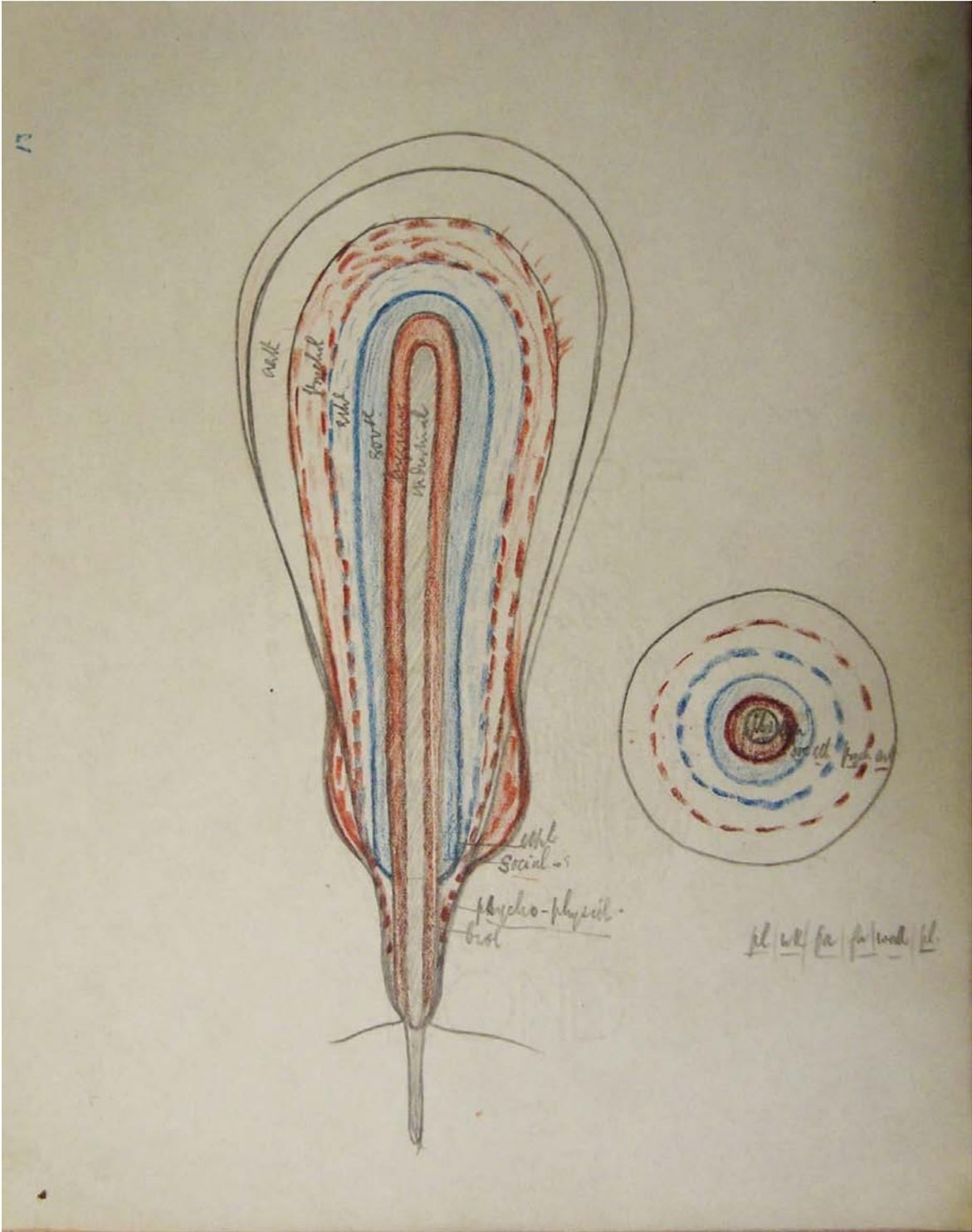


Figure 2.40: "Social Notations", 1902  
Source: University of Strathclyde Archives T GED 18/1/203

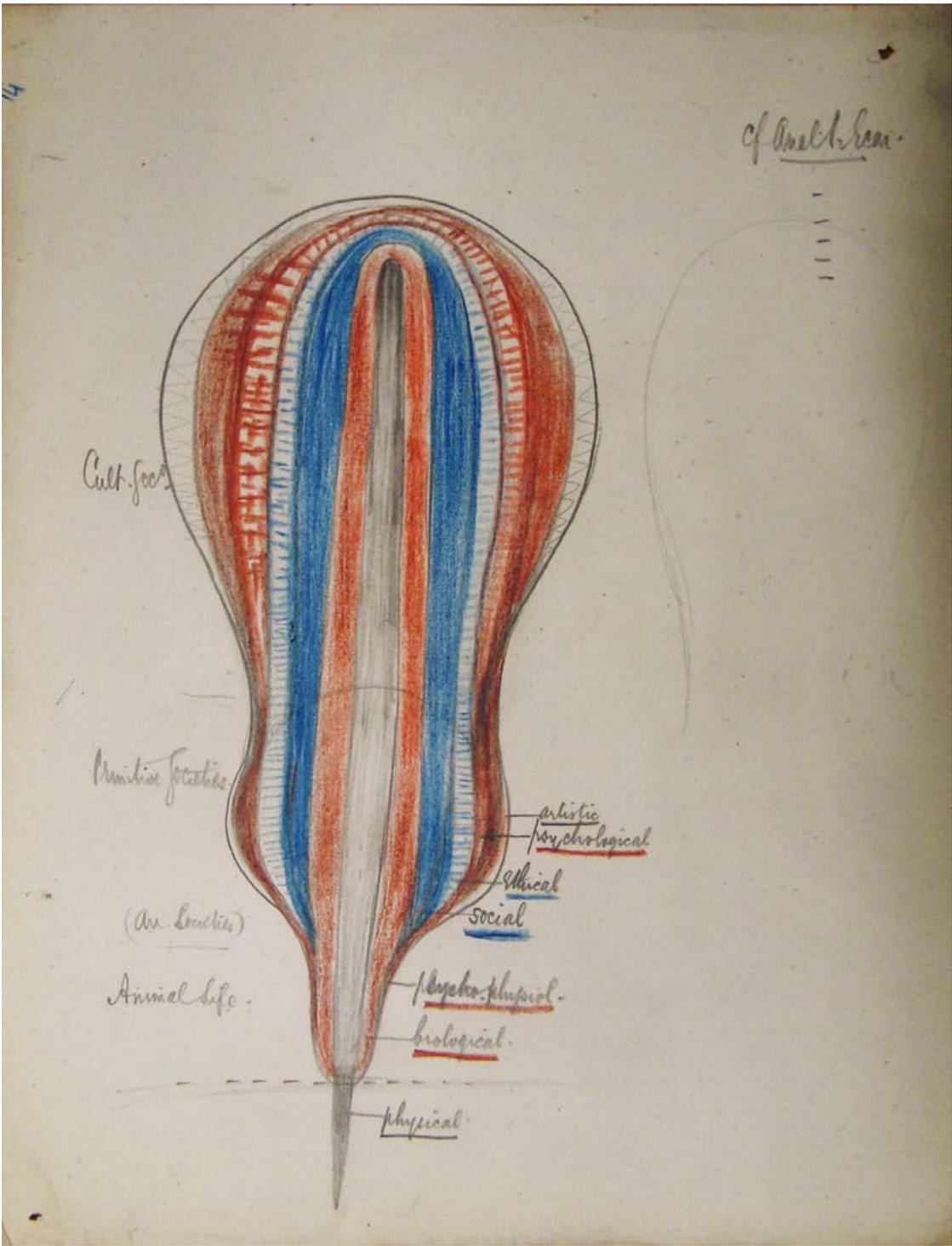
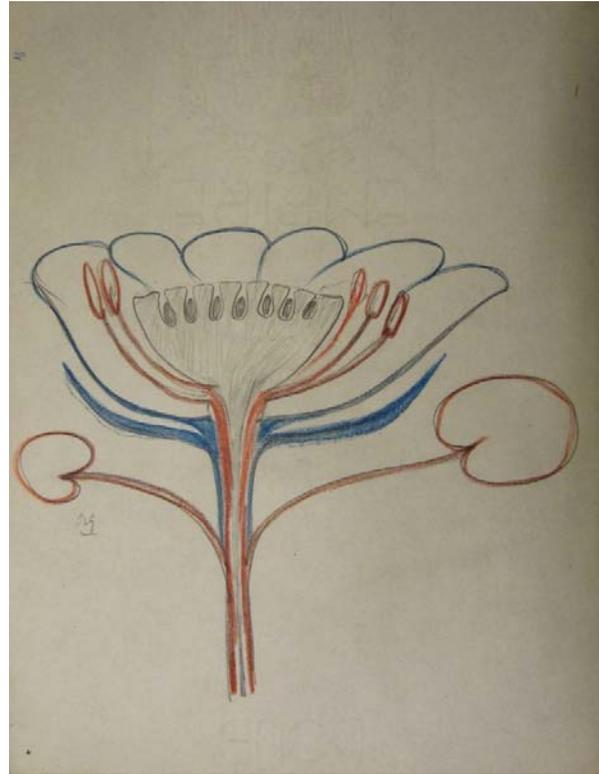
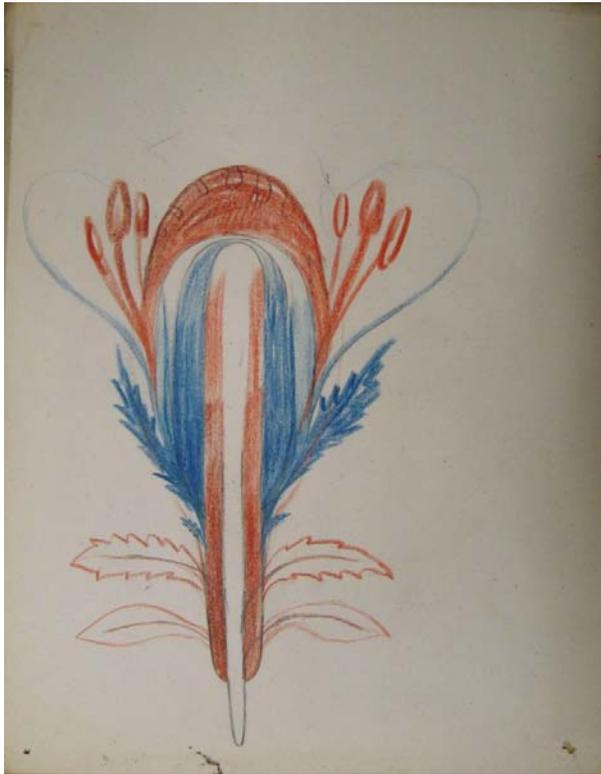


Figure 2.41: "Social Notations", 1902  
Source: University of Strathclyde Archives T GED 18/1/203



**Figure 2.42, 2.43:** "Social Notations", 1902  
Source: University of Strathclyde Archives T GED 18/1/203

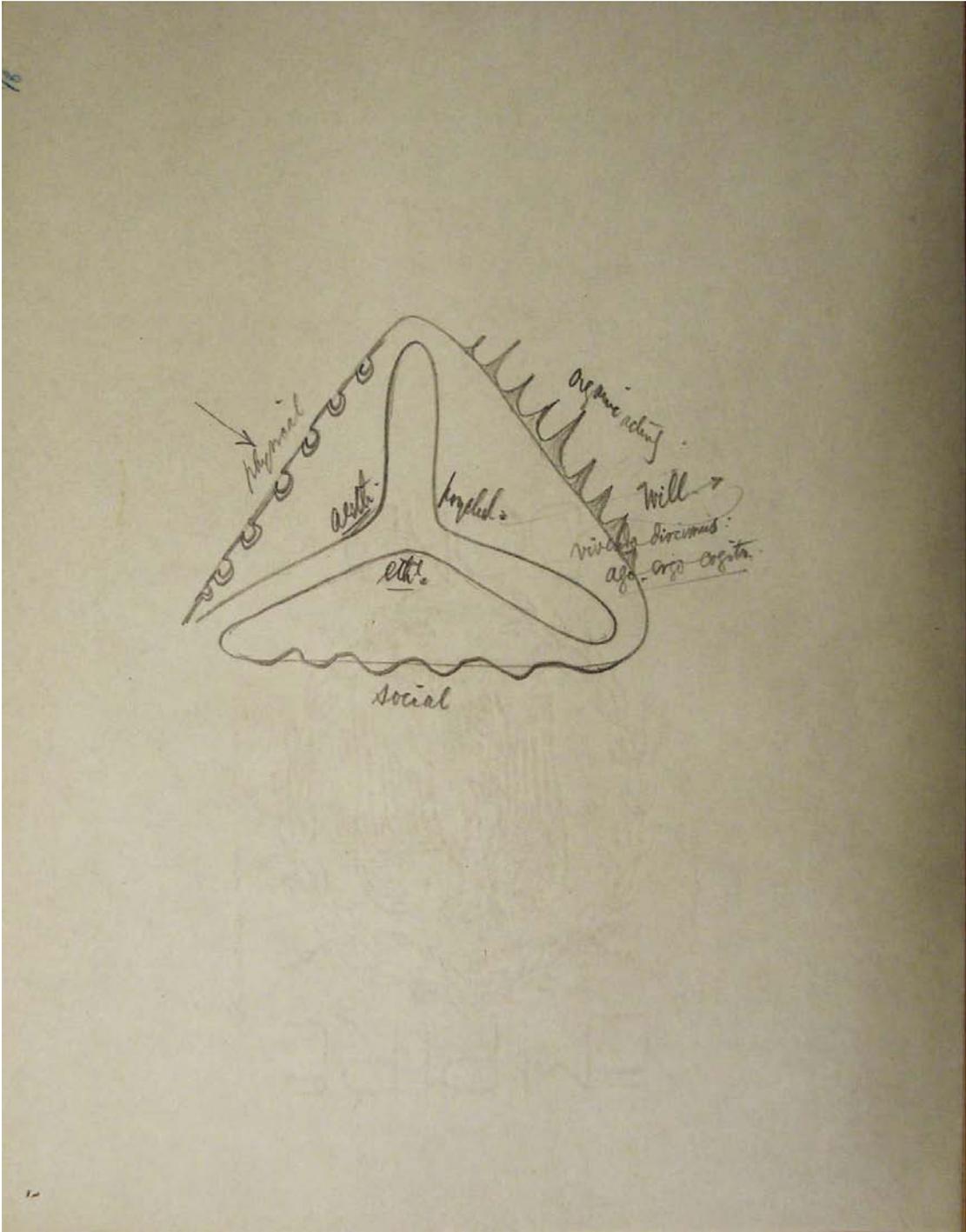


Figure 2.44: "Social Notations", 1902  
Source: University of Strathclyde Archives T GED 18/1/203

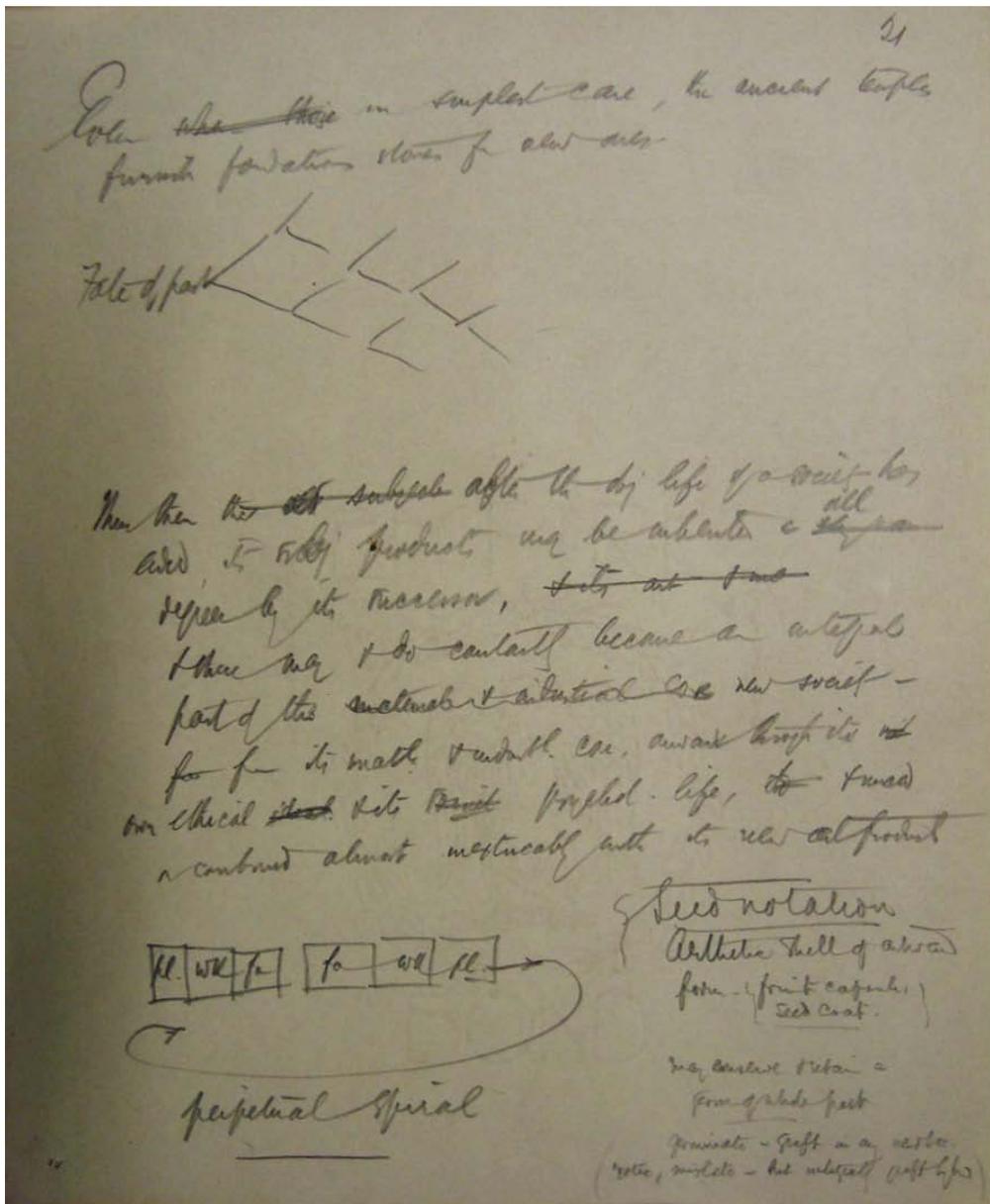


Figure 2.45: "Social Notations", 1902  
Source: University of Strathclyde Archives T GED 18/1/203

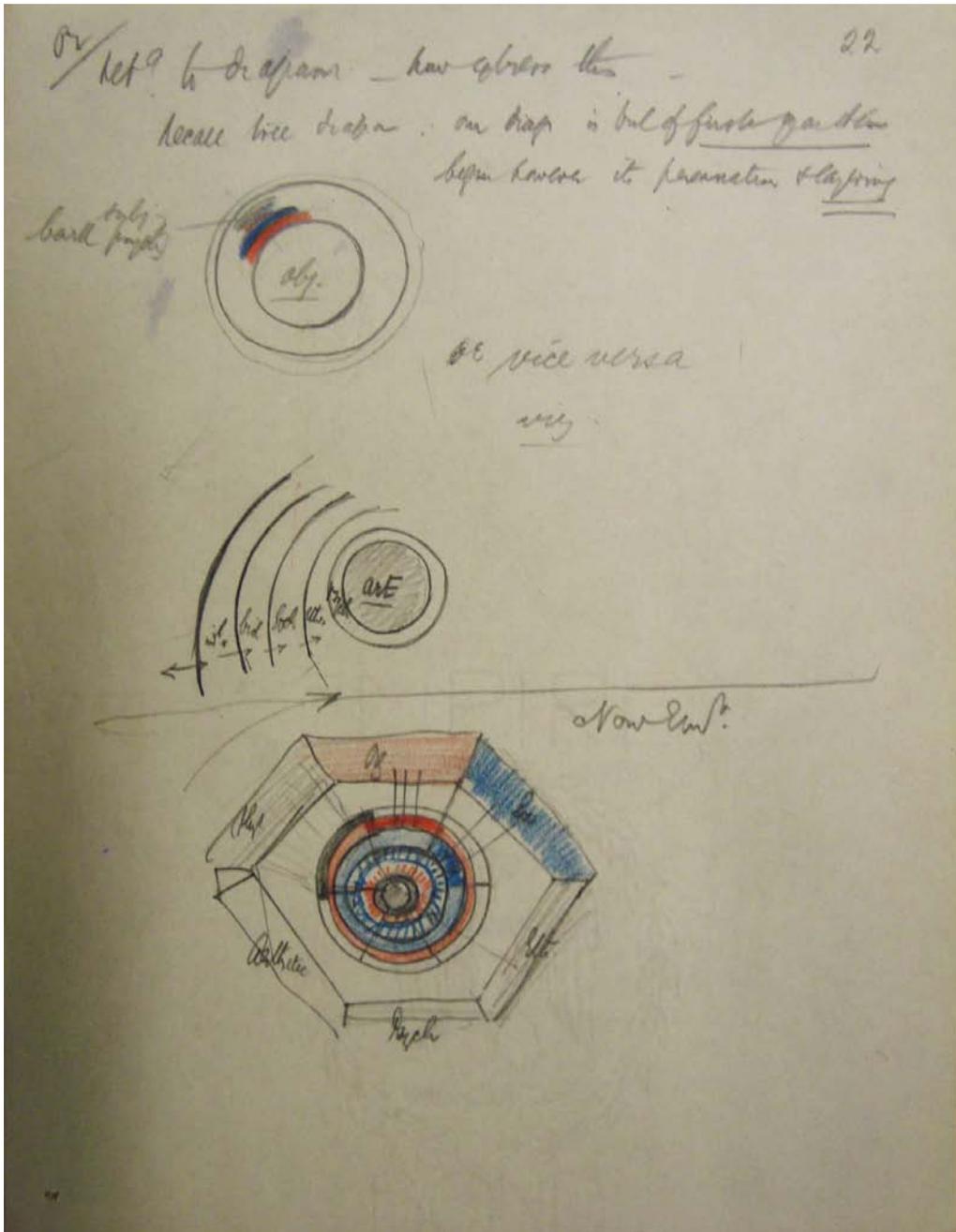


Figure 2.46: "Social Notations", 1902  
Source: University of Strathclyde Archives T GED 18/1/203

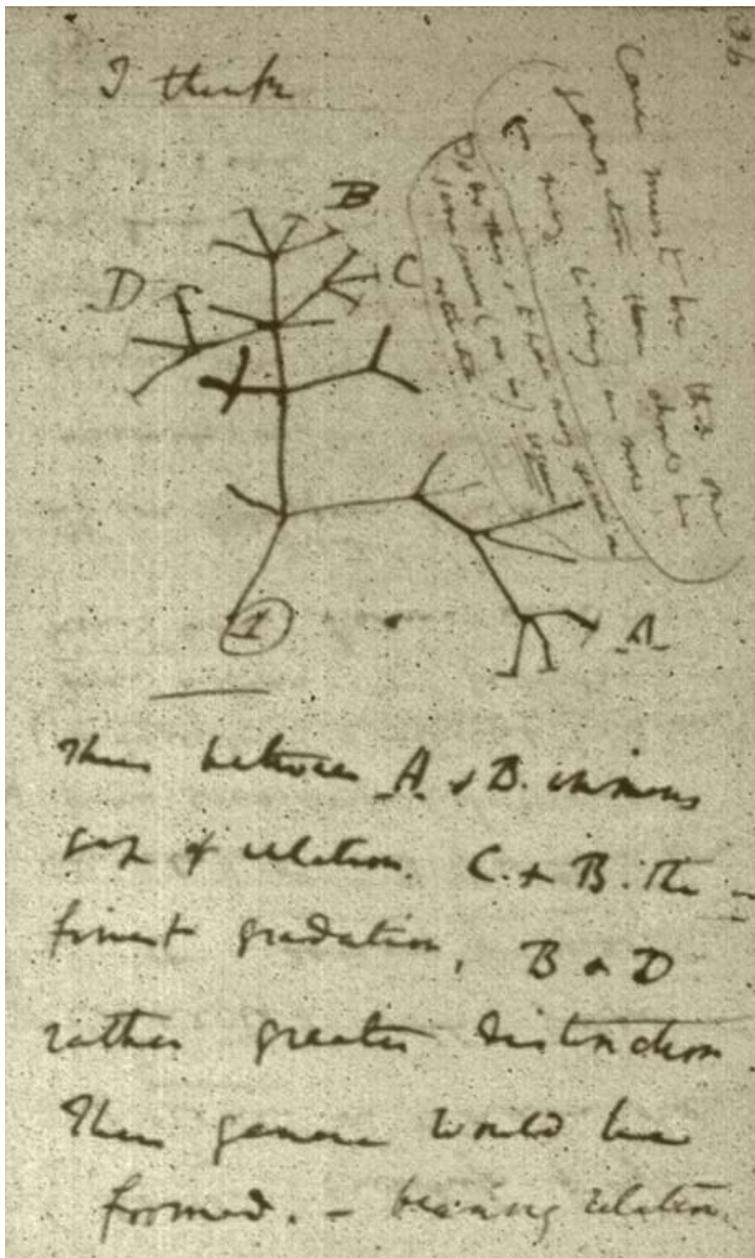


Figure 2.47: Darwin "tree of life"

Source: <http://www.amnh.org/exhibitions/past-exhibitions/darwin/the-idea-takes-shape/i-think>  
Retrieved 12/17/13

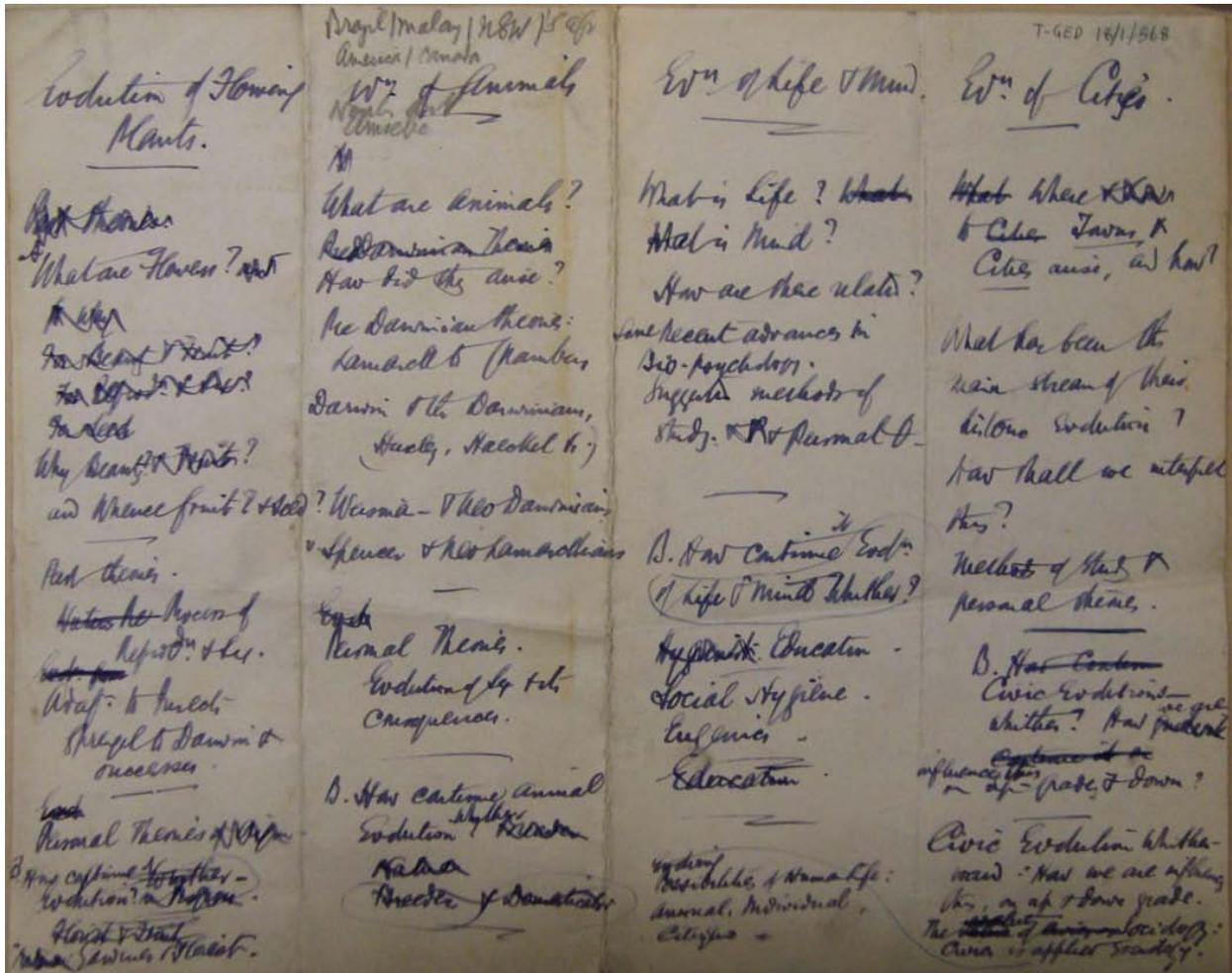


Figure 2.48: "Plants, animals, man, cities" thinking machine, undated  
 Source: University of Strathclyde Archives T-GED 18/1/568

### **CHAPTER THREE: THE OUTLOOK**

*So that it was in fact the speculum or watch-tower of Teufelsdröckh; wherefrom, sitting at ease he might see the whole life-circulation of that considerable City; the streets and lanes of which, with all their doing and driving (Thun und Treiben), were for the most part visible there ... Friend, thou seest here a living link in that Tissue of History, which inweaves all Being: watch well, or it will be past thee, and seen no more.*

*Thomas Carlyle, Sartor Resartus*<sup>1</sup>

As Patrick Geddes enlarged the scope of his activities to promote the science of cities, he sought a method of study commensurate with those familiar to him from the biological sciences. As has been argued, the influence of Auguste Comte and his *Cours de Philosophie Positive* is evident in Geddes' determination to adopt consistent method in this new science of his creation, but he was also an experienced investigator, and could draw upon that experience in proposing methods of inquiry. Classification and arrangement strategies from botany and zoology, and graphic strategies from geology and anatomy were central to his approach, though bespoke to suit his personal theories of the evolution of cities. From his background of field research and time spent in the microscopical laboratory he was able to conceive of an "applied civics laboratory" which incorporated means of observation to a new end. In his Outlook Tower he would provide visitors with an experience of scientific method which also gathered from every trend of the establishment of knowledge of the nineteenth century. It was a public exhibition and spectacle, museum of curiosities, venue for educational lectures, employed the latest optical devices, and all was filtered through the combined lenses of evolutionary, psychological, and aesthetic theory, with a dose of spiritualism thrown in for good measure. The Outlook Tower was a material realization of all that Geddes thought the Science of Cities should be -- it allowed for the performance of science for each visitor, and an opportunity to "see" the world as Geddes thought it should be seen. It was also conceived within a tradition, developed over the course of the nineteenth century, of the public display of knowledge wherein popular entertainment coincided with the assertion of authority and a broadening of educational opportunity. Before touring Geddes' Outlook Tower, it is necessary to look at the culture in which such an enterprise should arise.

#### **The Culture of Exhibition**

In 1800 a Royal Charter was granted the Royal Institution in Mayfair, London. According to its prospectus, the purpose of the institution was "diffusing the knowledge and facilitating the general and speedy introduction of new and useful mechanical inventions and improvements; and also for teaching, by regular courses of philosophical lectures and experiments, the application of the new discoveries in science to the

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<sup>1</sup>Carlyle, Thomas (undated) *Sartor Resartus: The Life and Opinions of Herr Teufelsdröckh*. F.M Lupton Publishing Company. New York. P 17.

improvement of arts and manufactures, and in facilitating the means of procuring the comforts and conveniences of life." The demand of industry for a skilled work force contributed to the Victorian pursuit of education for the masses which in turn established a professional class of scientist mediating between the established, *Oxbridge* elite and the man in the street. Whereas the *production* of science had belonged to an elite which was also the consumer of science, the nineteenth century saw the *diffusion* of science and its application in industry.<sup>2</sup> The mechanism of this diffusion was the popular lecture or exhibition, and the popularization of scientific production created a new model of authentication determined by utility and mass consumption. Previously discovery had been authenticated by virtue of belonging to a world of "gentlemen," but the mass appeal of scientific discovery and invention in the 19<sup>th</sup> century was coincident with the advent of a professional class of "scientists" who chose to make a living through their pursuits. Intended to instruct members of the working class while attracting the patronage of the wealthy, weekly lectures at the Royal Institution introduced Londoners to the discoveries of science in a format both entertaining and educational. Admission proceeds supported the research of the laboratories within, as, for instance, Michael Faraday<sup>3</sup> maintained a laboratory for the investigation of electricity in the basement and was also a popular lecturer. (Figure 3.1) Income was derived from public performance, and performers ranged from the earnest educator to the spectacular showman.<sup>4</sup> "Lectures and shows of all kinds, from the incompetent and entertaining to the serious and the worthy, were pursued by a voracious public."<sup>5</sup>

Educational opportunities in the sciences had not previously existed for working men, but the changing culture of Victorian England established both a need and a moral obligation for popular instruction, supported by changes within the culture of science. Astronomer John Frederick William Herschel<sup>6</sup>, writing in 1838, argued for the broad dissemination of knowledge secured by men of science:

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<sup>2</sup> Morus, Iwan Rhys (1996) "Manufacturing Nature: Science, Technology and Victorian Consumer Culture". *The British Journal for the History of Science*. Vol 29. No 4. Pp 403-434.

<sup>3</sup> Michael Faraday (1791-1867) British scientist whose work in electromagnetism led to the development of "motors" and made electricity possible. Of "working class" origin, he was self-educated and among those who broke the barrier of class in the world of British science. Elected to the Royal Society in 1824, he was named Fullerian Professor of Chemistry in 1833. A dynamic lecturer, he instituted the "Christmas Lectures" at the Royal Institution, which continue today.

<sup>4</sup> Ophir, Adi and Steven Shapin (1991) "The Place of Knowledge: A Methodological Survey". *Science in Context*. Cambridge University Press. Vol 4. No 1.

<sup>5</sup> Anderson, R.G.W. (1992) "What is Technology?: Education through Museums in the Mid-Nineteenth Century". *The British Journal for the History of Science*. Vol 25. No 2. P 170.

<sup>6</sup> John Frederick William Herschel (1792- 1871) English mathematician, astronomer, chemist and botanist. Befriended Charles Babbage as an undergraduate at Cambridge University. He set up an observatory in South Africa where Darwin visited with him on his *Beagle* voyage. In Africa, he and his wife collected botanical specimens, using a *camera lucida* and watercolor technique to produce *Flora Herscheliana* in 1896. His *A preliminary discourse on the study of natural philosophy*, published in 1834

Those who admire and love knowledge for its own sake, ought to wish to see its elements made accessible to all, were it only that they may be the more thoroughly examined into, and more effectually developed in their consequences, and receive that ductility and plastic quality which the pressure of minds of all descriptions, constantly moulding them to their purpose, can alone bestow.<sup>7</sup>

However, he made a distinction between kinds of knowledge: "Art is the application of knowledge to a practical end. If the knowledge be merely accumulated experience, the art is *empirical*; but if it be experience reasoned upon and brought under general principles, it assumes a higher character, and becomes *scientific art*."<sup>8</sup> He saw a conflict between the need for preservation of artisanship and the development of scientific art which "should be divested, as far as possible, of artificial difficulties, and stripped of all such technicalities as tend to place it in the light of a craft and a mystery, inaccessible without a kind of apprenticeship."<sup>9</sup> Mechanization in the factory setting created a new type of worker, the mechanic, and the negotiations attendant to this new role shaped the way in which the location and display of knowledge, as well as the relationship between science and industry, would be understood. Under threat from the capacity of machines to control industrial production, the artisan maintained control of skill or specialized knowledge through the formation of mechanics institutes.<sup>10</sup> Such institutes established the standards of mastery for technical application, but at the same time separated the class of investigator from that of applicator. The scientist remained in his laboratory and the mechanic in the factory, and these conditions created the opportunity for an instructional setting in which discovery could serve application. By the mid 19<sup>th</sup> century, the term *technology*,<sup>11</sup> was applied to the "science of the mechanical and industrial arts" and this new field established a middle ground where the exhibition

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argued for the application of inductive reasoning and a scientific method which combined observation and theory.

<sup>7</sup> Herschel, John Frederick William (1838) *A Preliminary Discourse on the Study of Natural Philosophy*. Carey and Lea. Philadelphia. P52

<sup>8</sup> Ibid.

<sup>9</sup> Ibid..

<sup>10</sup> The first Mechanics Institute was formed in Edinburgh, Scotland in 1821. The purpose was to provide instruction in the mechanical arts to workers. Such institutes spread across Britain and housed libraries of technical books for members. These were the first libraries available to the public, and holdings were often transferred to libraries created after the Public Libraries act of 1850.

<sup>11</sup> During the debate concerning the establishment of a position of Curator of Technology, attendant with the creation of the Industrial Museum in Edinburgh in 1855, J.D. Forbes, professor of Natural Philosophy at the University of Edinburgh wrote to the University Senate: "I am surprised to find the [commission] includes no definition of that very vague term [technology] now introduced (for the first time I believe in Britain) as the title of a chair. The word is not to be found in Johnson's Dictionary, and as far as etymology goes, it might apparently entitle the Professor to lecture on any subject within the faculty of Arts...This is the proper time...for the Senatus to give expression to their opinion of what subjects really ought to be included under this most vague and indefinite commission." Quoted in Anderson, R.G.W. (1992) "What is Technology?: Education through Museums in the Mid-Nineteenth Century". *The British Journal for the History of Science*. Vol 25. No 2. P 177.

or public lecture took place. The sea-change of industrialization called for investigative production which could no longer cling to the mantle of secrecy which had protected the status of artisans through guild membership, and before the practice of patent was entrenched, public clamor for novelty created a new means for establishing utility and authority.

Display of the novel and the rare had long served to represent power and define the place of man in the world. Private collections, which had been maintained as curiosity cabinets and *wunderkammer*, had become the foundational holdings of public museums. The advent of department stores created another display place for manufactured goods and these new institutions encouraged public visual consumption. Nations marketed their industrial achievements by staging international exhibitions and the newfangled public showed a voracious appetite for exhibitions. There were six million visitors to the Great Exhibition, staged in London in 1852, when the total population of England was only eighteen and a half million. Popular interest guaranteed an audience for novelty and marketing opportunities for scientists and inventors as well as nations. "Showmanship could provide a means of linking the maker with his machine in the public eye whilst conforming to the principles of a free marketplace."<sup>12</sup> A curious public combined with the interests of industrialist, scientist, educator, politician, and impresario established a culture of exhibition in which venues for display proliferated.

Popular shows of all kinds proliferated in late Regency London. The curious could choose between dissolving views, panoramas and dioramas, waxworks and exhibitions of sculpture and painting. Purpose-built buildings such as the Egyptian Hall or the Great Globe in Leicester Square featured an almost infinite variety of attractions. The Colosseum in Regent's park had been designed specifically to house a spectacular panorama, representing the city of London as seen from the dome of St Paul's Cathedral.<sup>13</sup>

For example, between the years of 1847 and 1872, John Henry Pepper lectured at the Royal Polytechnic Institution opened in 1838 on Regent Street in London. (Figure 3.2) Scientist and showman, "Professor Pepper," as he was called, demonstrated the discoveries of the age in public lectures famous for their spectacular effects. (Figure 3.3, 3.4) "His induction coil, added to his repertoire in 1869, produced a spark nearly a meter long."<sup>14</sup> He amazed audiences with his "ghosts," effected by plate glass, screens and lighting, and authored four books, the *Boy's Playbook of Science* (1860), the *Playbook of Metals* (1861), *Scientific Amusements for Young People* (1861), and the *Cyclopaedic Science Simplified* (1869). Pepper's lectures and publications were among many such

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<sup>12</sup> Morus, Iwan Rhys (1996) "Manufacturing Nature: Science, Technology and Victorian Consumer Culture". *The British Journal for the History of Science*. Vol 29. No 4. P418.

<sup>13</sup> Ibid..

<sup>14</sup> Secord, J. A. (2002) "Quick and Magical Shaper of Science". *Science*, New Series. Vol 297. No 5587. P 1648.

popular displays of scientific discovery which served to both link the laboratory with education for the masses, and wrest the world of science from the exclusive purview of the class of privilege.

Of more serious intent, private lectures were available as supplement to university courses, and often available to non-matriculated students or the lay public. These extra-mural lectures were the source of income for those who did not have a university appointment and proliferated in the space opened by the new industrial and mechanical arts. Such a lecturer was Thomas Huxley. Born in 1825, he was the son of a mathematics teacher, and due to family financial difficulties, ended his formal education at age ten. Through self-directed study and surgical practice apprenticeships, he qualified for admission to the University of London where he passed the first of his Bachelor of Medicine exams at the age of twenty. In need of income, he applied to the Royal Navy and secured a position as Assistant Surgeon on the HMS Rattlesnake which sailed to New Guinea and Australia in 1846. Huxley devoted his time aboard the Rattlesnake to the study of marine invertebrates and forwarded to England papers for publication. Upon his return, he was elected a Fellow of the Royal Society in 1850, and in 1854 he became a professor at the Royal School of Mines.<sup>15</sup>

Huxley was also appointed naturalist to the Geological Survey, was Fullerian Professor at the Royal Institution, Hunterian Professor at the Royal College of Surgeons, President of the British Association for the Advancement of Science, and ultimately served as the president of the Royal Society. In addition to scientific papers, he published a series of popular books intended for a lay audience, and lectured publicly and in night classes for working people. These positions gave him a public platform from which he contributed to the construction of a new identity for the man of science. “The middle-class Young Turks of science like Thomas Henry Huxley and John Tyndall,<sup>16</sup> who came from outside the Oxbridge environment, began at the middle of the century to vie with the gentlemen of science for the leadership of the British scientific world and the accompanying cultural authority. They presented an alternative view of culture and society that drew its inspiration from evolutionary modes of thought.”<sup>17</sup> While ultimately losing out to the vision of Richard Owen,<sup>18</sup> Huxley engaged in the

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<sup>15</sup> It was in this capacity that Patrick Geddes became his student in 1877.

<sup>16</sup> John Tyndal (1820-1893) Irish-born experimental physicist. Elected to the Royal Society in 1852, his work in magnetism encouraged Michael Faraday to recommend him for appointment of Professor of Natural Philosophy (Physics) at the Royal Institution in London in 1853. He assumed Faraday's position at the Institution upon Faraday's retirement.

<sup>17</sup> Lightman, Bernard (1997) *Victorian Science in Context*. Bernard Lightman, ed. The University of Chicago Press. Chicago. P3.

<sup>18</sup> Richard Owen (1804-1892) British biologist, comparative anatomist and paleontologist. Studied medicine briefly at the University of Edinburgh before completing his studies in London. Instead of pursuing the practice of medicine, he became assistant curator at the Royal College of Surgeons, where he was appointed Hunterian Professor in 1839, and curator in 1849. In 1856 he was made superintendant of the natural history department of the British Museum and was engaged in the design of the Natural History Museum. He helped create models of dinosaurs for the Great Exhibition of 1852.

debate of the design for the Museum of Natural History in London, contending for a didactic arrangement which preserved laboratory space juxtaposed with the specimen collections. His view was that the museum should accommodate the research needs of the working scientist. Owen argued for the museum as a place of public display and instruction, more in keeping with a tradition of the collection as a fulsome exhibition of the conspiracy of man's dominion with divine will.<sup>19</sup>

Huxley envisioned the extensive scientific collections, bones and folded skins, stored in the drawers and cabinets of a facility where naturalists could conveniently compare specimens to living animals. In accord with Huxley, Darwin saw stuffing skins and rebuilding skeletons as crowd-pleasing techniques and proof of 'a sort of vanity in the curators.' This remark was probably directed to Richard Owen, who wanted to reconstruct beasts for a unified, large, encyclopedic museum that would serve as an ideal model of Creation.<sup>20</sup>

Not only were the findings of science debated within the community of investigators, but the nature of presentation and display of findings was contested as well. *How* knowledge was disseminated and by *whom* it was consumed was as controversial as any discovery or advanced proposal in science. In the class-dominated society of nineteenth century Britain, *who* could contribute to the body of knowledge was gradually removed from the rank of "gentlemen" to include "professionals," and the role of public audience became essential to acceptance of narrative constructs. Public venue had served as the means by which distinction and legitimacy of disciplines in the sciences were established, and as Geddes sought to establish the science of town planning, he resorted to the creation of a museum to serve that aim.

### The Outlook Tower

In 1892 Geddes secured a five-story building at the top of the Royal Mile in Edinburgh which would become his applied civics laboratory. Here he could train observers to apply the lenses he had devised and in that sense, the Outlook Tower was an instrument itself with procedures as specific as those of the microscope in the dissection laboratory. Friend and economist James Mavor recounts the beginning of the Outlook Tower:

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Owen was among those who publicly debated Darwin's proposals, and was an opponent of Darwin's views. Huxley publicly and persistently attacked Owen, whose vehemence and animosity toward those with whom he disagreed resulted in Darwin saying, "I used to be ashamed of hating him so much, but now I will carefully cherish my hatred & contempt to the last days of my life." Owen coined the word "dinosauria."

<sup>19</sup> White, Paul (2003) *Thomas Huxley: Making the 'Man of Science'*. Cambridge University Press. Cambridge.

<sup>20</sup> Yanni, Carla (1996) "Divine display or Secular Science: Defining Nature at the Natural History Museum in London". *The Journal of the Society of Architectural Historians*. Vol 55. No 3. P 277.

I happened to be with Geddes when the idea came into his mind. One day in a moment of leisure we paid our coppers and ascended the tower to look at the passing show as it appeared in this huge periscope. He found that the tower was purchasable for a relatively small sum. With characteristic decision and energy Geddes immediately bought the tower, retained the camera-lucida as its crowning glory, and furnishing the lower rooms with maps and other aids to the study of the region of Edinburgh, named the building appropriately Outlook Tower. It was indeed symbolical of a new outlook upon life from the point of view of an Edinburgh encyclopaedist.<sup>21</sup>

Located at the top of the Royal Mile, adjacent to the Castle esplanade, the Outlook Tower occupied the highest point in Edinburgh below the castle. (Figure 3.5) Geddes purchased the building from Maria Short who had operated an observatory and museum, "The Museum of Art and Science," in the building since 1835.<sup>22</sup> (Figure 3.6) Geddes described the Outlook Tower as "the centre of [the University's] geographical, historical, social and economic studies, and of its annual Summer Meeting for teachers."<sup>23</sup> There was a *camera obscura* installed on the uppermost floor, surrounded by a parapet from which the city and region could be viewed.

As in every 'Aussichthurm' [watchtower], the general view requires to be supplemented by a Telescope and Orientation Table indicating the main features of the landscape. With these is further associated the orientation of unseen places throughout the whole world by means of the Episcopo of M. G. Guyou, while a Tellurian Cosmosphere<sup>24</sup> and Star-map extend this orientation to its further limits.<sup>25</sup>

Geddes intended that visitors learn to see in a new way, and upon arrival, visitors were removed from the everyday as they climbed through the five-story stairwell to arrive at

<sup>21</sup> Mavor, James (1923) *My Window on the Street of the World*. Vol 1. E.P Dutton & Company. New York. P216.

<sup>22</sup> Maria Short was the daughter of Thomas Short who was the brother of James Short, optician. James Short (1710-1768) was born and educated in Edinburgh where he was encouraged in his optical work by Colin Mclaurin, lecturer in mathematics at the University of Edinburgh. James Short relocated to London where he became a successful maker of telescopes and was elected fellow of the Royal Society in 1737. He was the principal British collator and computer of the Transit of Venus observations made throughout the world in 1761. When he died, his brother Thomas took possession of his instruments and removed them to Edinburgh where an observatory was built on Calton Hill in 1776, designed by James Craig who also designed the plan for the New Town in Edinburgh.

<sup>23</sup> Geddes, Patrick. Undated manuscript. T-GED 7/6/3. Univeristy of Strathclyde Archives.

<sup>24</sup> From *A New English Dictionary on Historical Principles Founded Mainly on the Materials Collected by the Philological Society, Vol II, Part II, The Clarendon Press, Oxford, 1893*: "cosmosphere, an apparatus for showing the position of the earth at any given time, with respect to the fixed stars. It consists of a hollow glass globe, on which are depicted the stars forming the constellations, and within which is a terrestrial globe.

<sup>25</sup> Geddes, Patrick. Undated manuscript. T-GED 7/6/3. Univeristy of Strathclyde Archives.

the roof of the building: "Perhaps you wondered why I hurried you up here from the street? Simply because the exertion of climbing makes one's blood circulate more rapidly, thus clearing fog out of the brain and preparing one physiologically for the mental thrill of these outlooks."<sup>26</sup> Visitors arrived upon the parapet where, as if prepared on a slide for the microscope, the specimen *Edinburgh* was confronted through various instruments. (Figures 3.7, 3.8)

...we pass...onto a narrow gallery which encircles the outside of the turret some eighty feet above the ground. "Now you can see what I mean by the 'Outlook Tower,' says [Geddes] with a sweep of his arm. And so we do in an instant, from this height there is a panorama so extensive and so magnificent that tired limbs are quickly forgotten. All of Edinburgh and its surrounding region for many miles is spread out before us offering varied and striking outlooks towards whatever point of the compass we turn...And he continues this theme by saying that the fundamental significance of the Outlook Tower is that it gives one a *complete* view of his surroundings, a broad *outlook* over an entire valley section from mountains to the sea. Indeed, many of us were getting from this high gallery our first conception of what a natural region actually is and of how a great city is linked to such a region."<sup>27</sup>

The "orientation table" mentioned by Geddes is actually the parapet itself, where directional arrows and names of towns are inscribed in the granite coping. (Figure 3.9) This parapet affords a 360-degree view of the city and surrounding region, further gathered by a telescope. Biographer Amelia Defries describes her visit to the parapet of the Outlook Tower with Geddes:

...on the open roof is the Prospect of the Sciences. Here Geddes or his pupils at times expound the analysis of the Outlook into its various aspects -- with telescope and other devices...astronomic and topographic, geological and meteorological, botanical and zoological, anthropological and archaeological, historic, economic, and so on, and for each science is indicated its immediate and local problems, under their eyes."<sup>28</sup>

From the parapet, visitors, now investigators, adopted the "lenses" of many disciplines in gathering observations. As with the regional survey exhorted by Geddes, there is need to "...fully survey and interpret the city for which we are to plan...its collective

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<sup>26</sup> Boardman, Philip (1978) *The Worlds of Patrick Geddes: Biologist, Town planner, Re-educator, Peace-warrior*. Routledge and Kegan Paul. London. P 139.

<sup>27</sup> Boardman, Philip (1944) *Patrick Geddes: Maker of the Future*. University of North Carolina Press. Chapel Hill. Pp178-179.

<sup>28</sup> Defries, Amelia (1928) *The Interpreter Geddes: The Man and His Gospel*. Boni and Liveright. New York. P96.

soul...in some measure discerned." <sup>29</sup> Geddes called for an analysis "...in its various aspects -- astronomic and topographical, geological and meteorological, botanical and zoological, anthropological and archaeologic, historical and economic, and so on." <sup>30</sup> He continues: "Each science is thus indicated, in its simple yet specialised problem. This and that element of the whole environment is isolated, by the logical artifice of science from the totality of our experience." <sup>31</sup> That is to say that the city, displaced from its quality as a familiar environment by virtue of having been placed upon the viewing "platform," is now a specimen, subject to examination by investigators whose perspective is governed by the particularities of discipline.

We cannot be long on the roof without interesting ourselves in the weather. We shall be particularly alive to sun or shower, wind or calm, genial warmth, or icy cold, so that whether we will or no we are obliged for the moment to be meteorologists! In the same way we can hardly look at the great Castle Rock and the valley below without at least being reminded of the mighty forces which have piled the one and dug the other; that is for the moment we are looking through the geologist's eyes. <sup>32</sup>

Telescope, star-map, cosmosphere, <sup>33</sup> and episcope are the noted visual devices by which visitors made an outward examination of the city, extending the reach of that examination into the far universe. Though "episcope" was a term for what today would be called a slide projector, it seems likely that Geddes meant by this a device which was advertised as "The Hollow Globe: A New Geographical Apparatus by George Guyou" <sup>34</sup> in a pamphlet published by Geddes. (Figure 3.10) This device, according to the pamphlet:

...shows quite clearly the relations of any part of the world to a chosen point (in this case Edinburgh) both as regards distance and direction. In addition the Hollow globe shows a picture, when properly oriented, of the earth's features as they would be seen from the chosen point were the earth transparent. <sup>35</sup>

Philip Boardman described this device, encountered on his visit to the Outlook Tower:

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<sup>29</sup> Geddes, Patrick (1915) *Cities in Evolution*. Williams and Norgate. London. Pp xxvi-xxvii.

<sup>30</sup> *Ibid.*. P323.

<sup>31</sup> *Ibid.*

<sup>32</sup> *A First Visit to the Outlook Tower* (1906) Published by Geddes and Colleagues. The Outlook Tower. Castlehill. Edinburgh. P 11.

<sup>33</sup> A cosmosphere is a terrestrial globe mounted within a transparent globe upon which the fixed stars and constellations are marked, thus allowing one to view the relative position of stars to terrestrial locations.

<sup>34</sup> *George Guyou* was the name used by Paul Reclus who was the nephew of geographer and anarchist Elisee Reclus.

<sup>35</sup> *The Hollow Globe*. Undated. Published by Patrick Geddes and Colleagues. The Outlook Tower. Castlehill. Edinburgh. T-GED-7/8/69. University of Strathclyde Archives.

Finally there is a curious and ingenious device called the Episcopo which allows one to visualize the world as if it had suddenly become transparent under his feet. Looking into a round glass case at a strangely distorted map, we behold the earth in the perspective it would have from this tower: continents and oceans seemingly turned inside out and backwards, Scandinavia a large imposing mass while Australia is shriveled up to a tiny spot, and similarly for other lands far and near. What a fertile challenge to minds accustomed only to conventional flat maps and to globes! <sup>36</sup>

Following this initial gathering of observations from the roof of the tower, visitors then entered the *camera obscura*. This room, at the top of the building, is entered by a short flight of steps. (Figure 3.11) A small mirror, mounted on the roof, may be rotated from within the room and reflects through two lenses the view of the street below onto a circular, concave table at the center of the room. In a guidebook, *A First Visit to the Outlook Tower*, (Figure 3.12) Geddes describes the *camera obscura* as “a huge photographic camera...but, instead of standing outside, we enter it bodily.”<sup>37</sup> In his “Explanation of the Camera Effect” he continues:

What is the explanation of this fresh beauty given by the camera? How does its picture differ from what we saw outside? Without entering into technicalities it is easy to see that in the camera image the intensity of daylight is subdued in course of its reflection from the mirror above and its transmission through the camera lens, its enlargement upon the table, and finally, its reflection from this to our eyes, so that this diminished quantity of light corresponds to that reflected to our eyes from a picture. Still more important, each object is shown in its truth of colour, and in its actual relations of tone; since from the image we get of it, made by the sheaf or pencil of rays which it is actually reflecting at the moment, there are stopped off all the irrelevant cross-rays from all parts of the sky and from surrounding objects; for it is these which, to our everyday vision, so much tend to veil and overpower the colour, the tone, the pictorial truth and beauty of things. Thus it comes about that the camera, which to those who have not seen it, may seem something unnecessary, perhaps even childishly simple, becomes for those who use it, one of the very richest of aesthetic luxuries. Nay, more, it becomes understood as a means of recovering that appreciation of beauty which, under modern city conditions

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<sup>36</sup> Boardman, Phipp. (1944) *Patrick Geddes: Maker of the Future*. The University of North Carolina Press. Chapel Hill. P184.

<sup>37</sup> *A First Visit to the Outlook Tower* (1906) Published by Geddes and Colleagues. The Outlook Tower. Castlehill. Edinburgh. T-GED-5/1/35. University of Strathclyde Archives.

of atmosphere and surroundings, of education, alas, also, become dulled in too many of us, if not left dormant altogether.<sup>38</sup>

Far from providing an experience free of subjective influence, the role of these optical instruments is one of mediation, for through them the outside world is collected, but in particular ways which lend these vistas to an interpretive experience. None of these instruments are purely for "looking at," and depart from mechanical objectivity both in their subjective intention and dependence on subjective perception. Where, as Lorraine Daston and Peter Galison explain, the optical instruments of the nineteenth century served an ideal of objectivity which absolved scientific vision of will,<sup>39</sup> Geddes subjugates vision to will, for "what is so often missed by scientific and philosophic minds, that the synthetic vision to which they aspire may be reached more simply from the aesthetic and the emotional side, and thus be visual and concrete."<sup>40</sup> In so doing he both returns to an earlier practice of synthetic idealization which had yet, significantly, persisted in botanical illustrations, and anticipates the modern practice of trained judgment, for in the beginning of the twentieth century Daston writes, "the ethical virtue of self-eliminating pictorial practices was confronted by a new form of epistemic ethic associated with active and highly trained judgment."<sup>41</sup> Such judgment captured the collective force of type images with the observer no longer a passive receptor, but an active participant in construing hypothesis or meaning. John Dewey,<sup>42</sup> in his 1934 *Art as Experience* (Geddes met Dewey on his visit to America in 1899-1900), develops the idea of the psychological agent in aesthetic experience:

In seeing a picture, it is not true that visual qualities are as such, or consciously central, and other qualities arranged about them in an accessory or associated fashion...These are stimuli to which we respond with emotional, imaginative, and intellectual values drawn from ourselves, which then are ordered by interaction with those presented through the medium of words. The colors seen in a picture are referred to objects, not to the eye. For this reason alone are they emotionally qualified up to the point sometimes of hypnotic force, and are significant or expressive... When we perceive, by means of the eyes as causal aids...it is certain that

<sup>38</sup> *A First Visit to the Outlook Tower* (1906) Published by Geddes and Colleagues. The Outlook Tower. Castlehill. Edinburgh. T-GED-5/1/35. University of Strathclyde Archives..

<sup>39</sup> Daston, Lorraine and Peter Galison (2007) *Objectivity*. Zone Books. New York.

<sup>40</sup> Geddes, Patrick (1968) *Cities in Evolution*. Harper and Row, Publishers. New York. P 321.

<sup>41</sup> Daston, Lorraine and Peter Galison (2007) *Objectivity*. Zone Books. New York.P 319.

<sup>42</sup> John Dewey (1859-1952) American Pragmatist philosopher, earned his PhD from Johns Hopkins University, studying under Charles Sanders Peirce, joined the faculty of the University of Chicago in 1894. Elected president of the American Psychological Association in 1899 at which time he joined the faculty of Columbia University. With Thorstein Veblen founded The New School for Social Research in New York in 1919. Among his publications are *Democracy in Education* (1916), *Human Nature and Conduct* (1922), *Art as Experience* (1934).

other qualities than those of the eye are conspicuous and controlling in perception." <sup>43</sup>

James Krasner has argued that following Darwin's proposed theory of evolution, man takes his place within the evolutionary process and loses his status of supremacy. The eye, embodied, is no longer all-seeing but "physiologically limited."<sup>44</sup> Such limitations subject vision to scientific study and invite investigation of perception, and optical devices both serve and demonstrate such investigation. The role of consciousness and the power of the mind to integrate visual experience inevitably admit the psychological, and within such an understanding Geddes may invoke the "aesthetic and emotional." The imagination, governed by attributes of consciousness, acts as "a licensed trespasser", <sup>45</sup> and, in a sense, recovers its omniscient power. The city and region, once sufficiently experienced as a panorama, now mediated by instruments and the physiologically limited eye, rely upon the synthetic achievement of consciousness to project a city free of temporal and spatial restraints, that is to compose in imagination a future city. <sup>46</sup> For Geddes, the view of the present city presented also the past and future, possible city: "The general principle is the synoptic one, of seeking as far as may be to recognize and utilize all points of view – and so to be preparing for the Encyclopaedia Civica of the future."<sup>47</sup> As we shall see, the experience of the Outlook Tower afforded visitors the opportunity to construct in imagination an operative and idealized city as a basis for planning interventions.

Upon entering the *camera obscura*, the visitor left the world of *outlook* and began what for Geddes was the *inlook*. Arriving in a dark room, all that could be seen was an image of the city, captured through mirror and lens and projected onto a round table in the center of the room. (Figure 3.13) At first only a dim image, its clarity increased as eyes adjusted to the light conditions. As the outside mirror rotated, controlled by a wand dangling above the table, a 360-degree view of Edinburgh and its environs danced upon the table. No still image, the activity of the street – pedestrians, vehicles, passing clouds, circling gulls and wind-whipped flags – played out before visitor's eyes, miniaturized and contained. On a visit to the *camera obscura* at the Outlook Tower in 2010, a guide demonstrates a folded card placed upon the table over which projected pedestrians and busses climb, enhancing the effect of a view into a Lilliputian world overseen by inquisitive Gullivers. This manipulation of scale and the voyeuristic nature of the experience can't help but suggest that the lens is an omniscient eye and spectators operate within the *camera* as the mind. At the same time, the city, objectified

<sup>43</sup> Dewey, John (1980) *Art as Experience*. Perigree Books. New York. P 123.

<sup>44</sup> Krasner, James (1992) *The Entangled Eye: Visual Perception and the Representation of Nature in Post-Darwinian Narrative*. Oxford University Press. Oxford. Introduction.

<sup>45</sup> Elliot, George. (2004) *Adam Bede*. Signet Classics. P 73. "Yes, the house must be inhabited, and we will see by whom; for imagination is a licensed trespasser: it has no fear of dogs, but may climb over walls and peep in at windows with impunity."

<sup>46</sup> Dewey, John (1980) *Art as Experience*. Perigree Books. New York. P 267.

<sup>47</sup> Geddes, Patrick (1968) *Cities in Evolution*. Harper and Row, Publishers. New York. P 320.

through miniaturization, appears again as a specimen upon a table with investigators gathered to examine it. "We recognize the buildings and landscapes, but they are all magically different now, like highly colored miniatures of country and city scenes placed right under our hands."<sup>48</sup>

The guide book for the Tower explains that the *camera*

...helps the ordinary observer to see the familiar scene somewhat in the way that the artist has trained himself habitually to do, and thus enables him better to understand the artist's vision. He has had a lesson in the art of seeing.<sup>49</sup>

Philip Boardman recalls Geddes claiming that the camera provides the "artist's point of view" for,

...like Ruskin, he tells us that few people have ever really learned to see with their eyes, that the Princes Street Gardens are just a confused mass of green to them and the buildings of the city merely blotches of gray. 'How can anyone understand this world, not to mention improve it, if he cannot even see it accurately to start with? We must reeducate our eyes so that we can first of all be in more effective visual contact with external reality. Now the Tower can do just this by the complementary panoramas from gallery and through the Camera. The first gives us views which would arouse even a dullard by their sheer scope and variety, while the latter can train our eyes to detect subtle distinctions of line and color. The one provides that all-inclusive view of the world which both practical man and philosopher need, while the other symbolizes the universal viewpoint of the artist who finds beauty everywhere.'<sup>50</sup>

John Ruskin argued in both *The Elements of Drawing* and *Modern Painters* for the necessity of training the eye to see, or rather, developing the mind so as to judge the offerings of the eye. Consistent with contemporary debates about the nature of perception, Ruskin maintained that:

The perception of solid Form is entirely a matter of experience. We see nothing but flat colours; and it is only by a series of experiments that we find out that a stain of black or grey indicates the dark side of a solid

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<sup>48</sup> Boardman, Philip. (1944) *Patrick Geddes: Maker of the Future*. The University of North Carolina Press. Chapel Hill. P180.

<sup>49</sup> *A First Visit to the Outlook Tower* (1906) Published by Geddes and Colleagues. The Outlook Tower. Castlehill. Edinburgh. T-GED-5/1/35. University of Strathclyde Archives.

<sup>50</sup> Boardman, Philip. (1944) *Patrick Geddes: Maker of the Future*. The University of North Carolina Press. Chapel Hill. P181.

substance, or that a faint hue indicates that the object in which it appears is far away.<sup>51</sup>

Through the course of the nineteenth century, the understanding of visual perception was wrested away from acceptance of the eye and the observer as passive receptors and finally assumed an active, apprehensive role for the observer whose eye was now a mediating instrument which subjected the objective world. Famously asserting that an artist must recover “the innocence of the eye,”<sup>52</sup> Ruskin thus makes clear his position that visual perception is an illusory construct of the mind. In his first volume of *Modern Painters*, Chapter II: “Truth Not Easily Discerned,” he begins by explaining the necessity of training the eye to make reasoned judgment:

...it is possible for all men, by care and attention, to form a just judgment of the fidelity of artists to nature....To do this...are required...powers, namely, of observation and intelligence, which by cultivation may be brought to a high degree of perfection and acuteness. But until this cultivation has been bestowed, and until the instrument thereby perfected has been employed in a consistent series of careful observation, it is as absurd as it is audacious to pretend to form any judgment whatsoever respecting the truth of art...<sup>53</sup>

Geddes, too, writing in his *Every Man His Own Art Critic: An Introduction to the Study of Pictures* asserts the need to educate the eye:

The subject of our picture we must, of course, apprehend and discuss with the intellect; whereas our appreciation of treatment is primarily a question of the senses, and so depends upon their natural delicacy and subsequent training.<sup>54</sup>

The Molyneux question had intrigued philosophers for two hundred years prior to Geddes' writing. Concerned with the capacity of a sight-restored blind man to recognize by sight shapes previously known to him only through touch, the question opened a path of inquiry which led away from perception of space as an abstract, geometricized idea and into an understanding of space as a judged condition constructed through sensory experience tempered by the mind.<sup>55</sup> By the time that Geddes opened the

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<sup>51</sup> Ruskin, John (1857) (1907) *The Elements of Drawing and the Elements of Perspective*. J. M Dent and Sons. London. P 3.

<sup>52</sup> Ibid.

<sup>53</sup> Ruskin, John (1873) *Modern Painters*. Vol 1. Frank F. Lovell and Company. New York. P 116.

<sup>54</sup> Geddes, Patrick (1888) *Every Man His Own Art Critic: An Introduction to the Study of Pictures*. William Brown. Edinburgh. P12.

<sup>55</sup> In George Berkely's 1709 *New Theory of Vision*, he objects to the Cartesian understanding of space derived from natural geometric ideation, “Moreover it is evident that no idea which is not itself perceived can be the means of perceiving any other idea.” Additionally, he responds to the Molyneux problem by

Outlook Tower, studies in optics and visual perception no longer discounted subjective influence, and writers like Geddes, as Ruskin before him, included aesthetic judgment as a legitimate concern in the opening field. Just as trained judgment had replaced mechanical objectivity as a means of scientific consensus, the truth of beauty was understood as something which could be measured by a combination of emotional and rational faculties. Echoing earlier conversations about the sublime and the beautiful, late nineteenth century and early twentieth century writers addressed judgment of beauty in the confluence of the science of optics and psychology. When Geddes writes of the *camera obscura* as “a means of recovering that appreciation of beauty,” that the “diminished quantity of light corresponds to that reflected to our eyes from a picture,” or that it “enables him better to understand the artist’s vision” he is conflating science and art through the use of optical instruments.

In his description of the effect of the *camera obscura* he is at pains to explain that it reduces “irrelevant cross-rays from all parts of the sky and from surrounding objects.” In contrast, an 1861 description of the use of the microscope recommends the fixing of mirrors so as to illuminate specimen: “Opposite to the microscope, and about a foot away from it, is the lamp with the edge of the flame presented to the microscope, the concave mirror of which is so arranged as to receive the rays from the flame and direct them up the tube of the microscope.”<sup>56</sup> Whereas one would expect that the optical instruments upon the Outlook Tower would enhance visual experience, Geddes here is extolling a diminishment of the view, “for it is these [rays] which, to our everyday vision, so much tend to veil and overpower the colour, the tone, the pictorial truth and beauty of things.”<sup>57</sup> A margin note in *A First Visit to the Outlook Tower* guidebook states, “Whistler’s art omits or degrades local colour for simplicity and unity’s sake.”<sup>58</sup> If unity supersedes truth then the *camera obscura* becomes a tool, not of the scientist, but of the artist, and it becomes clear that he wields this tool as an artist with a convex mirror or a Claude glass.

The Claude glass, so named because of its association with the artist Claude Lorraine is a colored glass the effect of which is to reduce the tone of color of the scene, which an artist held so as to view a prospective subject, and from which his painting would be made. Ruskin described the effect:

Every one knows what is called a Claude glass. We see nature through a coloured medium – yet we do not doubt that we are looking at nature – at trees, at water, at skies – nay, we admire the colour – see its harmony and

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asserting, “For our judging objects perceived by sight to be at any distance, or without the mind, is entirely the effect of experience...”

<sup>56</sup> Wood, J.G. (1861) (1948) *Common Objects of the Microscope*. Routledge and Kegan Paul Ltd. London. P 22-23.

<sup>57</sup> *A First Visit to the Outlook Tower* (1906) Published by Geddes and Colleagues. The Outlook Tower. Castlehill. Edinburgh. P 9. T-GED-5/1/35. University of Strathclyde Archives.

<sup>58</sup> Ibid.

many beauties – yet we know them to be, if we may use the term, misrepresented. While speaking of the Claude glass, it will not be amiss to notice a peculiarity. It shows a picture – when the unaided eye will not; it heightens illumination – brings out the most delicate lights, scarcely perceptible to the naked eye, and gives greater power to the shades, yet preserves their delicacy. It seems to annihilate all those rays of light, which, as it were, intercept the picture – that come between the eye and the object.<sup>59</sup>

In use also was the convex mirror which, because of the distortion of the curved glass, both flattens the perception of depth and corrects for loss of clarity at the periphery of the visual field. Its origin is found in early mirrors which were made of polished obsidian and such mirrors were applied in the occult sciences as scrying mirrors. The mirror's tradition as a tool of speculation carries into Geddes' use of it as a means to see past the veil of "everyday vision." A convex mirror can be seen hanging outside the entrance to the *camera obscura* at the Outlook Tower. (Figure 3.11) He describes the convex mirror as a "characteristic optical instrument...long and largely used by artists."<sup>60</sup> He continues:

Its miniature-like perfection of detail, its helpfulness towards grouping have been of the greatest influence upon artists and teachers, but so also have its defects of blackness and consequent falsity of colour and tone.<sup>61</sup>

Arnaud Maillet, in *The Claude Glass*,<sup>62</sup> directs us to the work of Roger de Piles who in 1743 wrote *The Principles of Painting*. In this treatise he writes of the truth of painting and the techniques by which truth may be achieved. *Claro-obscuro*, by which he intends a softening of tone, is one necessary technique:

The simple, which I call the primary truth, is a plain and faithful imitation of the motions that express nature, and of those objects which the painter has chosen for his copies, such as they appear to the eye at first sight; so as the carnations may seem to be real flesh, and the draperies real stuffs, in their several varieties, and each object maintain the true character of its nature, and, by the force of the *claro-obscuro*, and of the union of colours,

<sup>59</sup> Ruskin, John (1903-12) *The Library Edition of the Works of John Ruskin*. E.T. Cook, ed.A.D.O. Wedderburn. London. Quoted in *John Ruskin: The Critical Heritage*. Bradley, John Lewis [Quotes from 'Not long ago' to 'blaze of the sea', 'Works' 3:278-80] P 52

<sup>60</sup> *A First Visit to the Outlook Tower* (1906) Published by Geddes and Colleagues. The Outlook Tower. Castlehill. Edinburgh. P 9. T-GED-5/1/35. University of Strathclyde Archives.

<sup>61</sup> *Ibid.* P 10.

<sup>62</sup> Maillet, Arnaud (2009) *The Claude Glass: Use and meaning of the Black Mirror in Western Art*. Zone Books. New York.

the several painted objects may appear to have a relief, and the whole be harmonious.<sup>63</sup>

He argues that the “satisfaction of the eye” depends upon the subordination of parts to the whole, and the effect of *claro-obscuro* is to “hinder the eye from being dissipated.” He distinguishes between the “particular lights and shades,” by which he means the natural lighting of an object or scene, and the “general lights and shades, which we usually call the *claro-obscuro*” which “depends absolutely on the painter’s imagination, who, as he invents the objects, may dispose them to receive such lights and shades as he proposes in his picture, and introduce such accidents and colours as are most for his advantage.”<sup>64</sup> This force is introduced by the painter so as to bring the elements of the painting into relative coherence: “And by the word *claro-obscuro* is meant the art of advantageously distributing the lights and shades which ought to appear in a picture, as well for the repose and satisfaction of the eye, as for the effect of the whole together.”<sup>65</sup>

A century later, Ruskin took issue with the practice of *chiaroscuro*, arguing, as always, that beauty derives from truth, and he urged painters to learn to see the play of light and shadow in nature. He regarded *chiaroscuro* technique as a trick which corrupted the ideal of art. Writing in *Modern Painters* he explains:

I believe I shall be perfectly well able to prove...that ‘mere natural light and shade’ is the only fit and faithful attendant of the highest art; and that all tricks – all visible, intended arrangement – all extended shadows and narrow lights – everything in fact, in the least degree artificial, or tending to make the mind dwell upon light and shade as such, is an injury, instead of an aid, to conceptions of high ideal dignity. I believe I shall be able to show, that nature manages her *chiaroscuro* a great deal more neatly and cleverly than people fancy; -- that ‘mere natural light and shade’ is a very much finer thing than most artists can put together, and that none think they can improve upon it but those who never understood it.<sup>66</sup>

It is to this tradition that Amelia Defries refers when she writes in 1928 of her experience of the *camera obscura*:

...and here in the darkness, there travels anew before our eyes the whole vast view; but now lowered in tone, intensified in shadows, yet thereby glorified in lights; and with its colours refined and purified, indeed

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<sup>63</sup> De Piles, Roger (1743) *The Principles of Painting*. Eighteenth Century Collections Online Print Edition. P 18-19.

<sup>64</sup> *Ibid.* P 220.

<sup>65</sup> *Ibid.*

<sup>66</sup> Ruskin, John (1873) Vol I. Chapter III. ‘The Truth of Chiaroscuro’. *Modern Painters*. Frank F. Lovell and Company. New York. P 253.

transmuted into those of art, and changing too with every passing cloud, still more with every hour, and thus passing with the sunset through Turner's effects to Whistler's. We realize how the great Impressionists were right, for here are all their colours and 'values' shown far more clearly than in the dark mirror with which the older painters so often worked.<sup>67</sup>

So Geddes, though he eschews the dark glass, relishes the diminishment of tone, which is the inevitable effect of the *camera obscura*, and recommends the use of the convex mirror, thus borrowing techniques of the artist, and the microscopist as well. The employ of the dark mirror is like the staining of a specimen in the microscopy laboratory, which enhances observation, but also pre-determines that which will stand out in contrast. Just as an artistic rendering of a scene will depart from the given to present an imagined composition, Geddes intends that the view of the city, composed through artistic lenses, will be other than the "real," and open to the possible. Whereas Ruskin objected to the idealized landscape, arguing instead for the artist to see and present truth, Geddes deliberately invokes the ideal, but he does not substitute the ideal for the real, rather the ideal is future and possible. As Dewey writes: "When the new is created, the far and strange become the most natural inevitable things in the world. There is always some measure of adventure in the meeting of mind and universe, and this adventure is, in its measure, imagination." Geddes seeks vision beyond the visual. Existing only in imagination, the future city is an inscape composed synthetically by the mind's eye upon reflection.

Having viewed the city, first from the parapet, then through the *camera obscura*, visitors entered a solitary cell described by Geddes:

Re-entering the octagon[ The Outlook Tower is an octagonal building], we note a curtained doorway leading into a small bare cell with obscured windows. Its single chair shows that it is intended for a solitary occupant; and the little room is meant to suggest that our direct observation, our gathering of many new impressions, must be complemented by quiet reflection and meditation before it can reach its full value either for ourselves or for others.<sup>68</sup>

Philip Boardman explains that when "our heads are reeling," Geddes motions him toward this cell: "Here is the needed complement to all those outlooks on the external world."

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<sup>67</sup> Defries, Amelia (1928) *The Interpreter Geddes: The Man and His Gospel*. Boni and Liveright. New York. P96.

<sup>68</sup> *A First Visit to the Outlook Tower* (1906) Published by Geddes and Colleagues. The Outlook Tower. Castlehill. Edinburgh. P 11. T-GED-5/1/35. University of Strathclyde Archives.

Behind a curtained doorway is a tiny bare-walled cell containing nothing but a solitary chair: the beginning of an Inlook Tower. This is to symbolize the solitary meditation with which every observer must complete his studies of the outside world.<sup>69</sup>

In one of Geddes' thinking machines, he has drawn a diagram of the tower in section, and indicated this room of meditation. (Figure 3.14) At the top of the card he has written "Outworld. Inworld," and he has made a note, "See essay-lesson (Branford to us)." Under the roof appears a figure standing at the table of the *camera obscura*. The tower parapet is evident, with some instrument sitting on the coping.<sup>70</sup> A similar device is pictured in another card and may be the device which appears in a photograph taken at the Tower. (Figures 3.15, 3.16) To the left of this upper structure is written "Outworld." To the right of the structure is written "(Photo) and Drawings. Images of real world. Outworld. Concrete." The tower descends below with an indication of stairs on the right, beside which is written "Toil." On the left, and apparently outside and adjacent to the tower is a ground floor room in which is a seated figure. Beside this he has written "inworld." To the left of the bottom of the tower, is written "Cabinet of Images" and a downward pointing arrow. The arrow points to a descending list of words also connected by arrows: "Return [arrow] Memory. Flow [arrow] Reverie. Play [arrow] Fancy. Process [arrow] Art. Rearrange. Interact. as. Images." At the bottom of the card, Geddes has written: "How shall we get outworld/ inworld together so that world/mind correspond?" Dated 1904, the card shows Geddes' intention of a deliberate experience at the Outlook Tower. The "outworld," here represented by the parapet and *camera obscura* are an initial foray into the field experience of the "concrete." Observations made, specimen gathered, the visitor then enters the "inworld," and while physically descending through the tower, engages in specified processes initiated by images, but also, presumably resulting in mental images. The tower, not unlike a microscope, is an instrument which brings into focus the outworld and inworld of the imagination. Amelia Defries describes the experience and result:

As I stood, crammed with new knowledge, and upset by such sudden change in my ordinary ways of looking at things, Geddes pulled aside a curtain. 'In here you may rest awhile.' I entered a veritable cell, with plain rough walls, only roof-lit. Nothing was to be seen except a solitary chair (and a devotional one, though no one notices this). The curtain was gently pulled on me. I was alone with my thoughts. Here is the cell for meditation; for turning over in memory the outlook and its mirrored reflection, and the particular detailed studies of these. But I came to feel

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<sup>69</sup> Boardman, Philip (1978) *The Worlds of Patrick Geddes: Biologist, Town-Planner, Re-educator, Peace-Warrior*. Routledge and Kegan Paul. London. P141.

<sup>70</sup> A similar device appears on a note card beside which is written "camera/black mirrors," (Figure 3K) and may represent a device which appears to be a globe mounted on the north parapet of the Outlook Tower shown in an undated photograph (Figure 3L).

its emotional reactions. Here is the place where ones' picture is conceived – not copied – from nature. It is the room of the Weaving of Dreams.<sup>71</sup>

This departure from the outlook of science – where one would expect the collection of impressions to establish correspondence with the sensate world – and emphasis on an inner, imaginative construction of an idea of the city, speaks to the aesthetic experience as later outlined by Dewey who also acknowledges the power of reverie composing the future and possible:

...I do not think it can be denied that an element of reverie, of approach to a state of dream, enters into the creation of a work of art, nor that the experience of the work when it is intense often throws one into a similar state. Indeed, it is safe to say that 'creative' conceptions in philosophy and science come only to persons who are relaxed to the point of reverie.<sup>72</sup>

In his proposed approach to the city, Geddes is eager to include aesthetic experience, which operates as a synthesizing agent. Whereas his scientific training would suggest an approach by which an objective, morphological model would account for various observations, the inclusion of subjective influence dismisses the city as an organism observed from without, and to re-embody the specimen with the very subject of investigation. "For though this objective order [Place...Work...Folk] be fundamental, it is the complementary subjective evolution which throughout history has ever become supreme; so that our scheme must combine the outward geographic presentment with the inward psychological one."<sup>73</sup> Here Geddes is describing a graphic "scheme" wherein reconciliation of outward and inward presentment is accomplished by folding a card, but for the visitor to the Outlook Tower, "folding," and so juxtaposing observation with imagination is achieved through reflection –the double meaning of reflection as both a mirroring and speculative gesture is preserved. Geddes' provision of mirrors and lenses and reference to artistic vision makes clear that an investigation of The City demands a mental reconstruction of experience by which the observer engages with the object of study aesthetically.

The introductory experience at the Outlook Tower, where visitors first observe the region through conventional means of investigation, and then recompose experience through psychological means, established a unique construct by which visitors would then approach the additional exhibits of the museum. Geddes' published diagram of the Outlook Tower shows the sequence of display. (Figure 3.17) As visitors descend the tower, each floor accommodates displays of ever-widening regional perspective.

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<sup>71</sup> Defries, Amelia (1928) *The Interpreter Geddes: The Man and His Gospel*. Boni and Liveright. New York. P95.

<sup>72</sup> Dewey, John (1934) (1980) *Art As Experience*. Perigee Books. New York. P 275.

<sup>73</sup> Geddes, Patrick (1904) "Civics: As Applied Sociology". Dodo Press. P 100.

Whereas a geological stratigraph demonstrates layers of time, the newest layers uppermost, a section through the Outlook Tower shows it as more like a telescope, bringing into the scope of survey greater and greater distances. Conversely, like a microscope, should visitors ascend through the tower, each floor affords increased magnification. Like the adjustment of focal length of a microscope, each adjustment of a visitor to a new floor at the tower brings into focus new details of the organism, be it city or region, under observation. Within each floor, historic or temporal characteristics of the layer are in view. In such a way, the process of evolution for city, region or world is evident, and the relation of organs within the organism apparent. The complete descent or ascent shows the relatedness of systems across scales. The content of display, and the particular lessons in "seeing" attended to upon the roof, encouraged a synthetic appreciation of place, that is all parts are subordinate to a comprehension of the whole. One of Geddes' Tower note cards illustrates this. (Figure 3.18) In this drawing, the tower is a scale with "synthesis" and "analysis" on opposing ends; "natural history" falling along the scale. Boardman writes of this:

Through the devices of the Tower, Geddes sought to unify thousands of usually unrelated items of knowledge and to create in this way an intellectual counterpart to the unity of nature. He called this process *Synthesis* and then coined a new word, *Synergy*, to be its mate.<sup>74</sup>

Descending from the roof, visitors first entered the floor dedicated to "Edinburgh." The only extant photograph of the Outlook Tower exhibition shows this room. (Figure 3.19) This view is to the southwest corner of the building, and the view from the window to the right would be of the castle, the view from the windows on the left of the Royal Mile and buildings opposite the narrow street. The walls are hung with framed photographs and images, and some labels (which the quality of the photograph does not allow to be read). Chairs, a bench, and two tables are evident, as well as linen or clothing which appears to be hung from a drying rack suspended from the ceiling.

There is a relief map of the Firth of Forth region modeled on the floor of the Edinburgh room, and its walls are covered with charts showing the history of the region and, with sketches, prints and photographs, illustrating the city as it was in the past and as it is now. Other documents show what the various resources of this section are: mineral, industrial, educational, social, and so on. Finally there are maps and drawings to show what the future of Edinburgh might be, how its defects can be

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<sup>74</sup> Boardman, Philip (1976) "Patrick Geddes and His Many Worlds". *The Outlook Tower: Essays on Urbanization in Memory of Patrick Geddes*. Ferreira, J.V. and S.S. Jha, eds. Popular Prakashan Press. Bombay. P5.

remedied, and how its heritage of culture and art may best be preserved.  
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Also on display in this room was a relief model of Edinburgh created by Paul Reclus. (Figure 3.20) In an undated photograph the model is shown as though from the south east of Edinburgh. Arthur's Seat is in the foreground and Calton Hill to the right. Castlehill is in the background, showing the "craig and tail" formation which forms the "Royal Mile." Geddes writes of this model in *A First Visit to the Outlook Tower*:

This is the only model in existence which presents the vertical relief in true scale, i.e. without exaggerating the heights...Note especially the ice-sculpture of the landscape; how during the glacial period the glaciers scooped out the valleys on either side of the Castle Rock, Calton Hill, Salisbury Crags [sic], etc., and how these hollows with their (present or former) lochs all run in the same direction...the direction in which the glaciers travelled from the Pentlands to the sea...

Geddes then goes on to suggest another approach to viewing this model:

To restore the actual scene from which the facts for the model are abstracted bend down at the north side of the model, bringing the eye almost on a level with the surface, when the relief will be more clearly distinguished. Look up then to the frieze facing you on the south wall of the room (actually sketched from the corresponding situation at sea) which represents the Salisbury Craigs as seen from sea outside Leith Harbour.

Friezes which depicted views of Edinburgh were painted upon the walls of the Edinburgh Room by artists James Cadenhead<sup>76</sup> and Helen Hay.<sup>77</sup> In Geddes' suggested use of the paintings, by juxtaposing them as a background to the relief model view, it is obvious the way in which he asks visitors to synthesize experience in "seeing" the city:

...the literally solid knowledge of the facts of relief as well as contour, needs to be contrasted with, and completed by, the correspondingly general and artistic expression of the main aspects of the city...The mutual complementing of science and art is here, as elsewhere in the Tower, clearly brought out.

Geddes borrowed techniques across disciplines, in this case viewing the city simultaneously through the interpretation of geologist and artist, and in so doing he

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<sup>75</sup> Boardman, Philip (1944) *Patrick Geddes: Maker of the Future*. University of North Carolina Press. Chapel Hill. P185.

<sup>76</sup> James Cadenhead (1858-1927) Scottish landscape artist and member of the Royal Scottish Academy.

<sup>77</sup> Helen Hay (1895-1953) Member of the Celtic Revival group of artists along with John Duncan, Charles Rennie Mackintosh

maintained a synoptic and synthetic view by which no one part could be isolated from the whole. Visitors to the Tower crossed the boundaries of practice as readily as they crossed history and place, resulting in a unified perspective, expressed in Geddes' "work-place-folk" triad which accounted for the synergistic relationship of the city organism. The Outlook Tower invited visitors to be active investigators, construing for themselves a coherent narrative of experience collected through the array of devices. Anthony Vidler writes: "The city, in Geddes' terms, was rendered alive to its citizens by virtue of this didactic apparatus that, rather than separating art from life, history from the present, brought back both as integral to the life of each inhabitant."<sup>78</sup>

Descending from the Edinburgh room, the floors of the Tower accommodated displays of Scotland, Empire, Europe and the World. Accounts of the displays, including Geddes', are scanty. They report displays of charts, maps, diagrams, drawings and photographs, but little mention of the specific content of these images. Defries writes that hanging in the Scotland Room are "the alternative plans of the great project of the Forth and Clyde Canal."<sup>79</sup> She also mentions a "coloured map of the vegetation of the Highlands" prepared by Dr. Hardy.<sup>80</sup> Geddes calls out a design for a frieze, "illustrative of the history of Edinburgh and Scotland."<sup>81</sup> At the time of the publication of *A First Visit to the Outlook Tower* (1906) descriptions of both the Scotland Room and Empire Room indicate they are closed. Visitors are directed to stained glass windows in the stairwell between floors where "The Valley Section" is in one window, and the "Arbor Saeculorum" is in another. (Figure 3.21) Below is the Europe Room where "running around three walls of the room is a chart which represents in coloured diagram the stream of European history from the fourth century A.D. to the nineteenth."<sup>82</sup> Two busts, one of Dante and one of Henry IV of France, represent, Geddes explains, the spirituality of the Middle Ages, and the economic leadership in the Renaissance. this

<sup>78</sup> Vidler, Anthony (2003) "The space of history: modern museums from Patrick Geddes to LeCorbusier". *The Architecture of the Museum: Symbolic structure, urban contexts*. Michaela Giebelhausen, ed. Manchester University Press. Manchester and New York. P 166.

<sup>79</sup> Defries, Amelia (1928) *The Interpreter Geddes: The Man and His Gospel*. Boni and Liveright. New York. P97.

<sup>80</sup> Marcel Hardy (1876-1920) Belgian, studied under Geddes at the University of Dundee and graduated from the University of Edinburgh. He proposed a method of mapping vegetation which took into account conditions of site, thus making his maps particularly useful in agricultural planning. He wrote: "For a given place and for a given ensemble of natural conditions, whether physical or biological, there is a spontaneous vegetation which presents the most complete adaptation to environment, which constitutes the most perfect expression of the ensemble of the natural conditions." ("A note upon the methods of Botanical Geography". *Scottish Geographical Magazine*. Vol 18. P 409. (1902)). He wrote *Esquisse de la géographie et de la végétation des Highlands d'Ecosse*. published in 1905.

<sup>81</sup> *A First Visit to the Outlook Tower* (1906) Published by Geddes and Colleagues. The Outlook Tower. Castlehill. Edinburgh. P 19. T-GED-5/1/35. University of Strathclyde Archives.

<sup>82</sup> *Ibid*. P 29.

room also house a collection of books which "in their variety...may serve once more to remind us of the many varied aspects of the unity." <sup>83</sup>

The bottom, ground floor, is both the entrance to the Outlook Tower, and the culmination of the descent into the ever-enlarging prospect of the world. Here is found another globe, described as having been made under the direction of Elisee Reclus at a scale of 1/10,000,000. On this floor also is a collection of travel books and atlases. Here also is a bust of Pallas and a figure of Pandora which "reminds us that curiosity is the beginning of knowledge." <sup>84</sup>

Neither Boardman or Defries, or even Geddes, comment on the specific displays in the descending rooms of the tower, suggesting that there was nothing of commensurate interest to the optical devices on the roof. Boardman and Defries both comment on the novelty of descent through expanding regions, and it may be that this organization of display was sufficient to achieve the synthetic vision Geddes propounded. His many tower note cards omit details about the content of display, and focus, instead, on a general arrangement of topic. (Figures 3.22, 3.23, 3.24) In a set of three Tower note cards (Figures 3.25, 3.26) he relates the stories of the tower to processes, rather than geographic region, and makes a start at creating an analogy between the Tower and "Garden, Garden del'Arts, Forrest and Lea," though the categories of the card are not completed. These cards show that Geddes thought of the Tower as means by which actions of visitors were instrumentalized. None of the cards or Tower descriptions provide the information about inventory, that is specific content, or arrangement within display space that one might expect to be useful in planning an "index museum." What they do show is Geddes' thoughts about an intended experience. The Tower was a tool of investigation, not a repository of related material. Like his "thinking machines," the Outlook Tower provided a search space in which unanticipated relationships were discovered. The extent to which the Tower was like a "thinking machine" is revealed in two of Geddes' Tower note cards. (Figures 3.27, 3.28). The first, labeled "Objective Thought," shows the Tower in section alongside a partial plan. "Floor" is noted in three places, lending to a reading of the card as a diagram of space within and adjacent to the building. However, the Tower section becomes highly diagrammatic, with cells that seem to have no relationship to the building, and labels for cells following the pattern of other "thinking machines." A second matrix, more diagrammatic than the first is alongside. The first tower is labeled "logic," and the second "matter," with "Biodrama" between the two. It is really impossible to set up an indexical relationship within these diagrams and between these diagrams and the actual Outlook Tower. Instead the relationships are synthetic, with a general meaning for the whole derived, not from parts, but from their juxtaposition. The diagrams are thinking machines that explore the potential of the Tower as a thinking machine.

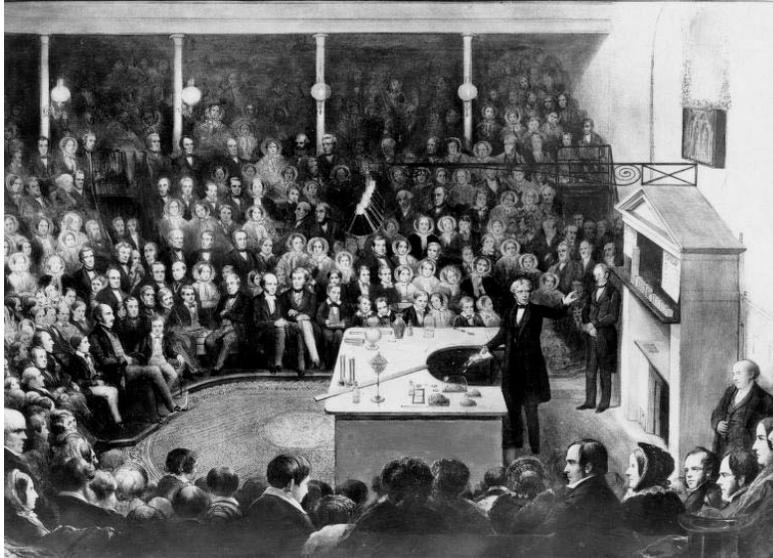
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<sup>83</sup> Ibid. P 31.

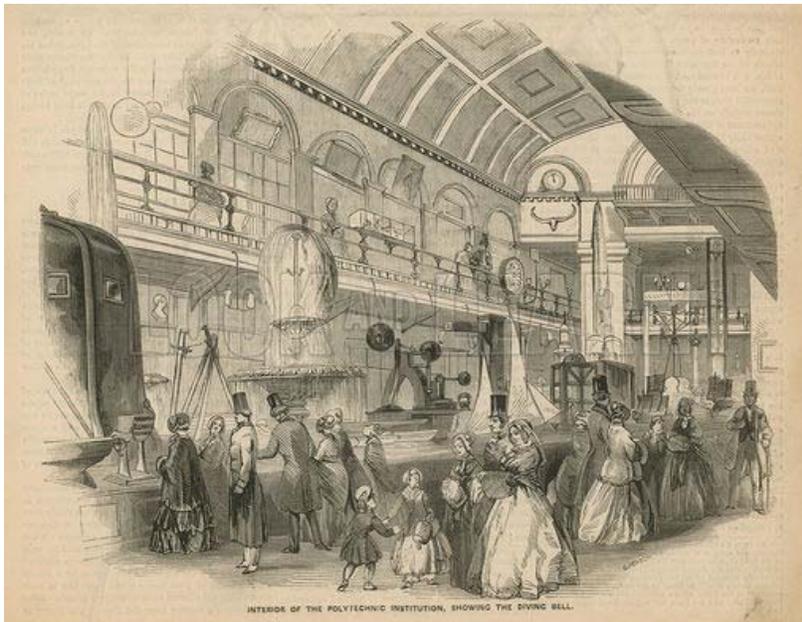
<sup>84</sup> Ibid.

The experience at the Outlook Tower was carefully choreographed and in many ways mimics the procedures of the microscopical laboratory, allowing the Tower itself to operate like a microscope. Following the practice by which scientific knowledge was legitimized in the nineteenth century, Geddes established authority for his new science by means of public exhibition and display. The sequence of experiences composed a narrative in which the city could be seen like an organism nested in a larger spatial context of region and temporal context of history. The Tower "thinking machines" are models of thought, which both develop ideas about the city and anticipate the experience at the Tower. As the "thinking machines" were instruments for exploring ideas, so the Outlook Tower was an instrument for discovery. By synthesizing the view through its many lenses, investigators at this "applied civics laboratory" could achieve the "synoptic" view Geddes thought town planners should adopt.

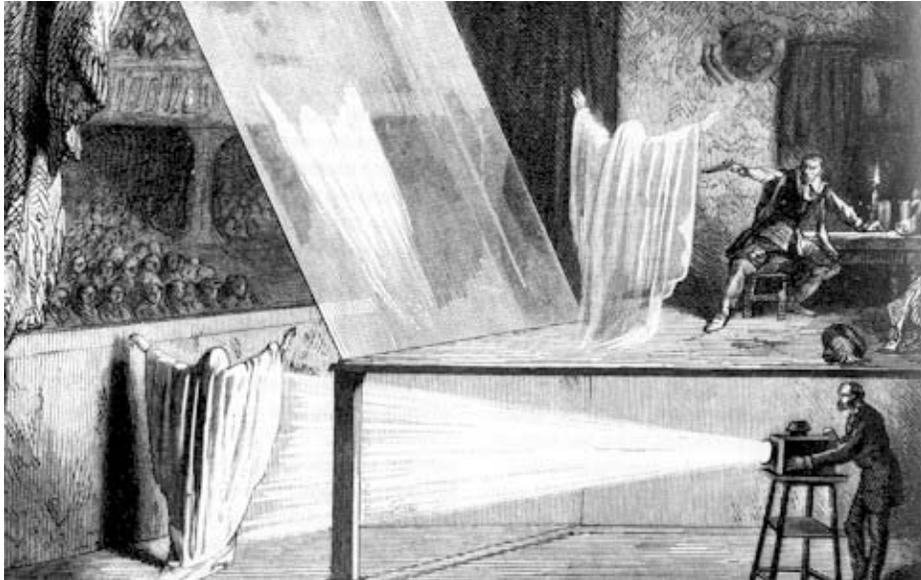
**IMAGES: CHAPTER THREE**



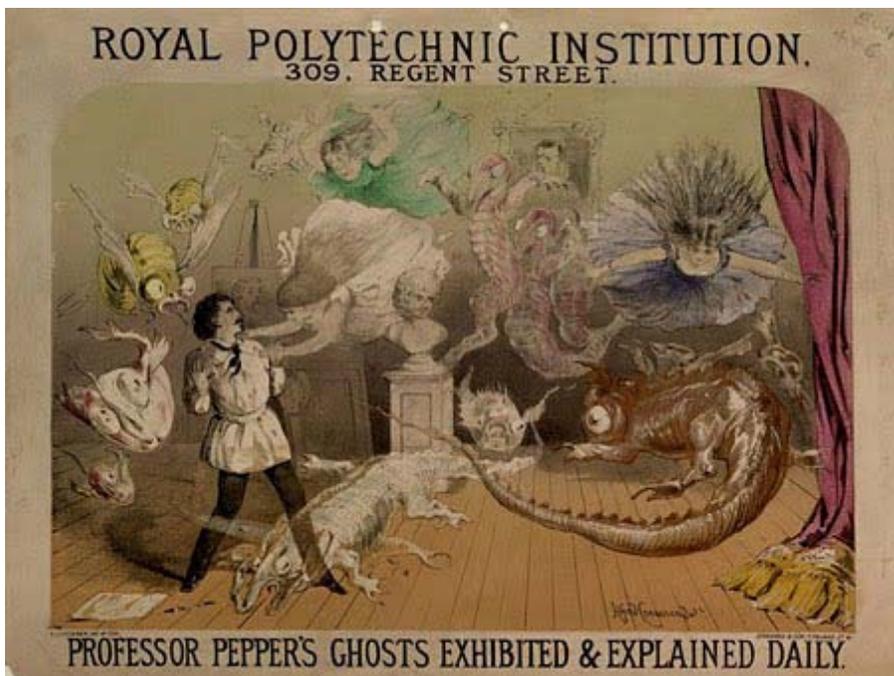
**Figure 3.1:** *Michael Faraday delivering lecture at the Royal Institution, c 1856.*  
Source: [http://commons.wikimedia.org/wiki/File:Faraday\\_Michael\\_Christmas\\_lecture.jpg](http://commons.wikimedia.org/wiki/File:Faraday_Michael_Christmas_lecture.jpg)  
Retrieved 12/17/13



**Figure 3.2:** *Interior Royal Polytechnic Institution, c 1850.*  
Source: <http://www.lookandlearn.com/history-images/XJ110537/Interior-of-the-Royal-Polytechnic-Institute>  
Retrieved 12/17/13



**Figure 3.3:** Henry Pepper demonstrating a "ghost".  
Source: [http://gukmal.files.wordpress.com/2010/04/peppers\\_ghost-1.jpg](http://gukmal.files.wordpress.com/2010/04/peppers_ghost-1.jpg)  
Retrieved 12/17/13



**Figure 3.4:** Advertisement for Pepper's Ghosts. c 1885  
Source: <http://darkvictoria.livejournal.com/418198.html>  
Retrieved 12/17/13



**Figure 3.5:** *Patrick Geddes and group of children, view from Castle esplanade, Outlook Tower in background with Assembly Hall of the Church of Scotland (spire by A.W. Pugin) beyond, c. 1900. Source: University of Strathclyde Archives.*



**Figure 3.6:** *Maria Short's Museum of Art and Science, c. 1855*

Source:[http://camera-obscura.co.uk/camera\\_obscura/camera\\_history\\_attraction.asp](http://camera-obscura.co.uk/camera_obscura/camera_history_attraction.asp)

Retrieved 12/17/13



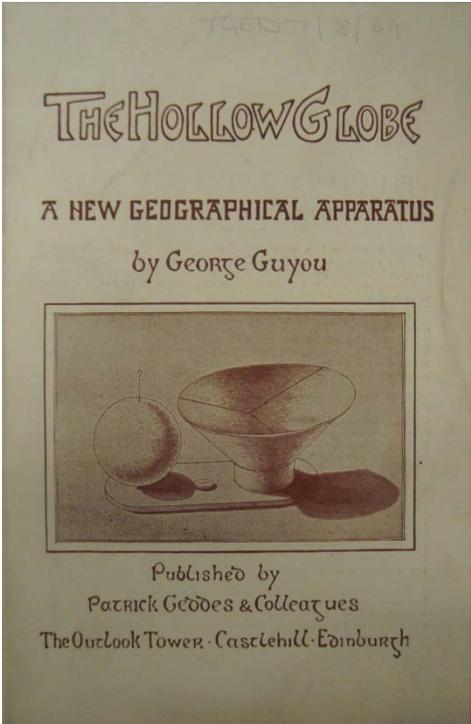
**Figure 3.7:** *View to North from Outlook Tower parapet, c. 1910*  
Source: University of Strathclyde Archives



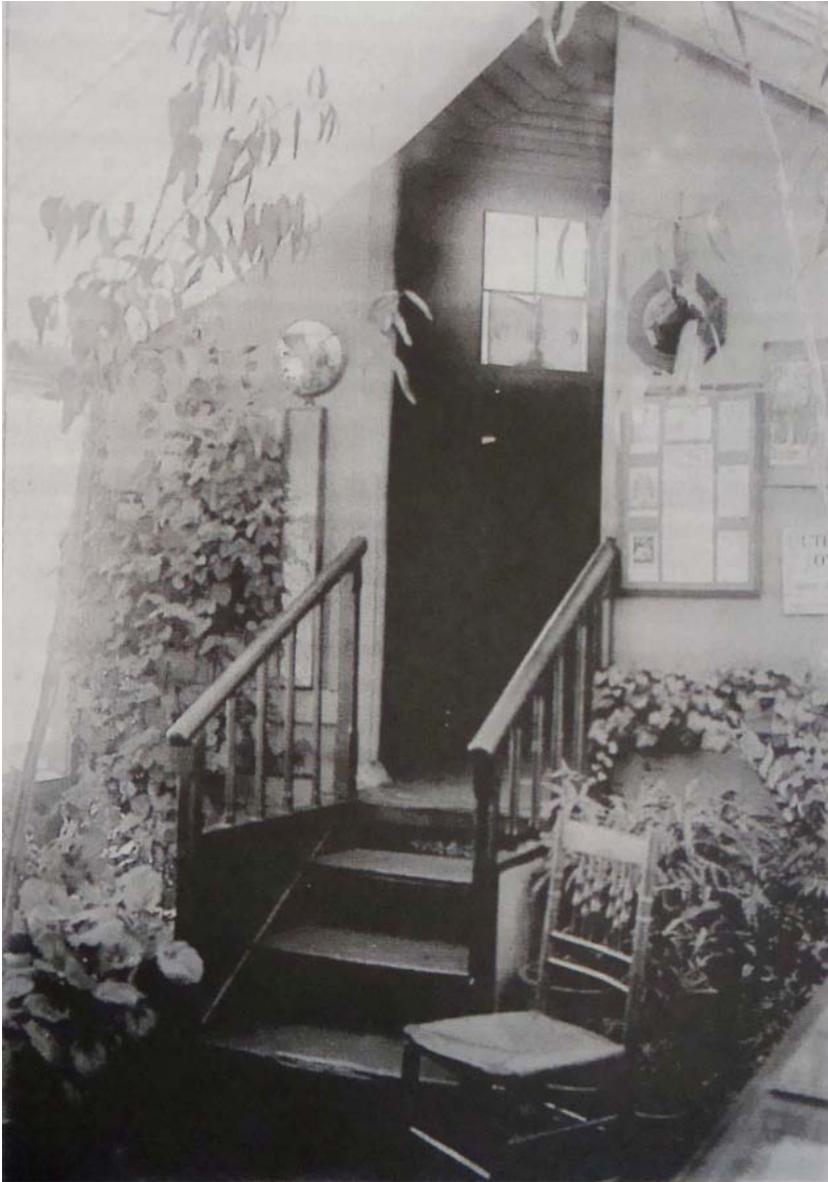
**Figure 3.8:** *View to North from Outlook Tower parapet, 2010*  
Source: Author



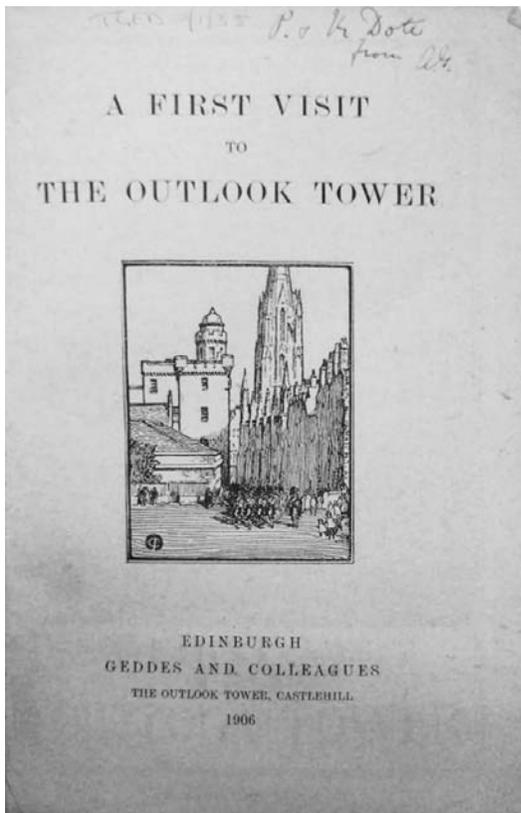
**Figure 3.9:** detail of Outlook Tower parapet coping, showing inscribed North arrow, 2010  
Source: Author



**Figure 3.10:** cover, "Hollow Globe" brochure  
Source: University of Strathclyde Archives



**Figure 3.11:** Entrance to Camera Obscura, Outlook Tower, c. 1910  
Source: University of Edinburgh Archives, (Sec X Cat X2 Neg green box 76)



**Figure 3.12:** cover, "A First Visit to the Outlook Tower"  
Source: University of Strathclyde Archives



**Figure 3.13:** *Image projected onto table in Camera Obscura, Outlook Tower*  
Source: [http://www.camera-obscura.co.uk/camera\\_obscura/camera\\_obscura.asp](http://www.camera-obscura.co.uk/camera_obscura/camera_obscura.asp)  
Retrieved 12/17/13

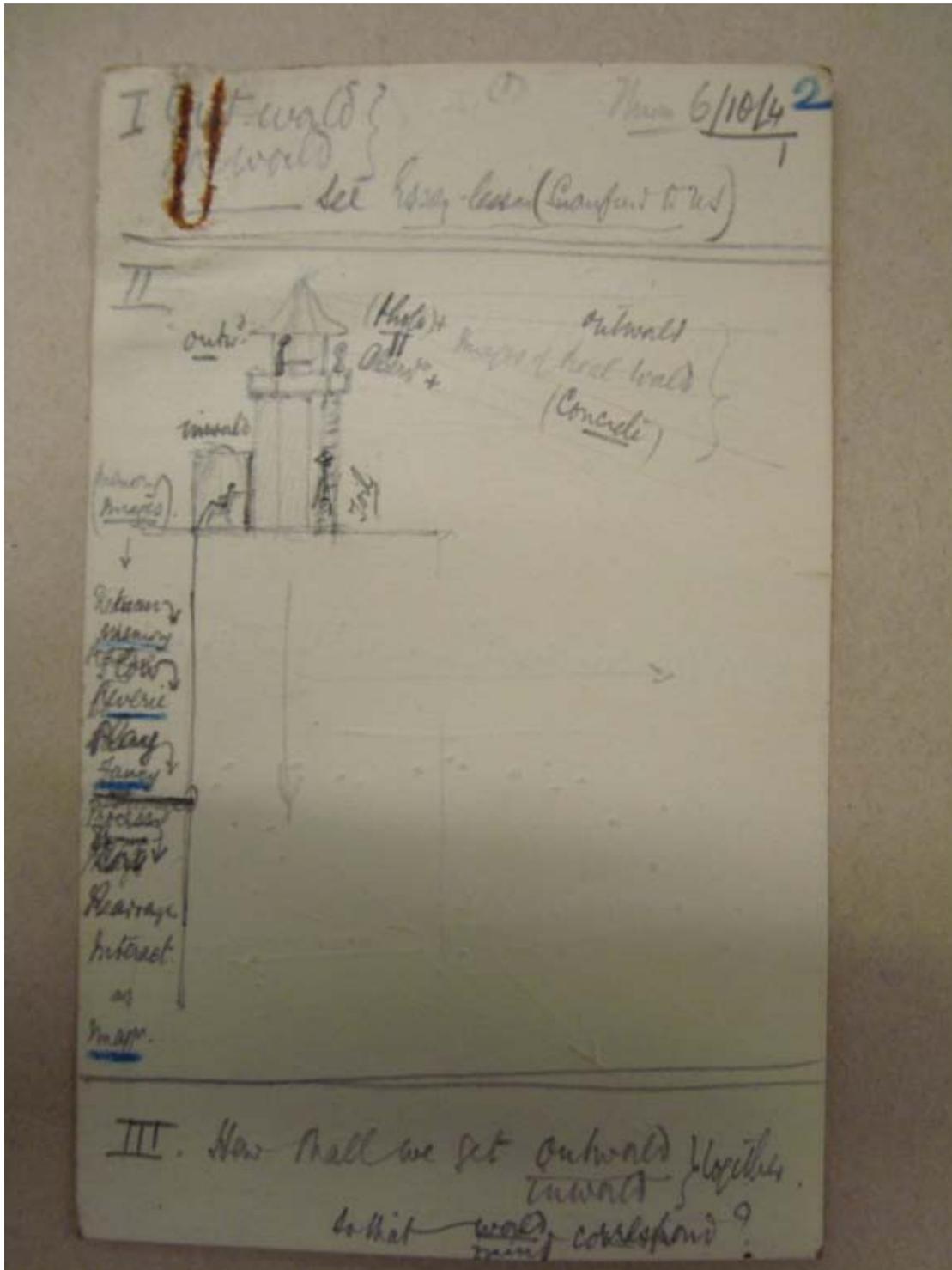
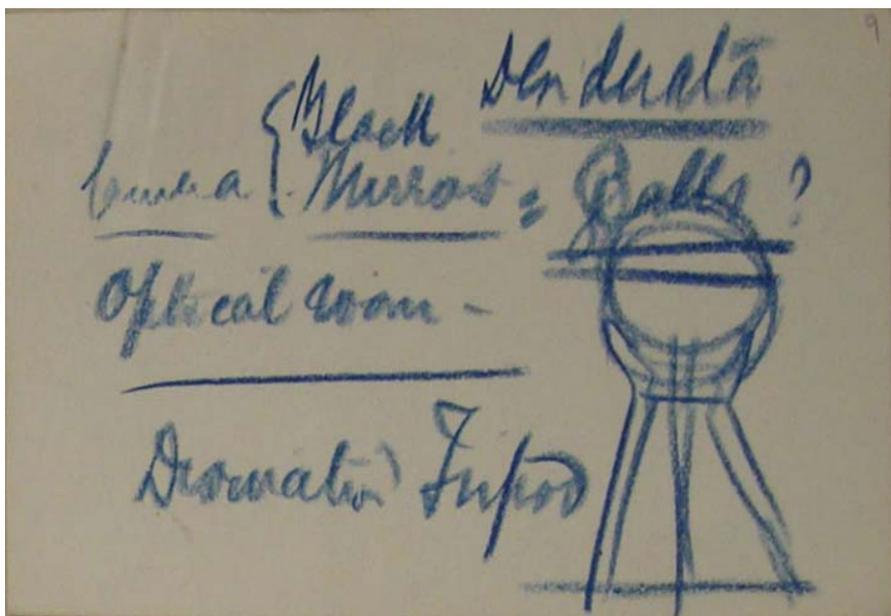
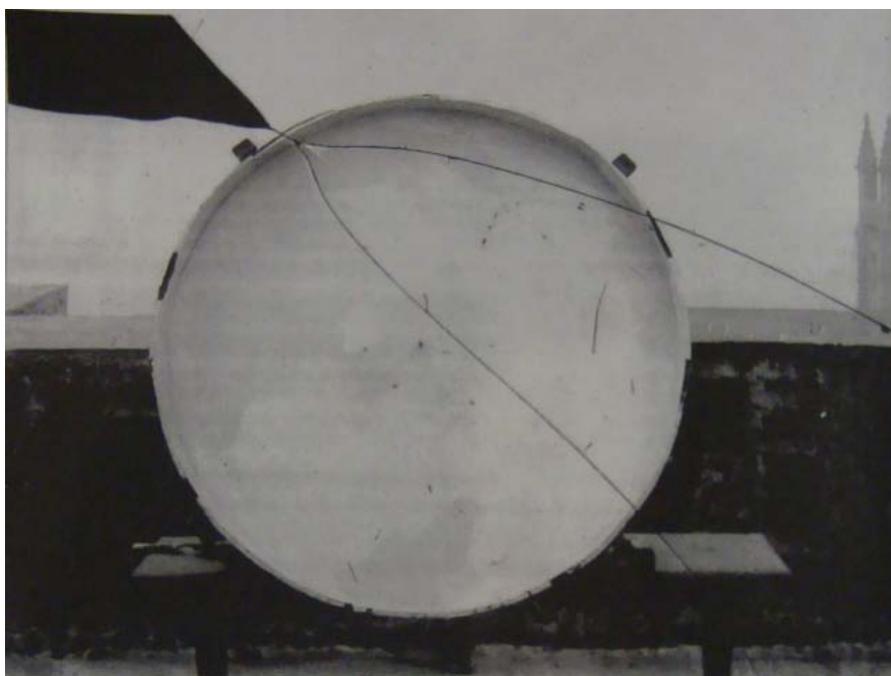


Figure 3.14: Tower thinking machine, 1904  
Source: University of Strathclyde Archives



**Figure 3.15:** Card from a series of "thinking machines" relating to Tower, undated  
Source: University of Strathclyde Archives



**Figure 3.16:** Print from (damaged) glass negative showing device which appears to be a globe secured on the north parapet of the Outlook Tower.  
Source: University of Edinburgh Archives, (Sec X Cat X3, neg green box 170)

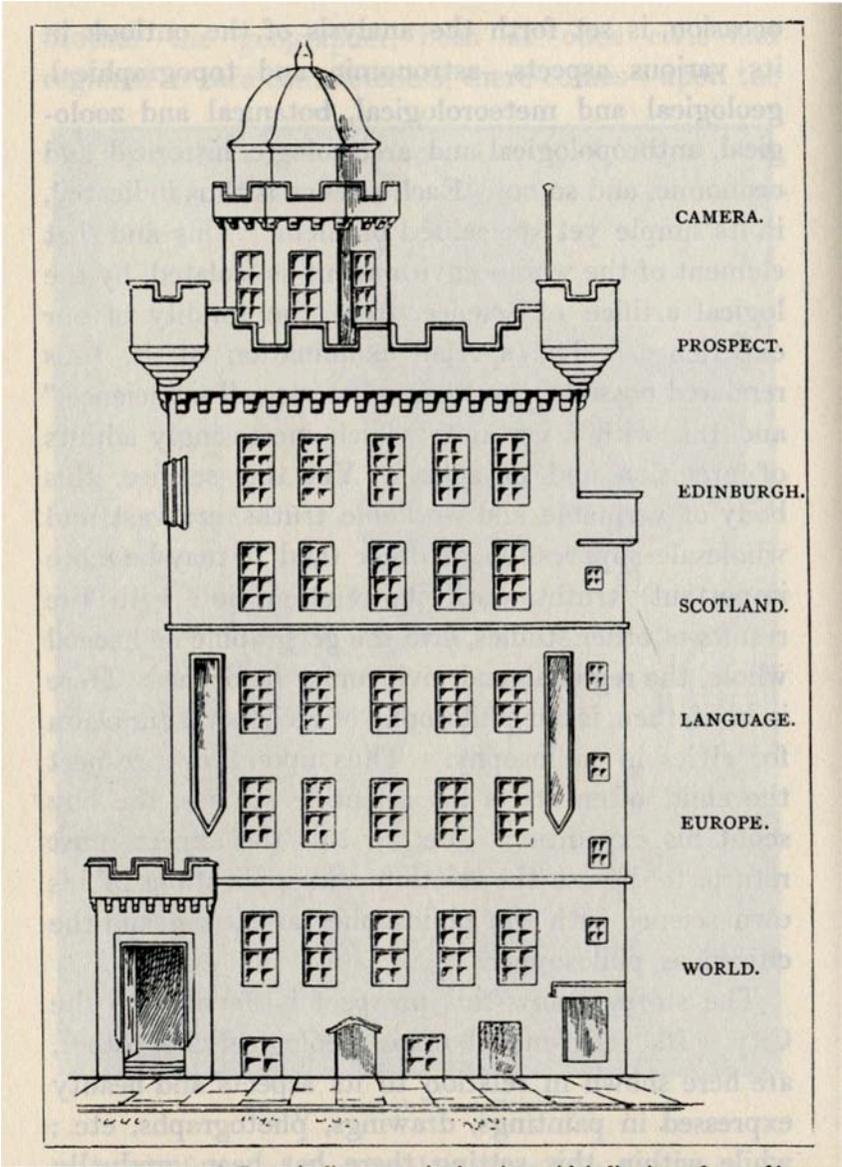


Figure 3.17: Outlook Tower diagram, 1915  
Source: *Cities in Evolution*, Williams and Norgate, London, 1915

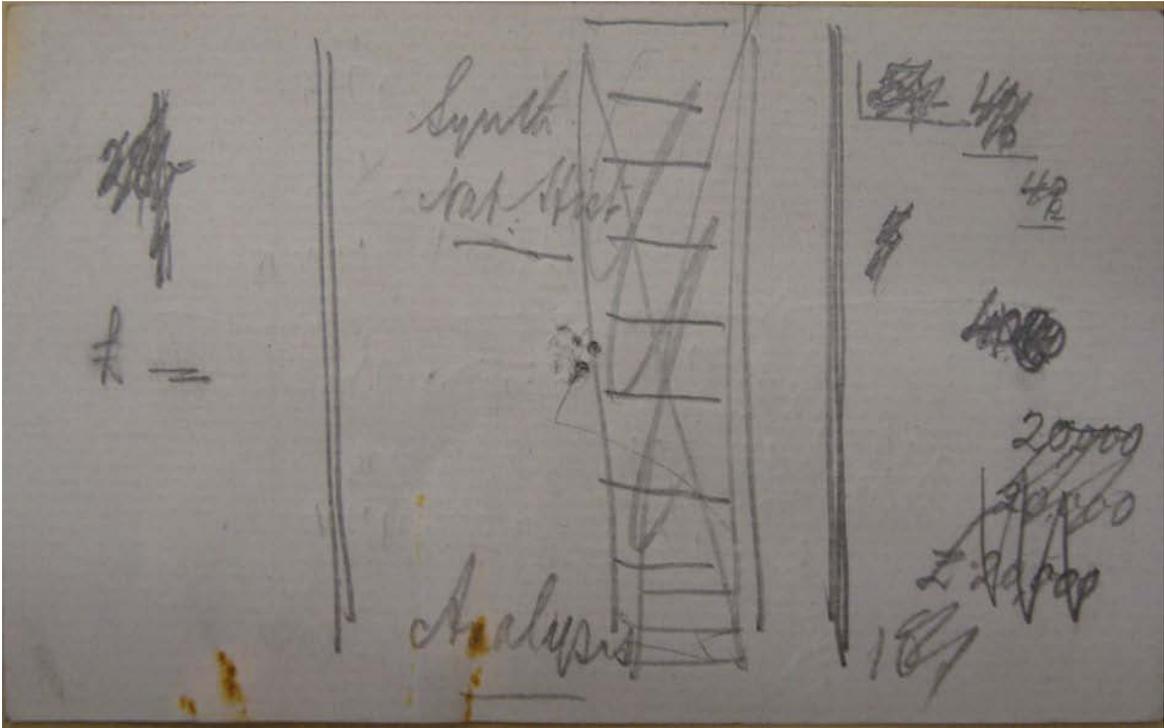


Figure 3.18: Tower thinking machine, "synthesis and analysis", undated  
Source: University of Strathclyde Archives



**Figure 3.19:** *Photograph of "Edinburgh Room" at the Outlook Tower, undated.*  
Source: University of Edinburgh Archives Sec x. Cat XI. Neg green box 123



**Figure 3.20:** *Relief model of Edinburgh by Paul Reclus, undated.*  
Source: University of Edinburgh Archives. Sec W. Cat W1. Neg green box 2.

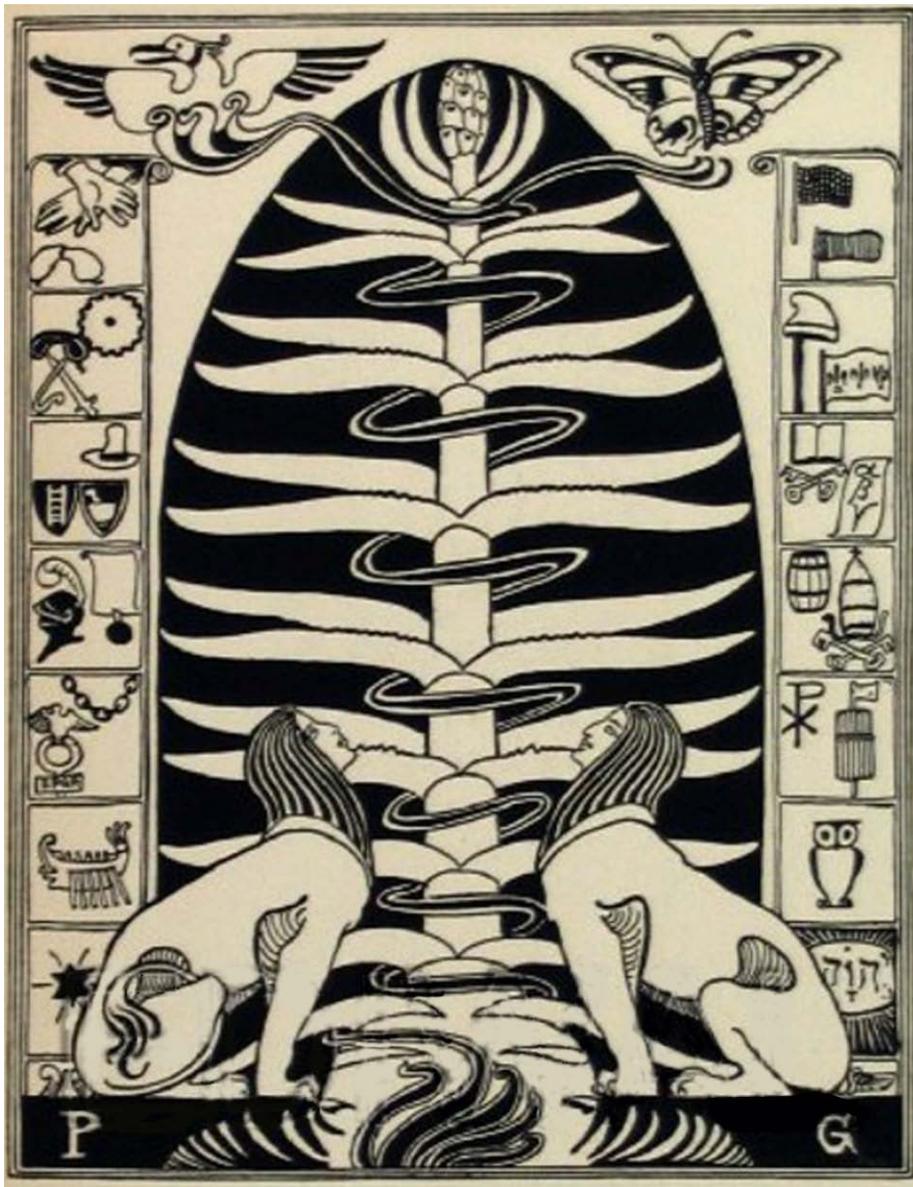


Figure 3.21: "Arbor saeculorum"

Source: [http://art-antiqueprints.com/images/Black-&-White/IMG\\_5005+1.jpg](http://art-antiqueprints.com/images/Black-&-White/IMG_5005+1.jpg)  
Retrieved 12/17/13

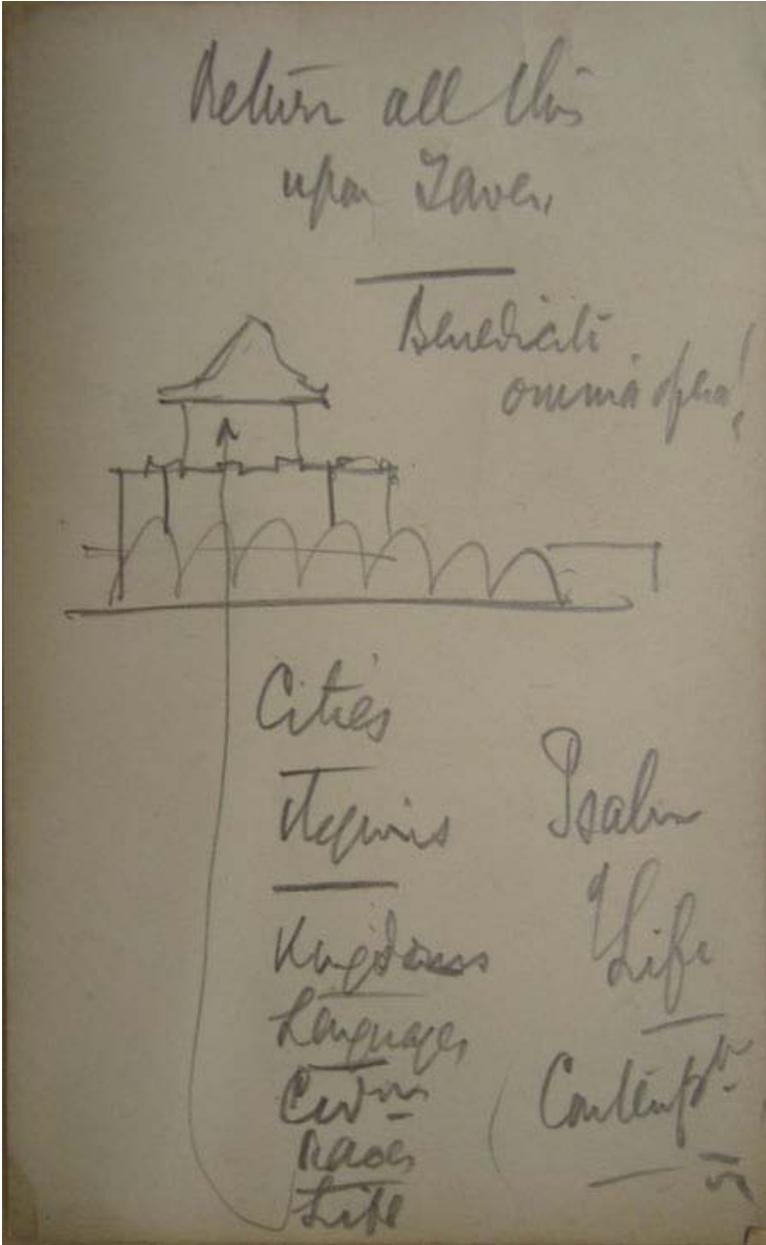


Figure 3.22: Tower note card, "Psalm of Life," undated. Source: University of Strathclyde Archives

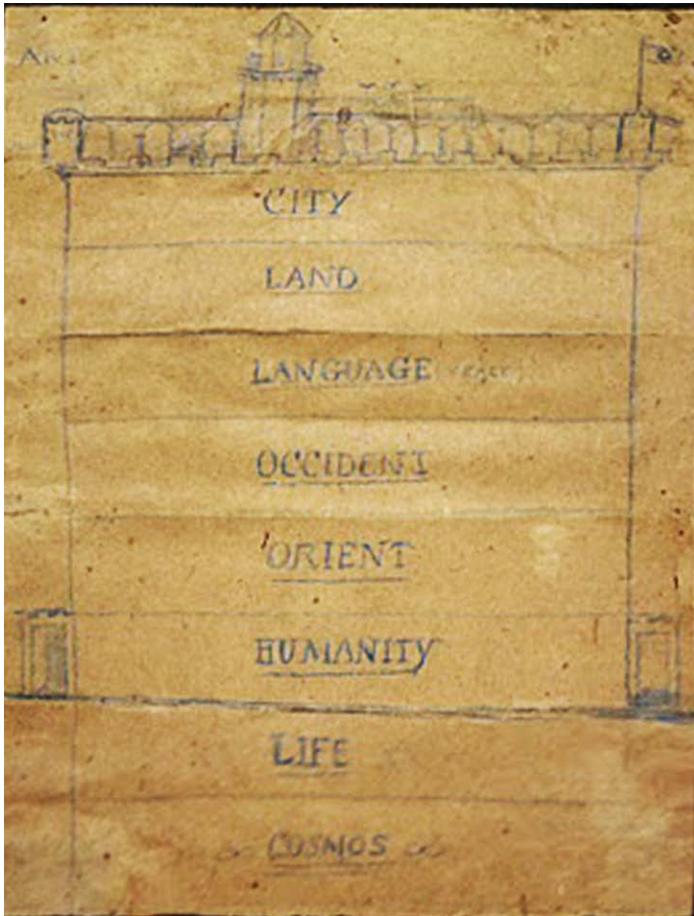


Figure 3.23: Tower note card, undated.  
Source: University of Strathclyde Archives

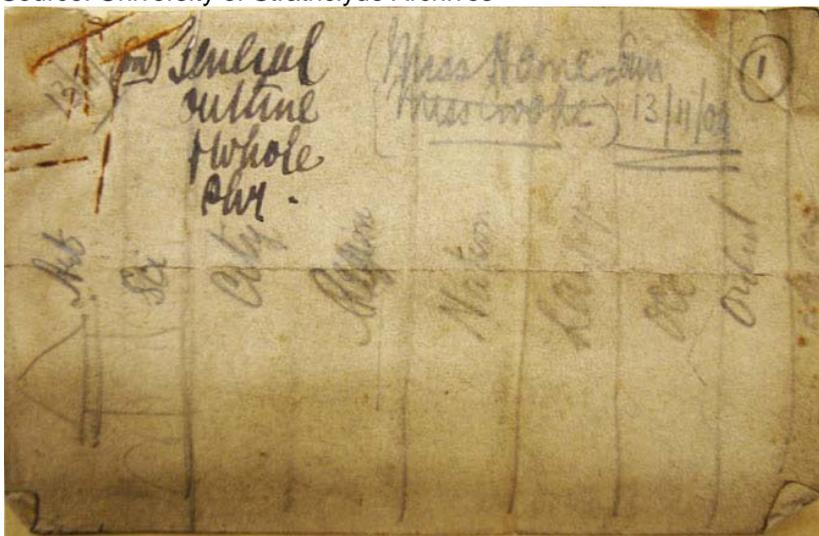


Figure 3.24: Tower note card, "General Outline," 1902.

Source: University of Strathclyde Archives

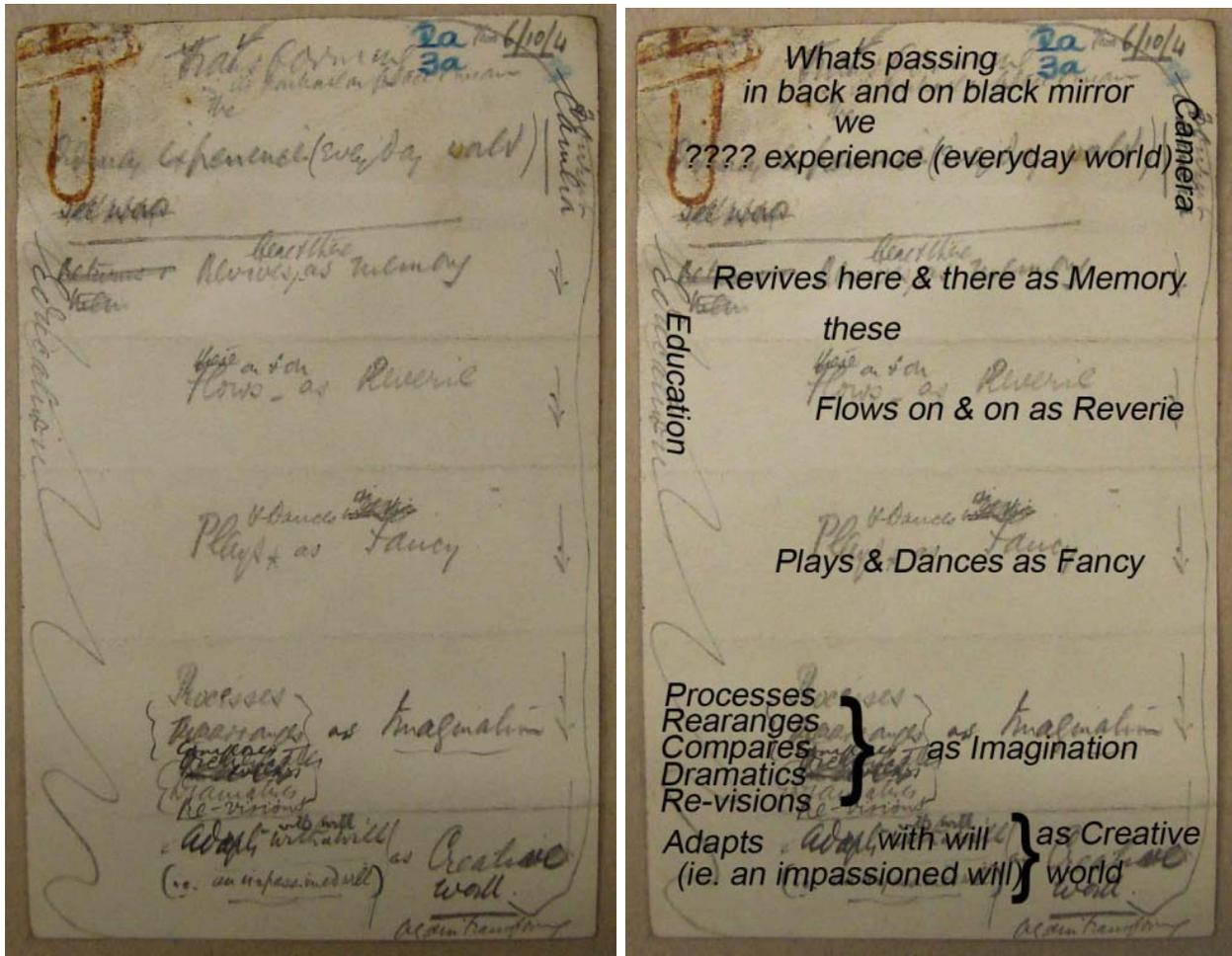


Figure 3.25: "thinking machine", dated 6/10/06, image to right is transcribed by author  
Source: University of Strathclyde Archives

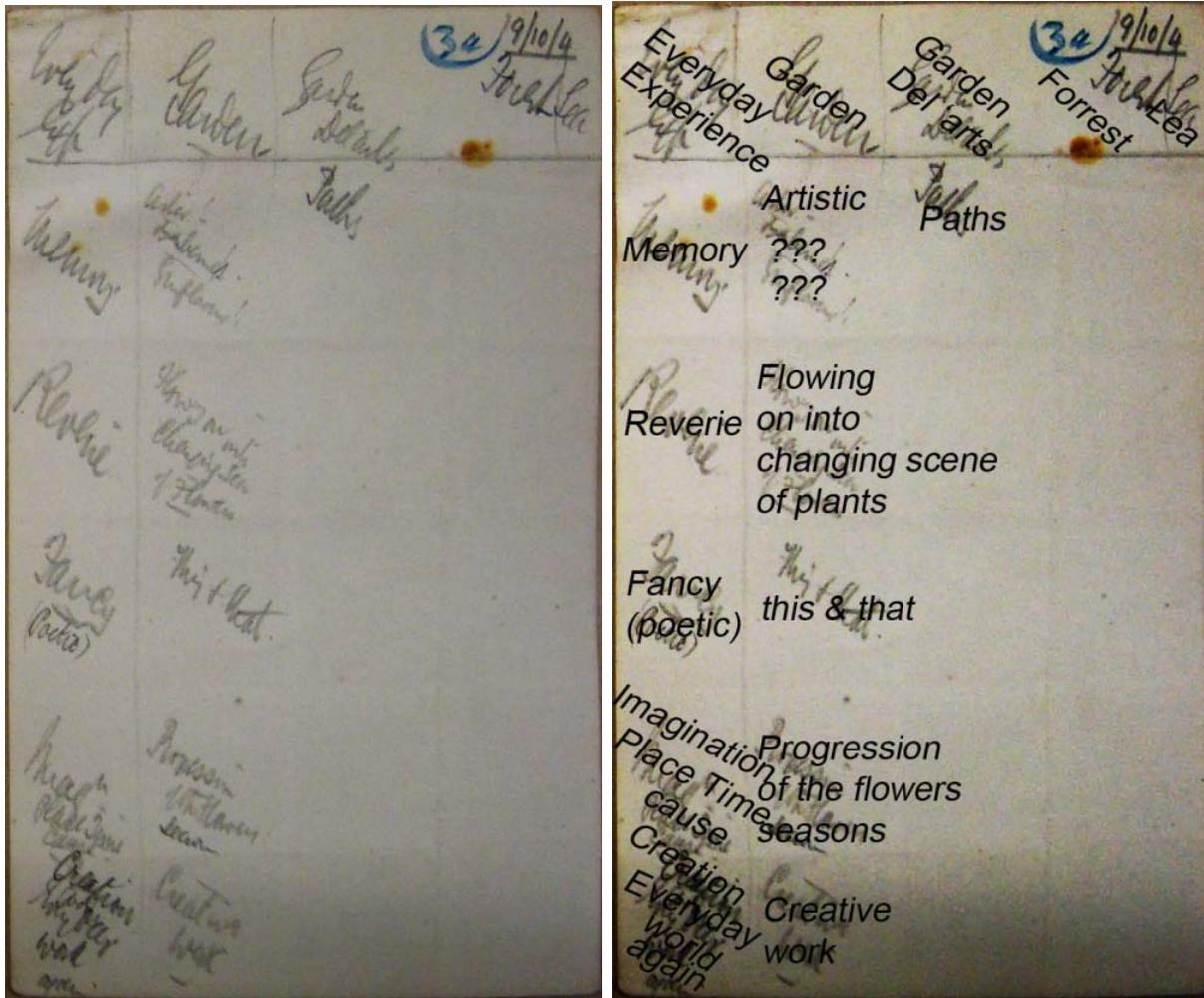


Figure 3.26: "thinking machine", dated 9/10/06, image to right is transcribed by author  
Source: University of Strathclyde Archives

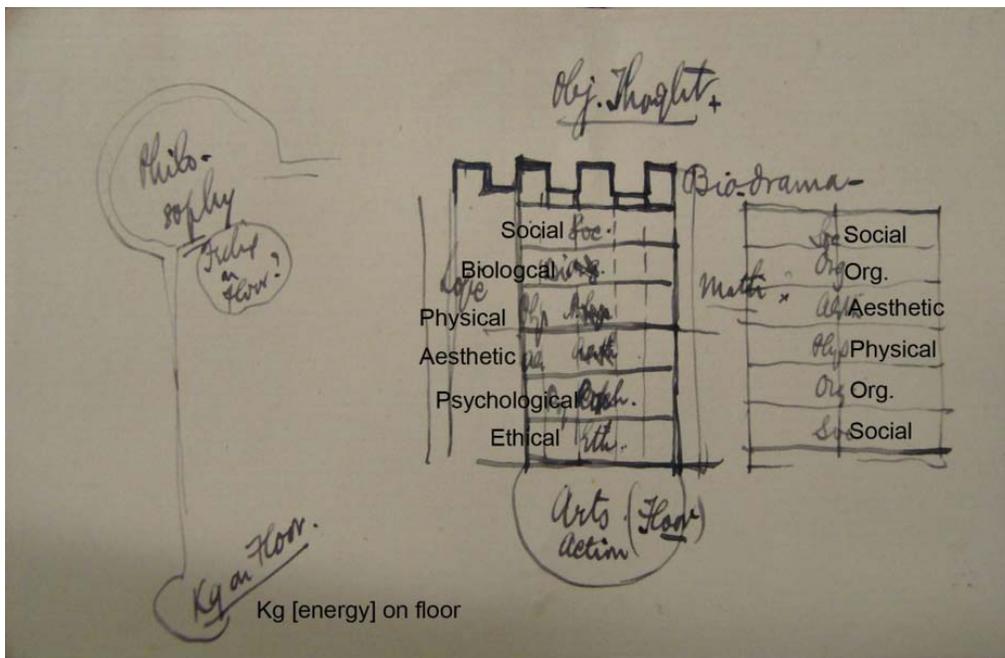
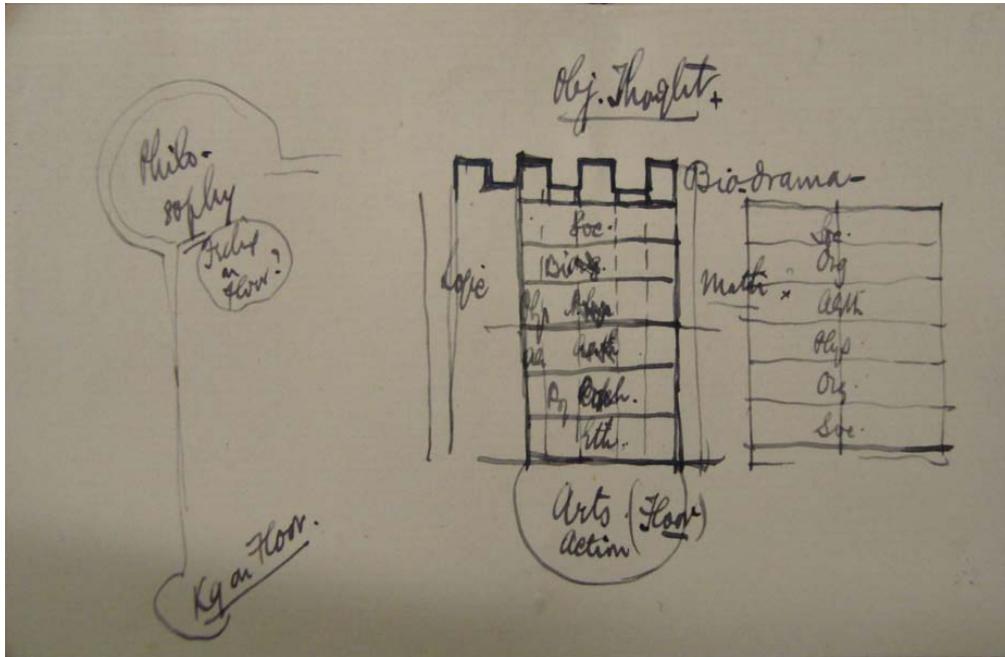


Figure 3.27: Tower note card and transcription, "Objective Thought", undated. Source: University of Strathclyde Archives

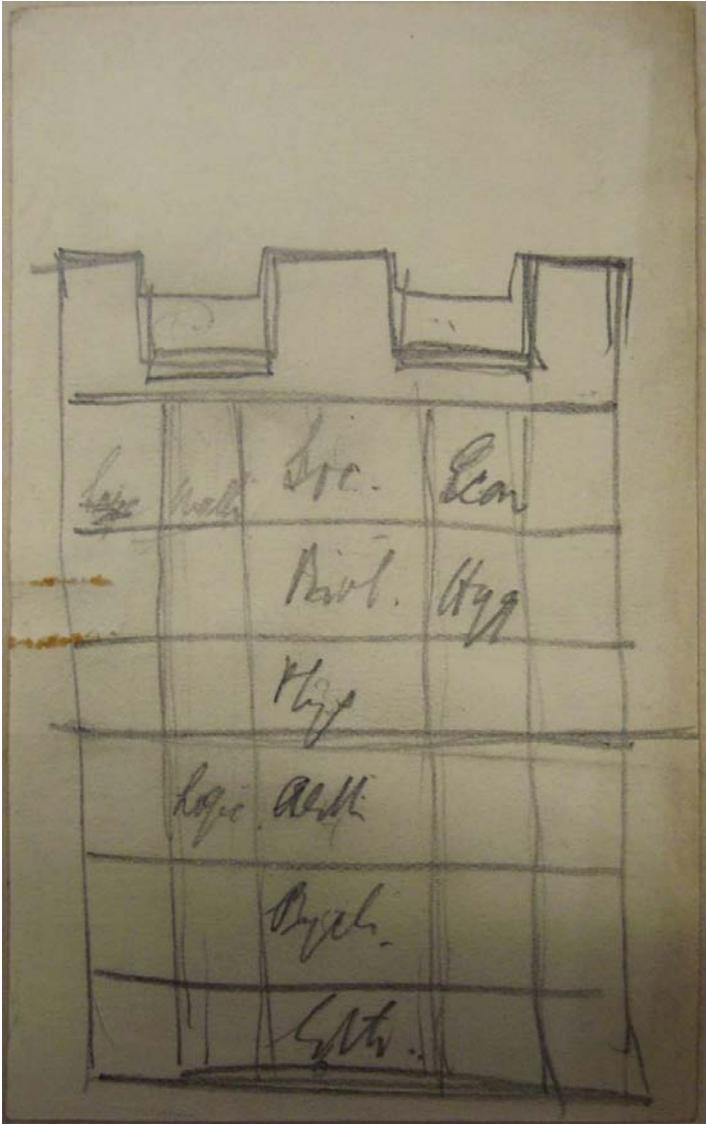


Figure 3.28: Tower note card, "thinking machine, undated.  
Source: University of Strathclyde Archives

## CHAPTER FOUR: THE INLOOK

*I am not a necromancer who draws horoscopes, nor am I merely sticking pins in butterflies, nor cutting up flowers -- nor a politician who can answer all questions, and provide editors with headlines -- but I am trying always, in garden and in city by turns, to work out a method which can adapt itself to anything, whether it be to brighten vacant spaces in old Edinburgh, or to abate political trouble in Dublin slums, to revive an old city like Jerusalem or like Indore; a social and evolutionary method, which can be adapted to the coal Strikes or to the Taj Mahal -- in fact a technique of life.*

- Patrick Geddes<sup>1</sup>

If Geddes' efforts at the Outlook Tower and "The Cities and Town Planning" exhibitions are to be understood as a *method* of the science of the city, one needs then to look at their application. Unlike, say Abercrombie or Unwin, or Tony Garnier, whose urban designs comprehensively articulate their theories about the city and may be critically evaluated against those theories, Geddes' design efforts are modest and really constitute interventions at the scale of a building, vacant lot or tenement block. Though he would later create a masterplan for Jerusalem and one for Tel Aviv (realized), during the three decades that he developed his science of cities one cannot look to a design portfolio as evidence of the efficacy of his method. However, the lack of "grand schemes" is itself an argument for the way in which he approached design. Taking into account his work/place/folk triad, and biological and evolutionary stance, one sees that proposed interventions would be as subtle as gradual change brought on by natural selection, and engage with social and economic forces. "Not even the highest expressions of human individuality can be adequately studied apart from their physical conditions and antecedents of geographical environment, as well as of race and culture," wrote Geddes.<sup>2</sup> If the city is a habitat for the species *homo urbanis*, the physical, social, and economic environments have to sustain and promote growth. For Geddes, habitat quality depends upon the symbiosis of place and culture and occupation. His "design efforts" were as likely to be an evening lecture for working men and women as the layout of a public garden.

### The Edinburgh Social Union

In 1884, with others, Patrick Geddes organized the Edinburgh Social Union, the stated aim of which was "to beautify the homes of the poor," and "to teach them to do so themselves."<sup>3</sup> The model for the activity of the Union was the work of Octavia Hill in London where, with funds initially provided by John Ruskin, leaseholds of tenements were purchased, and the tenancies managed by Hill. Her management included diligent rent collection through visits by, first voluntary and later paid, staff who also counseled

<sup>1</sup> Defries, Amelia (1928) *The Interpreter Geddes: the Man and His Gospel*. Boni and Liveright. New York. P 171.

<sup>2</sup> Geddes, Patrick (1898) "The Influence of Geographical Conditions on social Development". *The Geographical Journal*. Vol 12. No 6. P 581.

<sup>3</sup> [http://www.nationalgalleries.org/collection/online\\_etour/4:328/4591/6](http://www.nationalgalleries.org/collection/online_etour/4:328/4591/6)

tenants as a form of early social work. Investors were attracted by a promise of a five per cent return, and funds which remained after investor return were directed to property improvements and the establishment of tenants' associations and after-school clubs and societies for children. Hill advocated open-space allocation for use by workers and the poor, claiming: "I think we want four things. Places to sit in, places to play in, places to stroll in, and places to spend a day in."<sup>4</sup> Echoing the theme of the parks movement in America, Hill wrote:

What I wish to urge—and I have only introduced a practical example now vividly in my own mind as most strongly bringing home the fact—is, the immense value to the education and reformation of our poorest people of some space near their homes, or within reasonable distance of them. We all need space; unless we have it we cannot reach that sense of quiet in which whispers of better things come to us gently. Our lives in London are over-crowded, over-excited, over-strained. This is true of all classes; we all want quiet; we all want beauty for the refreshment of our souls. Sometimes we think of it as a luxury, but when God made the world, He made it very beautiful, and meant that we should live amongst its beauties, and that they should speak peace to us in our daily lives.<sup>5</sup>

By then engaged in efforts to establish gardens on disused plots of land in Edinburgh, Hill's work in London and her advocacy of open space appealed to Geddes the botanist, who lived within a city teeming with the frustration of overcrowding and substandard living conditions for the poor. The Edinburgh Social Union "started work of a very modest scope. They had courts and closes cleaned out and colour-washed, instituted window-boxes and executed some mural decorations in the halls..."<sup>6</sup> James Mavor, in his account of Geddes' work, describes the activity of the Union:

He formed the project of acquiring gradually, either in his own name or in the names of others who sympathized with his idea, ownership of a great mass of deteriorating property which lay between the Castle and Holyrood... old buildings were rescued from the ravages of inferior and uncontrolled tenantry, rendered habitable by their former occupants or others on terms of decency, or converted into student residences. In many cases the interior architecture in French fireplaces and ceilings of the seventeenth century was revealed in an astonishing state of preservation, in spite of the treatment to which it had been subjected by people who had actually lived in these houses without knowing that they were surrounded by things of beauty. Geddes was really on the same

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<sup>4</sup> Hill, Octavia (1883) *Homes of the London Poor*. New edition. London: Macmillan and Co. First published in 1875. Hill 1883, VII. [Space for the People, pp. 89–90]

<sup>5</sup> Ibid.

<sup>6</sup> Mairet, Philip (1957) *Pioneer of Sociology: The Life and Letters of Patrick Geddes*. Percy Lund, Humphries & Co, Ltd. London. P45.

track as Morris. With scarcely inferior practical sagacity, though with greatly inferior material means, Geddes had done something to bring back the surroundings of the period before the factory system had divorced the fine arts from production. Geddes had found one place where beauty still existed, overlaid as it was by the debris of two or three generations of people who cared for none of these things, and he had at least shown the way by which the lost threads of artistic tradition could be recovered. Geddes theory was, however, different from that of Morris. He did not believe in razing society to the ground in order to rebuild a new society in its place. His biological training was of value in revealing to him through the hard experience of direct social experiment, that, important as surroundings might be, the inherent factor was not less important, and that the degradation of surroundings was an index of the degradation of the people who inhabited them.<sup>7</sup>

Newspaper articles of the time detail the material and social intervention of the Union:

The adaptation of the building for the requirements of the Social Union...is in a manner practically a restoration of one of the most interesting portions of old Edinburgh. While the whole interior will undergo reconstruction, the exterior will be renovated in such a manner as to almost altogether preserve its original characteristics. The building consists of three flats, with a cellar flat at the North Back of Cannongate, where the level of the ground is lower. It is intended to renew the roof and the floors, and to provide houses for fifteen tenants, each house to consist of a large kitchen and a light bedroom; and also to fit up the cellars as washing-houses. As regards the exterior, the roof will be heightened about eighteen inches, and a large chimney now disused which forms another of the features of the building, will be replaced by a crow-stepped gable. The attractiveness of the exterior will be rather increased by the combination of colouring, which will be noticeable in the appearances of the roof and the main features. Two bathrooms will be formed in the interior, and proper sanitary arrangements will be made.<sup>8</sup>

The aims and activities of the Edinburgh Social Union are a demonstration of Geddes' synthetic composition of the contemporary revivalist movement and embrace of involvement with curative social programs. Geddes the evolutionist would look both back into the origins of culture, and forward to a future determined by present action. His involvement with preserving the historic fabric of the city, while putting it to the use of housing for the poor, was consistent with a folkloric outlook in which social aims were

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<sup>7</sup> Mavor, James (1923) *My Windows on the Street of the World. Volume One*. E. P Dutton & Company. New York. P 215-216.

<sup>8</sup> *The Scotsman*, February 28, 1890.

met through artisanal efforts. At the International Exhibition of 1886 in Edinburgh, the Union contributed a display of wood carving and metal work from the Edinburgh Social Union Art classes for artisans.<sup>9</sup> “Recreative” evening classes were offered,<sup>10</sup> and the Union lent support to the Exhibition of Decorative Handiwork of 1888-89.<sup>11</sup> A report of the annual meeting of the ESU of November 1890 indicated that the Union had by that time fourteen properties under management. Professor Baldwin Brown, member of the Executive Committee, announced the acquisition of a studio “where decorative work could be prepared and carried on” so as to “help the poor to improve their own surroundings, and to inculcate a higher standard of comfort, and also to encourage a feeling for that higher sort of comfort which came from the presence of objects of taste and beauty, bringing the elements of taste and beauty into the lives of the poor.”<sup>12</sup>

### Celtic Revivalism and Spiritualism

The stated goals of the Union situated it within a revivalist movement in Britain which had been molded by the writing of Thomas Carlyle, John Ruskin and William Morris in response to the changing social milieu imposed by industrialization. Objecting to mass production and subservience of man to machine, they encouraged a return to an idealized past of bucolic landscape and valued craftsmen. They argued that social values and identity were created through labor, and sought return to traditional craft practices. “There might be more freedom in England,” wrote Ruskin, “than there is while the animation of her multitudes is sent like fuel to feed the factory smoke...gaze upon the old cathedral front, where you have smiled so often at the fantastic ignorance of the old sculptors...for they are signs of the life and liberty of every workman who struck the stone.”<sup>13</sup> These reformers mused on a utopian future which would spring from a re-creation of past values. “England romantics consistently contrasted the ugliness, repetitiveness, and alienation that they perceived in city, factory and popular culture with the beautiful, secure, and natural life of the pre-industrial peasant.”<sup>14</sup> In Scotland this movement assumed tones of “Celtic revivalism” which served, by searching for pre-Anglo-Saxon roots, in creating a national identity distinct from that of England. Celtic themes were encouraged in the arts, furthered by the writing of Walter Scott and revival of the Ossian myths in the writing of Fiona MacLeod. Just as the “cult of kilts”<sup>15</sup> was a

<sup>9</sup> *The Scotsman*, May 17, 1886.

<sup>10</sup> *The Scotsman*, October 18, 1887.

<sup>11</sup> *The Scotsman*, June 2, 1888.

<sup>12</sup> *The Scotsman*, November 25, 1890.

<sup>13</sup> Ruskin, John (1871) “Mental Slavery of Modern Workmen”. *Selections from the Writings of John Ruskin*. Smith, Elder & Co. London. P 293-294.

<sup>14</sup> Evan, Timothy H. (1988) “Folklore as Utopia: English Medievalists and the Ideology of Revivalism”. *Western Folklore*. Vol 47. No 4. P 247-248.

<sup>15</sup> Though tartan kilts predate the nineteenth century, their popularization and association with clans is a fabrication of Sir Walter Scott. In 1822 King George IV visited Edinburgh, and Scott organized the attendant pageantry as a “gathering of the Gael.” “The Highland version of Scotland soon became the version presented to the world.” Queen Victoria established a residence at Balmoral Castle in 1852,

fabrication, these artists borrowed from the Celtic legacy and invented a modern idiom.<sup>16</sup> Purported by writer James McPherson to be translations of 3rd century Gaelic manuscripts found in the Scottish Highlands, *Fingal* and *Works of Ossian* were published in 1761 and 1765 respectively. The authenticity of the work was quickly challenged by scholars, but the works were enthusiastically received<sup>17</sup> and both inspired and influenced the Romantic writers of the period. Goethe is said to have based his *Die Leidend des Jungen Werthers* (The Sorrow of Young Werther) of 1774 on *Ossian*.<sup>18</sup>

At the time of its publication, the mythical landscape of *Ossian* was projected onto a Scottish Highland landscape that was still suffering the aftershocks of the Clearances, which had happened only two decades previously, a depopulated landscape that craved a new mythopoeic identity. Disregarding debates about its authenticity, Macpherson's [sic] *Ossian* owes its popularity to a fusion of the new aesthetic of the sublime with contemporaneous notions of myth and geography.<sup>19</sup>

Geddes reissued McPherson's work in 1896, published as *The Poems of Ossian*, with an introduction by William Sharp who also served as the managing director of the Outlook Tower publication *The Evergreen*. Sharp writes in his introduction, "...the ancient poetry, the antique spirit, breathes throughout this eighteenth century restoration and gives it enduring life charm, and all the spell of the cosmic imagination."<sup>20</sup> The back page of this publication lists "New Books" for November 1896 published by Patrick Geddes and Colleagues: *From the Hills of Dream: Mountain Songs and Island Runes* by Fiona Macleod [nom de plume of William Sharp]; *The Shadow of Arvor: Breton Legendary Romances* by Edith Wingate Rinder; *Lyra Celtica: An Anthology of Representative Celtic Poetry* by William Sharp. A following list of

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lending a native legitimacy to a family which was German rather than British. "It was thus not unusual to see groups of Germans, such as Prince Albert and several of his and Queen Victoria's children, wearing their 'ancestral' Scottish garb." Brooks, Alasdair M. (1997) "Beyond the Fringe: Transfer-Printed Ceramics and the Internationalization of Celtic Myth. *International Journal of Historic Archaeology*. Vol 1. No 1.

<sup>16</sup> Koch, John T. (2005) *Celtic Culture: A Historical Encyclopedia*. Vol 1-5. ABC-CLIO.

<sup>17</sup> In a letter to Charles McPherson of Albermarle, Virginia, dated 1773, Thomas Jefferson wrote: "These pieces have been and will, I think, during my life, continue to be to me the sources of daily pleasures. The tender and the sublime emotions of the mind were never before so wrought up by the human hand. I am not ashamed to own that I think this rude bard of the North the greatest poet that has ever existed. Merely for the pleasure of reading his works, I am become desirous of learning the language in which he sung, and of possessing his songs in their original form." <http://www.let.rug.nl/usa/presidents/thomas-jefferson/letters-of-thomas-jefferson/jefl06.php>

<sup>18</sup> Porter, James (2001) "'Bring me the Head of James McPherson': The Execution of Ossian and the Wellsprings of Folkloristic Discourse". *The Journal of American Folklore*. Vol 14. No 454. Pp 396-435.

<sup>19</sup> Shaw, Norman (2005) "Ossian, Sonority and the Celtic Twilight in Geddes' Circle". *Patrick Geddes: By Leaves We Live*. Kiyoshi Okutsu, Alan Johnston, Murdo Macdonald, Noboru Sadakata, eds. Maruni Ltd. Yamaguchi. Japan. P 175.

<sup>20</sup> Sharp, William (1896) Introduction to McPherson, James (1896) *The Poems of Ossian*. Patrick Geddes and Colleagues. Edinburgh. P xxiv.

publications, "The Evolution Series," edited by J. Arthur Thomson, promises to "begin early in 1897, and will give special prominence to contemporary questions alike in social and in natural science. It will express the standpoint of evolution in geography and economics, in education and morals, as well as in biology."<sup>21</sup> This diversity of topics is evidence of Geddes' interest in the emerging social science of his day and the inclusion of a borrowed past, romanticized if not fabricated, that provides a spiritual dimension out of which the present emerges. The Ossian myths provided an alternative to the classic, Homeric tradition, and lent support to nationalistic urges that sought a genuine or organic culture.

*The Evergreen: A Northern Seasonal* was a publication, produced in only four volumes, by Patrick Geddes between 1895 and 1897. The four volumes, "Book of Spring," "Book of Summer," "Book of Autumn," and "Book of Winter," collected poems, essays and illustrations from among Geddes' circle. The "Book of Winter" of 1896-97, concludes with an essay by Geddes, "The Megalithic Builders." In his essay he recounts hiking through landscapes, settlements, towns, and cities of Scotland, observing lithic constructions, tracing contemporary buildings of stone to their origin in Pict cairns: "Of Edinburgh...the megalithic influence...has silently been at work...Thus it is not merely the geographical resemblance of site to site... but kindred architectural sympathies also."<sup>22</sup> His tour ends at the soaring Scott Monument in Edinburgh, "...a stunted cenotaph, in which suggestions as of cairn and pyramid meet and mingle in the spire.." He continues:

Here sits the singer and tale-teller, our Northern Wizard (himself a builder), master and inspirer of magicians, alike of Past and Future, of those who as archaeologists or historians rescue and treasure the tradition of the dead, and those who as artists in word or deed, renew these traditions in ways fitting of the living.<sup>23</sup>

He argues for what, in today's parlance would be called *genius loci*, a spirit of place which maintains constancy between contemporary place and cultural traditions. This unseen spirit materializes in the "deeds" of city builders. "Of future building too," he writes, "let a word be boldly said":

For divining the future, as for recalling the past, there is the same rare yet open secret -- of Sympathy. But this spell, as in the old stories needs recasting three times, and each time in the right way. The first sympathy is with the best actual work which the men just nearing maturity and power are beginning to do; the second is with what the able youths of the next

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<sup>21</sup> Backpage. McPherson, James (1896) *The Poems of Ossian*. Patrick Geddes and Colleagues. Edinburgh.

<sup>22</sup> Geddes, Patrick (1896-97) "The Megalithic Builders". *The Evergreen: A Northern Seasonal: The Book of Winter*. Patrick Geddes and Colleagues. P 149.

<sup>23</sup> Ibid.

wave, the immature aspirants to governing and leading of all kinds, are learning and discussing, are doing and dreaming. But the third and rarest, is with what is sought and dreamed and felt among the people themselves. Hence the ballads of one generation give the art poetry of the next...<sup>24</sup>

As in the divinatory practice of casting stones, Geddes "reads" the stones of the past and present to foretell the future. He admits of a force, unseen and accessed through spiritualist practice. "Let any one who cares for it see what he can make out for himself not only of the history of Scotland, but of the life and thought of its People, from the speaking stones of Stirling, which he that runs may read."

Other contributors to this *Evergreen* issue include biologist J. Arthur Thomson, French ethnographer Elie Reclus, philosopher Paul Desjardins,<sup>25</sup> as well as other writers of the Celtic circle, among them Fiona Macleod, and Edith Wingate Rinder. The list of illustrators for the edition shows James Cadenhead, Charles Mackie and John Duncan among contributors. This coterie of artists as well as Charles Rennie Mackintosh and Phoebe Traquair,<sup>26</sup> embraced the Celtic myths, and their work lent a visual presence to revivalist ideals. Duncan, who was from Dundee and taught at the University there, was a friend of Geddes, and Geddes commissioned murals by Duncan for his home on Castlehill. *The Scotsman* commented: "Many will read with interest Professor Baldwin Brown's notice of what is being done in the way of mural decoration in Edinburgh. The subject was brought by the Fine Art Professor before the Art Congress, and it is gratifying to know that so public spirited a body as the Edinburgh Social Union is assisting in a quiet way to popularize again the ancient branch of decorative art."<sup>27</sup> The Arts and Crafts Movement – promoted for the most part by those who could well-afford both restful country dwellings and products of craftsmen – with its celebration of labor and attendant instruction and workshops, was well-suited to those who sought to address social ills through education and welfare organizations. Craft classes and

<sup>24</sup> Ibid. P 150-151.

<sup>25</sup> Paul Desjardins (1859-1940) French philosopher who in 1909 purchased Pontigny Abbey where he organized an annual ten-day conference, "The Pontigny Decades" between the years 1910-1914 and 1922-1939, gathering the likes of Antoine de Saint Exupery, Jean-Paul Sartre, Simone de Bouvoir, T.S. Eliot.

<sup>26</sup> Phoebe Moss Traquair married palaeontologist J. Ramsay Traquair in 1873, and the following year he was appointed Keeper of Natural History at the Edinburgh Museum of Science and Art. She joined the Edinburgh Social Union in 1885 and that same year painted a mural for the mortuary for the Royal Hospital for Sick Children, at the behest of the Union. In 1887 John Ruskin loaned Traquair French manuscripts for study as she embarked on manuscript creation, illustrating Elizabeth Barret Browning's 'Sonnets for the Portugese,' Robert Browning's 'Saul,' William Morris' 'Defence of Guinevere' and 'The Song of Solomon,' and Dante Gabriel Rossetti's 'The Blessed Damozel.' Her son, Ramsay Traquair, became chair of the Department of Architecture, McGill University in 1913, replacing Stewart Henbest Capper, who had worked with Patrick Geddes on the design of Ramsay Garden Residence Hall, Riddles Court and Close, James House, and Blackie House.

<sup>27</sup> *The Scotsman*, December 31, 1889.

evening lectures catered to the same population that had been served by Thomas Huxley in his lectures to working men in London, and the extra-mural instruction was familiar to someone like Geddes who needed to seek employment and remuneration without the academic establishment.

The idealized past, reconstituted through the Arts and Crafts movement and the Celtic revivalism of the Scottish Renaissance, offered refuge at the beginning of the twentieth century from the consternation of modern industry. For Geddes, such reconstitution was intended to preserve temporal continuity so as to historically situate the present and future. Just as paleontologists composed a narrative of the fossil record, and geologists explained formation of the Earth's crust, Geddes invented a narrative of the city that maintained constancy with the past. In the last decade of the nineteenth century he personally initiated restoration of ten buildings, dating from the sixteenth and seventeenth century, ranging along a quarter mile of the Lawnmarket (just below Castlehill) in the Old Town area of Edinburgh. Adjacent to the Castle, Ramsay Garden was a block of eighteenth century homes, added to by Geddes with architects Henbest Capper and Sydney Mitchell to include apartments and lodging for university students. A pastiche of everything Medieval (Figure 4.1), it is a fanciful recreation of a period style which was long missing in the Old Town. The intent was to provide a "missing link" in the formal narrative of the urban fabric. Another proposal was for a mural to be painted on the wall of a reservoir that fronted the Royal Mile between the Outlook Tower and the Castle esplanade. Never realized, the design was executed by artist William Gordon Burn Murdoch (Figure 4.2) and probably owes inspiration to William Holes' frieze of the procession of Scottish kings in the entrance to the National Portrait Gallery of Scotland. (Figure 4.3, 4.4) <sup>28</sup> Like the architecture of Ramsay Garden, these murals, and those commissioned by Geddes for the student halls and living quarters within the buildings, were fanciful recreations of a style of illustration from the middle ages. The artists thus engaged were of the Scottish Symbolist school, influenced by the earlier work of the Pre-Raphaelites, and their work captured in a romanticized style the legends of Celtic culture. This style was embraced by William Morris and Charles Robert Ashbee because it reflected the ideals of the Arts and Crafts movement.

Alongside art and architecture and the attempted revival of crafts guilds, public *masques* provided dramatic display of folkloric lineage. The masque derived from Medieval pageants and were a form of courtly entertainment in the sixteenth and seventeenth centuries. In the court of Elizabeth I, the masque, or *guising*, was an event wherein a masked character would appear to share an allegorical tale. Ashbee produced a masque in London in 1897:

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<sup>28</sup> Welter, Volker M. (2003) "The return of the Muses: Edinburgh as a Museion". *The Architecture of the Museum: Symbolic structures, urban contexts*. Miahaela Giebelhausen ed. Manchester University Press. Pp144-159.

This curious extravaganza had started in a small way, in a meeting of the Arts Workers' Guild on 'Masques and Pageants' in April of 1897; but it grew, slowly at first, and then uncontrollably. The architects, painters, sculptors, and craftsmen of the guild versified, argued, rehearsed and argued again; lavished disproportionate care on the stage and its furniture; drove their womenfolk to extraordinary lengths of patient needlework; and produced a gorgeous and ephemeral spectacle, *the event of the Arts and Crafts Movement, a demonstration of its varied talents and of its blessed irrelevance...It was to be formal, like the old masques, design, pageantry, allegory, but not an antiquarian revival, for there was a symbolic and processional strain in the Arts and Crafts which found a welcome expression in the masque: it was as if their allegorical figures had stepped out of the picture frames, down from the sculpted friezes, and now enjoyed the extra freedom of verse, music and dance. And being the Arts and Crafts, it was didactic, an allegory of London and the artists' hope for their city, touching and specific. The title was to be *Beauty's Awakening: A Masque of Winter and of Spring*.<sup>29</sup>*

Geddes, too, would produce such public pageants, presenting *The Masque of Ancient and Modern Learning* in Edinburgh in 1912, (Figure 4.5) and again in London in 1913. Philip Boardman describes the event:

During the third week of march 1912, Edinburgh's large Synod hall was eight times filled to capacity by paying spectators who thronged to witness 'The Masque of Learning,' a pageant of the history of civilisation, devised and interpreted by Patrick Geddes. It was performed by 'about 650 active participants, as players, orchestra and choir...and repeated for 2500 school-children of Edinburgh.'<sup>30</sup>

Photographs of *tableau* of the masque show the spirit of pageant (Figures 4.6, 4.7) and are reminiscent of the murals commissioned by the Edinburgh Social Union.(Figure 4.8) Geddes appears in two of the *tableau*, in one as Merlin (Figure 4.9, 4.10), and in another scene titled "Law." (Figure 4.11) He has surely fashioned himself after the portrait of King David in a Traquair mural of the 1890's for Mansfield Place Church in Edinburgh. (Figure 4.12) Biographer Amelia Defries first met Geddes at rehearsals for the London masque, and she describes the experience:

Several hundreds of young men and women stood about aimlessly in the big bare underground crypt; and most of them shook their heads and smiled when I tried to discover, from them, for what we were all gathered

<sup>29</sup> Crawford, Alan (2005) *C.R. Ashbee: Architect, Designer and Romantic Socialist*. Yale University Press. P 89.

<sup>30</sup> Boardman, Philip (1978) *The Worlds of Patrick Geddes: Biologist, Town Planner, Re-educator, Peace-Warrior*. Routledge and Kegan Paul. London. P234.

together...I gradually made out the thin figure of a bearded man whose eyes were very bright and whose hair stood on end...Someone told me he was the author of the *Masques of learning* ...shortly to be given by ourselves at London University. We were to present the history of modern civilization, beginning with the Fall of Rome...in the closing scene of the Masque, we passed the Torch of civilization on from one to another, onwards from past ages and into the coming generation; and there came to us some understanding, some realization, of the past -- and the priceless-ness of modern culture.<sup>31</sup>

Medieval pastiche, mural, and masque served not only as didactic instruments, but connected the lived city of the present to the lore of its past and the aspirations for its future. Geddes' dramatic presentments were design interventions that brought the past into the present. A photograph from around 1910 shows a group of school children being led down the street along Castlhill by Geddes' son Alasdair. (Figure 4.13) Alasdair, who would have been around twenty years old, is dressed as the Pied Piper, and the occasion was the opening of a children's garden along Johnson Terrace on the slope south of the Castle. The mood is one of jubilation; in the foreground two children run ahead, others smile, and others, dressed in costume and some holding banners, march with evident pride. Alasdair is playing the bagpipes, and it looks as if a child behind him is playing a drum. To the left, smiling women hold babies, and to the rear, men in hats also smile. Patrick Geddes does not appear to be in the scene unless he is the man whose head appears in a window on the upper right of the picture, (Figure 4.14) but perhaps he is waiting in the garden below to receive the group. This band will have to turn to their right, at the location of the unseen photographer, and then process down a steep set of stairs to arrive at the location of the Johnson Terrace Children's Garden. (Figure 4.15) Another of Geddes' initiatives, unused plots were claimed as gardens, planted and tended by school children. In this way he repurposed land, which he described as the original agricultural terraces of the hill fort, to provide children in this poor quarter of town with gardens. The garden is adjacent to the neighborhood targeted by the mission of Free Kirk founder Thomas Chalmers in his "West Port Experiment." Geddes' garden was in a sense, a continuation of the work of his childhood church. The intervention is modest, but as the photographs suggest, strengthens the connection between place and folk. In one of the diagrams explained by Geddes in his 1905 lecture at the second meeting of the newly founded British Sociological Society, entitled, "Civics: As Concrete and Applied Sociology, Part II," the relationship of place and culture and lore and folk and lear is shown in its dynamism. (Figure 4.16) His work in the Old Town of Edinburgh demonstrates a synthetic realization and materialization of the diagram.

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<sup>31</sup> Defries, Amelia (1928) *The Interpreter Geddes: The Man and His Gospel*. Boni and Liveright. New York. Pp 46-47.

Whereas the social reform efforts Geddes knew from his childhood were sanctioned by an ideal of Christian outreach, he had departed the orthodoxy of the traditional church, and his missionary zeal was fueled by a desire to win converts to a scientific viewpoint. For him, the Church was one of many public and social institutions which supported the spiritual and cultural needs of the city, and his affiliation with alternative "religions" reflected an interest in new paths to knowledge of the innermost. As a student in London, he had attended the Comtist Church which held to the "Religion of Humanity." Adherents endeavored to act altruistically for the benefit of society. Worship was of humanity rather than a deity. Huxley called it "Catholicism without Christianity." Also during his early years in London, Geddes had met Annie Besant, and he seems to have remained loosely associated with Theosophy. He lectured to the Edinburgh chapter of the Theosophical Society in 1893: A review in the society's publication describes his success:

At the Royal Institution a few days ago Professor Patrick Geddes delivered a lecture on *The New Evolution*, and the newspaper comment is that "it is plain that a new and somewhat different view of the operation of the evolutionary forces in nature is now taking the field as compared with that of the older authorities typified by Darwin, Wallace and Huxley." Professor Geddes' theme was that instead of looking at living matter as a mere cast arbitrarily shaped in the stern mould of environment, we are to look upon the latter as an external factor, checking the operation of the constant internal forces rather than assisting as an accelerating force...The *Secret Doctrine* has been laughed at, but Professor Geddes has evidently been reading it and his interpretation of it will be praised...If he is not already a true Theosophist, our Scottish lodge should speedily make him one.<sup>32</sup>

The *Secret Doctrine* is the treatise of theosophy founder Madame Blavatsky. Practitioners strove to resolve the inner emotive and spiritual experience with observable phenomena of nature and the outer world. One can see that this would have certain appeal for Geddes who states quite clearly that a purpose at the Outlook Tower is to "get the outworld and inworld together so that world and mind correspond." However, whatever the content of his lecture, it seems most unlikely that Geddes would agree with Blavatsky's condemnation of the very scientists, Haeckel in particular, he held in high esteem. There is one curious reference, though, in his lecture "Civics as Applied Sociology." He says:

Each new revelation and vision, each system of thought, each new outburst of poetry and song, has moved the men of its age by no mere scholastic instruction, but in a far subtler way, and into new and

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<sup>32</sup> *The Theosophical Review*. Annie Besant ed. Vol 12. March-August 1893. P 7.

unexpected groupings, as the sand upon Chladon's [sic]<sup>33</sup> vibrating plate leaps into a new figure with each thrill of the violinist's bow.<sup>34</sup>

Annie Besant in a 1901 publication, *Thought Forms*, explains that "at the present time observers outside the Theosophical Society are concerning themselves with the fact that emotional changes show their nature by changes of colour in the cloud-like ovoid, or aura, that encompasses all living beings." She continues, "if [a thought-form] succeeds in awakening sympathetic vibration in any mental body near at hand, an attraction is set up, and the thought-form is usually absorbed by that mental body...the fact of the creation by vibrations of a distinct form, geometrical or other, is already familiar to every student of acoustics, and 'Chladni's' figures are continually reproduced in every physical laboratory."<sup>35</sup> Geddes made a similar reference in his *Evergreen* essay of 1896 writing: "Emotion plays not with strings nor pipes only, but with things more massive and enduring also; to her Amphion-lute the very rocks range into order as sand-grains ripple to the violin-bow, and to her listening ear the Memnon statues sing."<sup>36</sup> The coincidence of these references to Chladni plates suggests that Geddes had either read Besant's work, or discussed the idea in conversation. While this need not make him a Theosophist, it shows at least a sympathy for esoteric practices which were oddly attractive to the *avant garde*, perhaps because there was "a desire to recapture a long-gone age of elemental purity."<sup>37</sup> Joseph Rykwert also links the Modernists with esotericism,<sup>38</sup> and there is much evidence of interest in the occult among those who sought to devise the future. As at the Outlook Tower, this may have to do with the relationship of the visual to the visionary, or perhaps it is because such thinkers sought satisfaction in alternative proposals. Geddes indicates the spiritual side of his science in a card he titles "Ways into the Tower." (Figures 4.17, 4.18)

At the top of the card he has written "Will you walk into my chamber?" This of course brings to mind the dark chamber at the Outlook Tower, the "room of quiet meditation" that Defries calls "the Room of the Weaving of Dreams." Down the left of the card descend "Traveler's Way," "Evolutionist's Way," "Woman's Way," "Biologist's Way," "Walker's Way," "Artist's Way," "Doctor's Way." In the New Testament Gospel of John, verse fourteen, in which Jesus claims to be the "truth and the light," the verse begins

<sup>33</sup> Ernst Florens Fiedrich Chladni (1756-1827) German physicist and musician who studied acoustics. When placing sand on metal plates, he found that drawing a bow across the plate caused the sand to organize in to patterns distinct for different frequencies.

<sup>34</sup> Geddes, Patrick (1904) "Civics as Applied Sociology". Reprint of lecture read before the Sociological society at a meeting in the School of Economics and Political Science (University of London). Dodo Press. P85.

<sup>35</sup> Besant, Annie (1901) *Thought Forms*. Percy Lund, Humphries and Co Ltd. Pp 8, 15.

<sup>36</sup> <sup>36</sup> Geddes, Patrick (1896-97) "The Megalithic Builders". *The Evergreen: A Northern Seasonal: The Book of Winter*. Patrick Geddes and Colleagues. P 146.

<sup>37</sup> Doorly, Moyra (2007) *No Place for God: the Denial of the Transcendent in Modern Church Architecture*. Ignatius Press. San Francisco. P 47.

<sup>38</sup> Rykwert, Joseph (1982) "The Dark Side of the Bauhaus". *The Necessity of Artifice*. Rizzoli. New York.

with "In my Father's house there are many dwelling places." Different translations use the word "mansions" or "rooms," but the sense of the word is that of a resting place for travelers. Jesus is telling his disciples that he is preparing a place for them. Beside "Woman's Way," is written "BD, TM," most likely initials for women in his circle. Then he has written "Education, Hygiene," and beside that "Ethical vs. War." Evidently this represents "women's work." Descending in the third column to the right is "Politician's Way," and "Educationist's Way." Below that are the most developed cells, "Occult Way" includes "Tell Fortune -- Making of Fortune," then "health and life" and "cast horoscope." Below that is written "Keys of Knowledge" opposed by "Arbor saeculorum," and "Crystal gazing" opposes "Lapis philosophorum," below which is his symbol for the "Valley Section" and "Flos. occupation" (flowering of occupations). A star symbol and again the "Valley Section" symbol occupy two more cells. Finally, at the bottom of the card he has written "Eugenic within upon everything." "Cast horoscope" recalls his reference to reading of or casting stones in his *Evergreen* essay. Viewed as a whole, one gathers an intent of bringing together those from "many walks of life", and a sense that the Tower offers views relevant to each of these. "Eugenic within upon everything" suggests that the principle of eugenics (which for Geddes had nothing to do with the "ethnic cleansing" or "improving" regulation later practiced by some, and was simply the genetic tendency for species success), as an internal mechanism of any organism is the ruling principle of all. Though he insists that his methods are strictly scientific in approach, here he borrows from occult practice the means of "seeing" the ineffable and unseen. Just as Geddes borrowed the convex mirror and the principle of the dark mirror among the instruments provided for viewing the present city at the Outlook Tower, casting horoscopes and fortune-telling are means for seeing the future city. . "Casting horoscopes" demands knowledge of planetary movement; knowledge of a physical reality, and reading the movement and position of heavenly bodies allows for predictions of future outcome. Geddes included astronomy as one of the many scientific outlooks at the Tower and one can imagine how reading planetary position and movement is not so unlike reading the physical presence and developmental change of the city. "Lapis philosophorum" is the philosopher's stone of alchemical practice. It can mean a substance that when combined with other elements transforms base metals into gold, but it also has the meaning of transformation or enlightenment. It is the sought-after knowledge, and can be both the process of transformation as well as transformation itself. Often described exoterically as an actual substance, it is as likely to be described esoterically, as a spiritual force. Just as the stones of cairns or buildings "speak" to Geddes of history and tradition, the "Philosophorum lapis" can have both physical and metaphysical properties. Carl Jung, who studied alchemy, used the language of alchemy to describe the processes of the psyche. "Individuation," a goal of the psyche, is achieved through *conjunctio*, or *synthesis*, a combining of elements which preserves their individual character while creating a new substance. Nothing is lost in the process, but a new being arises from the synthesis. Cubist painters of this same period applied this principle to *synthetic cubism*, wherein individual facets of a subject maintain their distinct properties, but seen together synthesize to

create a new subject. "The Occult Way" in to the Tower acknowledges a process which resists "scientific" description but which leads to a synthetic vision of the city. Such vision retains all the qualities of the past and present city while producing a new entity, the future city.

In a 1923 article for the *Sociological Review*, "A Note on Graphic Methods, Ancient and Modern," Geddes takes pains to emphasize that his graphic methods did not derive from esoteric practice: "...with no stock whatsoever in any theosophic, theological, metaphysical or other 'dreamlands,' as in the world of my main scientific experience they have usually seemed." <sup>39</sup> He continues:

I am compelled, in ordinary scientific honesty, to admit order in and among these 'dreams'; and at length just as definitely in this way, as Freud has come to do with regard to the dreams of the individual -- no longer despised by science, but explained -- in his own ways of psychology, (morbid, sexual, etc., mostly) -- so totally distinct from my (strictly cartographic) approach. <sup>40</sup>

"However," he writes, "nothing of all this has as yet ever induced me to use, or even experiment with, any one of the above-named or other older methods." <sup>41</sup> Though he disassociates his graphical methods from "older methods," he acknowledges that "the scholar...may think himself strictly observational, comparative, etc., and may claim to be as empirical as he pleases: but he needs little introspection...to realise that his interest, at bottom, is deeply speculative." <sup>42</sup> He points out that "...one has not in the least been working from historical cultures, or from reading pictographs, whether Egyptian, Amerindian, or other. As little from those of the religions -- western or eastern, or their mythologies; nor from the symbolisms, e.g., of the Freemasons or Rosicrucians, nor from the old divinations, magics or --'Mancies.'" <sup>43</sup> But he reports, with apparent delight, to have discovered similarities between his diagrams and "...those of ancient learning in mythologies, in religions, and even in magic!" <sup>44</sup> For "...the geometric logic too, first invented for myself -- and then found to be Cartesian -- I next find -- quite by chance -- in folk-lore, in alchemy, and in old magic, -- and now I suspect that Pythagoras was a master of this very game!" He is careful to make the distinction between his methods, which he aligns with scientific practice, and their utility which encompasses the mystical and dream world.

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<sup>39</sup> Geddes, Patrick (1923) "A Note on Graphic Methods, Ancient and Modern". *The Sociological Review*. Vol 15. P 231.

<sup>40</sup> Ibid.

<sup>41</sup> Ibid.

<sup>42</sup> Ibid. P 232.

<sup>43</sup> Ibid. P 229.

<sup>44</sup> Ibid.

Geddes admired John Bunyan's *The Pilgrim's Progress*, citing it in *The World Without and the World Within: Sunday Talks with My Children*:

Now remember your *Pilgrim's Progress*. "A splendid book!" Yes, indeed. From the Slough of Despond to the Delectable Mountains, from the Valley of the Shadow of Death to the Celestial city -- no explorer of the Out-world has ever ranged so far as that. Yet this traveller, who was his own Pilgrim, was all the time in a dingy, dirty, little jail, in a dull little country town. He had not even leisure from hard work to read, or often to write; for he had to earn his own living by making shoelaces: yet he travelled all the time.<sup>45</sup>

Bunyan's tale, published in 1677 as *The Pilgrim's Progress from This World to That Which is to Come Delivered Under the Similitude of a Dream* is a Christian allegory that recounts the travels and travails of the pilgrim Christian. He begins his journey in the "City of Destruction" and travels to seek the "Celestial City" where he will be unburdened of his sins. Along the way he encounters various characters ("Mr. Worldly Wiseman," "Mr. Legality" and his son "Civility," "Evangelist," and "Good Will") and must pass through the "Slough of Despond." He is directed to the "House of the Interpreter" where he is shown many rooms, each occupied by a repentant sinner. In one room Christian meets a man who says "I was once a fair and flourishing professor, both in mine own eyes, and also in the eyes of others...I am now a man of despair, and am shut up in it as in this iron cage." Finally, the Interpreter "took Christian by the hand again, and led him into a chamber," where he hears a description of the day of judgment. When he leaves the "House of the Interpreter" he is given a scroll with which he may enter the Celestial City. Geddes' "Ways into the Tower" is his pilgrim allegory, with himself as the Interpreter, welcoming travelers into his many rooms. Visitors were to be transformed by the experience of outlook and inlook, thereby leaving equipped as investigators prepared to "see" the light of the city in its complexity. He would write to Lewis Mumford, in 1922, "In the coming Utopia -- world Utopia --'there are many mansions.'"<sup>46</sup> To view these many mansions requires synthesis, lest one resort to specialization, by which only one mansion may be viewed at a time. "Inlook" or "the weaving of dreams" which takes place in the dark, the occult, is the *nigredo* of alchemy. In this stage, substances are blackened, and in a sense it is a cleansing stage prior to lightening or enlightenment. In Jungian terms it is a recognition of the shadow of self out of which arises the individual. In Bunyan's tale, Christian too must pass through darkness. Geddes' "Occult Way" anticipates the future and celestial city.

<sup>45</sup> Geddes, Patrick (1905) *The World Without and the World Within: Sunday Talks with My Children*. The Saint George Press Ltd. P 12-13.

<sup>46</sup> Novak, Frank G. (1995) *Lewis Mumford and Patrick Geddes: The Correspondence*. Routledge. New York. P133.

## Conclusion

Geddes brought to his new science tools familiar to him from other disciplines. In so doing he sought a method commensurate with other sciences, but at the same time he admitted the occult, "Inworld" which he believed to be an agency of synthesis. Proposing "diagnosis before treatment" he devised an instrument in the form of the Outlook Tower and his "Cities and Town Planning" exhibitions that would serve investigators as a means of "seeing" the future and possible through the past and present. The Outlook Tower, as a "thinking machine" writ large, encouraged a "way" of thinking. This tool afforded him a view which suggested subtle interventions, "conservative surgery" rather than the severe amputations that would prove more tempting to city planners in years to come. He saw the city as a dynamic organism where "place work and folk" are symbiotic, equal forces. The natural process of interaction between these organs is what gives rise to urban form, and by looking at that form, the educated observer can inductively reason past and future forms. Only a synthetic method can observe these processes simultaneously and allow for perhaps unanticipated associations that propose design intervention.

In 1904 Geddes published *City Development, A Study of Parks, Gardens and Culture-Institutes, A Report to the Carnegie Dumfermline Trust*. Dumfermline, just north of Edinburgh across the Firth of Forth, was the birthplace of Andrew Carnegie, and among his philanthropic endeavors, Carnegie provided funds to the town for beautification. Geddes, along with landscape designer T. H. Mawson, submitted a proposal for the improvement of Pittencrief Park in Dumfermline. In Geddes' report, one sees the application of his method, and the process by which he arrived at proposed interventions. As with all of Geddes' writing, it is a dense ramble, but one realizes, finally, that the ramble itself is the process, and the inclination to re-order material, to organize his observations, to apply a logical format to the wealth of data, removes from it its inventive capacity. To serve Geddes' purpose, it must be taken as a whole, and one can only pity the members of the Trust, who must have often wished for a moment to catch their breath on this dizzying walk through Geddes' *encyclopaedia Dunfermline*. Excerpts will perhaps serve to give the flavor of the work.

The report begins with a confusion of all of Geddes' points about town planning:

Yet as the wandering student of old, though seeking ever to learn as well as teach, was wont boldly to nail up his theses against all comers, so do I here. First of all I press the conception of the literature of cities as constituting a vast "Encyclopaedia Civica," having for each city its Book of the Past, its interpretative guide-book, geographical and historical; its Book of the Present, a social survey; and its Book of the Future, the city's book of hope, in which it should be attempted to discern, to plan out, and to suggest its incipient or potential development. Civics as an art, a policy,

has thus to do, not with U-topia, but with Eu-topia; not with imagining an impossible no-place where all is well, but with making the most and best of each and every place, and especially of the city in which we live. Here then is such a Eutopia for Dumfermline...<sup>47</sup>

As he continues, one recalls "the confusion and profusion" with which visitors were greeted at the Cities and Town Planning Exhibition. And, as at his exhibitions, one may begin from a variety of points and proceed along a variety of paths:

Where shall we begin? For many the High Street seems the natural starting-point, for many the Abbey, with its park entrance, or the Tower Hill, around which the whole city has historically arisen. With the recent inaugural procession we might enter by the Pittencrief gate, with the visitor to Dumfermline from the Lower Station, or, again, from the naval base by the road from Inverkeithing, or from Rosyth...<sup>48</sup>

Having settled on an entry, Geddes begins his report:

Entering from the station, our visitor, though favorably impressed by the old public park and the short boulevard of Comely Park Place, can hardly fail to notice the great defects of the first and the imperfect adjustment of the two. The latter, he may point out, is easily remediable, mainly by a slight rectification of road, railing, and park wall, with a little planting, by which the street, the old park, and the railway station would all be united, and thus each improved not a little. Coming on through the narrow Priory Lane to the new Technical School and High School, he can hardly fail to note with regret the recently lost opportunity of extending the station boulevard he has just traversed to meet the school square; and though welcoming the recent widening of the street at the expense of the garden edge of the bowling green, he may regret the bareness of its wall.<sup>49</sup>

In most cases (and this is a proposal for a park, after all) he proposes specific plantings to augment views:

Large and lofty trees at the highest points along this ascending east side of the Glebe, soon to be the edge of the park, are obviously desirable to frame the valley in trees on both sides, the present high and unsightly wall being, of course, removed. Common maple (Scots 'plane') would here do well; and immediately west of these should be planted flowering trees first the wild gean, white in spring blossom and orange-scarlet in autumn

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<sup>47</sup> Geddes, Patrick (1904) *City Development, A Study of Parks, Gardens and Culture-Institutes, A Report to the Carnegie Dumfermline Trust*. General Books. P4.

<sup>48</sup> Ibid. P 22.

<sup>49</sup> Ibid.

foliage; within these again a variety of crabs and other apples, so interesting in fruit as well as in flower, and acquiring with age a gnarled picturesqueness of form and beauty of bark all their own. Rowan, service tree, and hawthorns of sorts would also be added...<sup>50</sup>

The report was illustrated with photographs of views to which Geddes refers throughout. He employed a technique, novel for the time, of taking photographs and "touching them up" with white paint to indicate proposed improvement. (Figure 4.19) He describes this technique in his introduction:

Further illustrations of the same principle that of clear observation of the thing as it is, and design of it as it may be, are given throughout this volume...Here, of course, I owe the skilled expression of my rough design to my friend and architect Professor Capper. I find this method is substantially a revival of that employed by Repton, in whose imposing descriptive volumes lithographic plates, illustrative of views of places as they stood, are frequently supplied with a movable slide showing the effect of his proposed improvement. This method can now be carried out with far greater accuracy in these days of photography, and its wider application would be of service alike in the preparation of designs and in the appraisalment of them. They afford a means of testing the more familiar perspectives, such as I also supply in almost every particular.<sup>51</sup>

An un-retouched photograph would appear alongside one which had been retouched to indicate improvements. (Figures 4.20, 4.21). The novelty and effectiveness of this technique was remarked upon by Charles Booth, he of *The Life and Labour of the People of London* of 1892 which revolutionized graphic presentment in social science:

[Geddes'] charming volume on Dumfermline shows what beautiful features there are near Dumfermline, and how much may be done to preserve them in ways that are most interesting to study. His use of photography in this matter is extraordinarily successful. Prof. Geddes has photographed a scene as it now is, with its background and distance and its squalid foreground, already ruined by the debris of the city -- old tin pots and every kind of rubbish -- thrown down by the side of the stream, which is naturally beautiful. By manipulating the photographic plates he wipes out that which he does not want and introduces other features, including a little waterfall; and you have, instead of a miserable suburb, a dignified

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<sup>50</sup> Ibid. P 24.

<sup>51</sup> Ibid. P 16.

park. Well now, that is practical work. It has in it that element which he has described by question-mark in his diagram, the element of forecast.<sup>52</sup>

As at the Outlook Tower, Geddes deploys visual *techne*, modified by scientific method ("they afford a means of testing") in speculative endeavor. He intersperses specific recommendations with explanations of their utility in expressing the civic nature of town:

...sloping down to the stream below [Figure 4.22]...this should be terraced much as is the existing garden immediately to the south; and thus by sloping paths and steps one should descend to the stream, which should be crossed by a bridge...and that this new bridge at the bottom be made between these two church gardens. The result of this simple and comparatively inexpensive improvement would be that the public would have a new and attractive access from both sides to one of the most interesting and historic spots within the city...in this way, too, we should have literally united churches brought together with that spot of early traditions in which all the various denominations feel a common interest.<sup>53</sup>

The report continues in this vein, moving from particularity to particularity to its end. One waits for the "plan" to be revealed, for the "design" to become evident, for an overarching scheme that rationalizes each proposition. No such scheme arrives. Exhausted by the dizzying tour of every particularity, one finally understands the method Geddes advocates. Each clearing, each stream crossing, each street corner, each bank of shrubs, each vista, each entrance has qualities unto itself which insinuate its relationship, not to a grand scheme, but to its own moment and its immediate connection to the moment beside it. These are objects in a collection, never cleft of external reference, but obligated only to reside beside one another, and in that collective residence to comprise the total experience of place. Like the species which define the genus, rather than bending to the will of it, each moment stands alone, a paradigm, which maintains its individual qualities; each a facet of some new place of being which derives its identity from the synthesis of all facets.

Imagine display cases of fossils at a natural history museum, where a collection of specimens may stand for the characteristics of a species, or be arranged so as to show geographical dispersion, or indicate a sequence of development over time -- the "gaps" in the collection are opportunities for interpretation, and through inductive reasoning to determine likely causative events of the past, or to reason likely future outcomes. In operating as a collector -- either of the fragments of a particular city, or the visual evidence of a number of cities, Geddes could compose a narrative of place which took into account the many forces which shape a city, and propose a future which

<sup>52</sup> Geddes, Patrick (1904) *Civics as Applied Sociology*. Dodo Press.P30-31.

<http://www.gutenberg.org/ebooks/13205>

<sup>53</sup> Geddes, Patrick (1904) *City Development, A Study of Parks, Gardens and Culture-Institutes, A Report to the Carnegie Dumfermline Trust*. General Books. P 86.

maintained constancy with not only the past, but the specifics -- geology, climate, industry, social organization -- by which place is characterized. In his introduction to *The Civic Survey of Edinburgh*, he explains that "...we seek...to connect our studies of contemporary conditions with their origins -- local, regional and general."<sup>54</sup> He explains the purpose of survey in beginning the study:

This inquiry we find requires, first, a survey of our geographical environment in its fullest and deepest aspects; secondly, a survey also of the history of the city and region, and of Scotland in particular; with general history so far as bearing on this, and necessarily, therefore, from the earliest beginnings of civilisation. Above all, we are thus learning to view history not as mere archaeology, not as mere annals, but as the study of social filiation. That is, the determination of the present by the past; and the tracing of this process in the phases of transformation, progressive or degenerative, which our city has exhibited throughout its various periods...<sup>55</sup>

He reviews the history of Edinburgh, pointing out that its past defensive needs resulted in overcrowding, squalor and disease which proved the incentive for Joseph Lister's experiments in antiseptic surgical procedure -- a neat demonstration of Geddes' work/place/folk triad. Commenting on the settlement patterns of European cities which endured warfare, he writes:

Architecture and town planning in such a city, we thus plainly see, are not the mere products of the quiet drawing-office some here would have them. They are the expressions of the local history, the civic and national changes of mood and contrast of mind. Here, indeed, I submit an answer to those town planners who design a shell, and then pack their snail of a would-be progressive city into it, not discerning that the only real and well-fitting shell is that which the creature at its growing periods throws out from its own life.<sup>56</sup>

The "well-fitting shell" can only be proposed when the organism has been studied, and the fitness, in a Darwinian sense, is understood as an adaptive relationship between the folk and work and place. Geddes takes issue again with planners who fail to consider the exigencies of place:

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<sup>54</sup> Geddes, Patrick (2011) *The Civic Survey of Edinburgh*. Reprinted from the Transactions of the town Planning Conference. P 537.

<https://ia600300.us.archive.org/20/items/civicsurveyofedi00gedduoft/civicsurveyofedi00gedduoft.pdf>  
12/117/13

<sup>55</sup> Ibid.

<sup>56</sup> Ibid.

These town-planners, with all their merits, made various grave mistakes. First, they omitted adequate consideration of relief and contour, and thus their office-made schemes broke down wherever the ground became seriously irregular, so demanding unforeseen outlays for foundations here upon cliffs, or there on marshy hollows.

In contrast, Raymond Unwin, lifelong friend of Geddes and the architect who had implemented the Garden City ideals of Ebenezer Howard at Letchworth, and was, in 1909, designing a garden city at Rosyth, 3 miles south of Dumfermline, writes of town planning in practice:

The conscious art of town building is practically a new one for us in England. We shall need to begin somewhat tentatively, and at first we may well be content if we can introduce order to replace the present chaos, if we can do something to restrain the devastating tendency of personal interests and to satisfy in a straightforward and orderly manner the obvious requirements of the community.<sup>57</sup>

Unwin recognizes the beauty to be found in towns "from before what may be called the modern period,"<sup>58</sup> where, "one is sure to see something pleasing and beautiful in its effect."<sup>59</sup> But, he continues, "in these old towns and streets we read as in an open book the story of a life governed by impulses very different from our own..."<sup>60</sup> Modern cities, he argues, arise from new conditions and demand a new approach. "Modern conditions require, undoubtedly, that the new districts of our towns should be built to a definite plan. They must lose the unconscious and accidental character and come under the rules of conscious and ordered design."<sup>61</sup> In his words we recognize the contemporary impulse of town planning and urban design. This modern desire to bend place to will has its counterpart in the macrocosmic/microcosmic assumption of earlier centuries, and imposes a near teleological responsibility on designers who readily, apparently, assume a divine role in making great plans. Geddes advocated for a different approach, one which situated man within an evolutionary continuum. His proposals for intervention were modest of scale, for he saw that the city, like any organism, could respond to subtle influence, and that its adaptive capacity could insure its health. In the Dumfermline report he wrote:

The following plans have thus been drawn up with the idea not of finishing the place once for all as a nine day's wonder, but as indicating a comprehensive policy of improvement, which would not only occupy the

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<sup>57</sup> Unwin, Raymond (1909) *Town Planning in Practice: An Introduction to the Art of Designing Cities and Suburbs*. T. Fisher Unwin. London. P13.

<sup>58</sup> Ibid. P 12.

<sup>59</sup> Ibid.

<sup>60</sup> Ibid.

<sup>61</sup> Ibid. P 14.

constructive labour of years, but could ever be further and further developed.<sup>62</sup>

His "plan" for the city was like his "thinking machines" with cells left incomplete, or an exhibition or museum which could always be added to or rearranged. The city, seen as a collection, tells its own story, out of the assemblage of its many parts, and, when listened to, calls for its own interventions. Geddes' "method" was to listen carefully for that call. Borrowing strategies from comparative anatomy, taxonomy, and the microscopical laboratory, and mixing them with an evolutionary perspective seasoned with emerging thought in sociology and psychology he proposed a synthetic approach to the science of cities, instrumentalized by a way of seeing which was soft of focus and which resists the compartmentalization of disciplines more common in practice. His is an inconvenient means and defies the logical, deterministic approach to planning and design that characterized much of the twentieth century. Like his thinking machines, it is the folding and unfolding of relationships between place work and folk that yields a promise of a future city commanded not by will but by a coherence to its own nature. Like Carlyle's fictional character Professor Teufelsdröckh, it can be said of Geddes:

Our Professor's method is not, in any case, that of common school Logic, where the truths all stand in a row, each holding by the skirts of the other; but at best that of practical Reason, proceeding by large Intuition over whole systematic groups and kingdoms; whereby, we might say, a noble complexity, almost like that of Nature, reins in his Philosophy, or spiritual Picture of nature: a mighty maze, yet, as faith whispers, not without a plan....For it seems as if the demonstration lay much in the Author's individuality; as if it were not Argument that had taught him, but Experience. At present it is only in local glimpses, and by significant fragments, picked often a wide-enough intervals from the original Volume, and carefully collated, that we can hope to impart some outline or foreshadow of this Doctrine.<sup>63</sup>

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<sup>62</sup> Geddes, Patrick (1904) *City Development, A Study of Parks, Gardens and Culture-Institutes, A Report to the Carnegie Dumfermline Trust*. General Books. P 17.

<sup>63</sup> Carlyle, Thomas (1831) *Sartor Resartus: The Life and Opinions of Herr Teufelsdröckh*. F.M. Lupton Publishing Company. New York. P 45.  
<http://www.gutenberg.org/files/1051/1051-h/1051-h.htm>

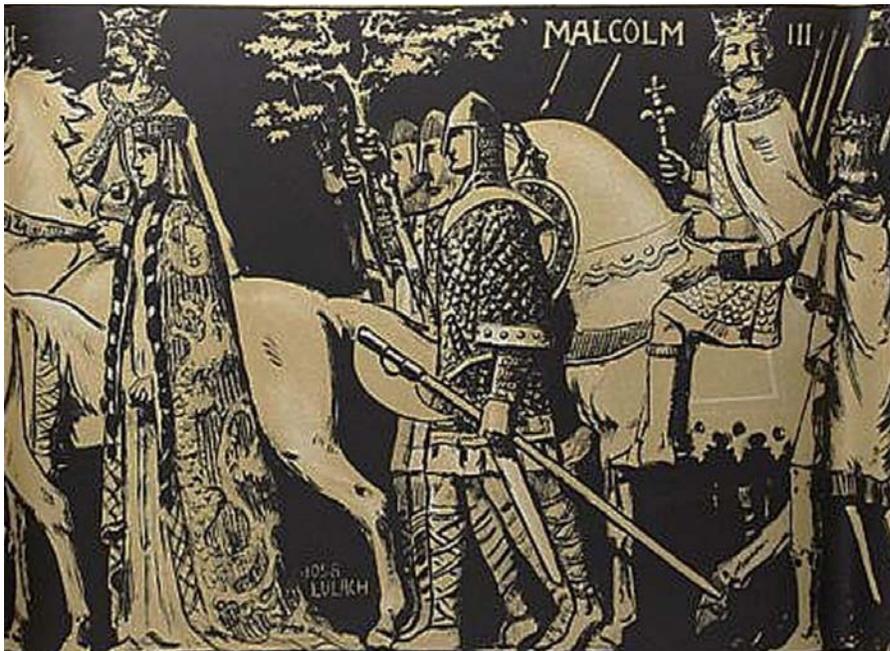
**IMAGES: CHAPTER FOUR**



**Figure 4.1:** *Ramsay Garden from the north, Outlook Tower on the far left.*

Source: <http://www.redemptionblues.com/?m=200508>.

Retrieved 7/11/13



**Figure 4.2:** *William Murdoch, detail, design for proposed mural, after 1900*  
Source: <http://www.lyonandturnbull.com/asp/fullCatalogue.asp?salelot=357>  
Retrieved 12/17/13



**Figure 4.3:** entrance hall, Scottish National Portrait Gallery, William Hole frieze, 1900.

Source: <http://www.nationalgalleries.org/visit/history-architecture-302/>

Retrieved 12/17/13



**Figure 4.4:** detail, William Hole frieze, Scottish National Portrait Gallery, 1900.

Source: <http://www.rampantscotland.com/famous/blfamfrieze.htm>

Retrieved 12/17/13

The Edinburgh Masquers: Outlook Tower.  
 THE  
**MASQUES OF LEARNING.**  
 A Pageant of Education through the Ages,  
 Devised by Professor Patrick Geddes,  
 With Musical Illustrations by Orchestra, Choir, &c.,  
 under the direction of Mr W. B. Moonie, Mus. Bac. (Edin.),  
 Will be presented in the  
**SYNOD HALL, CASTLE TERRACE.**  
**I.—THE MASQUE OF ANCIENT LEARNING.**  
 Thursday, 21st November.  
 Friday, 22d                   "  
 Saturday, 23d               "  
**II.—THE MASQUE OF MEDIEVAL AND MODERN  
 LEARNING.**  
 Monday, 25th November.  
 Tuesday, 26th               "  
 Wednesday, 27th           "  
 At Eight P.M.                   Carriages 10.30.  
 \* Voucher Holders are reminded that their Vouchers  
 must be exchanged for Numbered Tickets at **PATERSON  
 & SONS**, 27 George Street.  
 Tickets for Single Performances—Reserved, 7s. 6d., 6s.,  
 5s., 4s.; Unreserved, 3s., 2s., 1s. 6d.  
 Double Tickets (admitting to One Performance of each  
 Masque), 12s., 10s., 8s., 7s., and 5s. 3s. 6d., 2s.  
**PATERSON & SONS, 27 GEORGE STREET.**

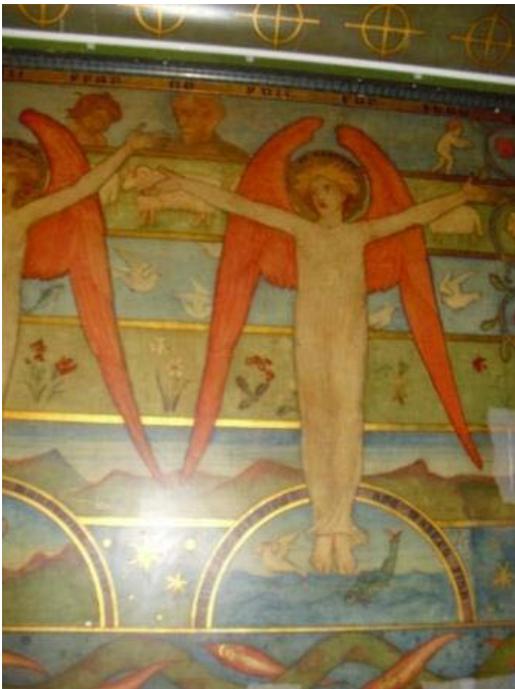
Figure 4.5: advertisement for "Masques of Learning," 1912  
 Source: Scotsman, November 13, 1912



Figure 4.6: photograph, "Masque of Learning," c 1912.  
 Source: University of Strathclyde Archives T-GED 22/3/3



**Figure 4.7:** photograph, "Masque of Learning," c 1912.  
Source: University of Strathclyde Archives T-GED 22/3/3



**Figure 4.8:** Phoebe Traquair, detail mural, Chapel of Rest, Royal Hospital for Sick Children, Edinburgh, 1885  
Source: <http://www.edinburghsickkids.org/KreativkidS/collection.html>  
Retrieved 12/17/13



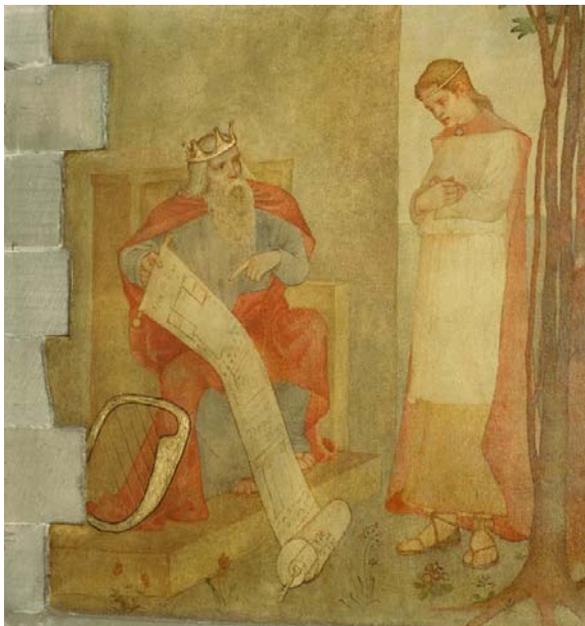
**Figure 4.9:** *photograph, "Masque of Learning," Geddes as Merlin c 1912.*  
Source: University of Strathclyde Archives T-GED 22/3/3



**Figure 4.10:** *detail, photograph, "Masque of Learning," Geddes as Merlin c 1912.*  
Source: University of Strathclyde Archives T-GED 22/3/3



**Figure 4.11:** detail, photograph, "Masque of Learning," "Law" with Geddes c 1912.  
Source: University of Strathclyde Archives T-GED 22/3/3



**Figure 4.12:** Phoebe Traquair, King David showing plans of temple, Mansfield Place Church, Edinburgh, c 1890.  
Source: [http://www.rcahms.gov.uk/index.php?option=com\\_rcahmsimagebank&view=imagebank&Itemid=32&imageld=28](http://www.rcahms.gov.uk/index.php?option=com_rcahmsimagebank&view=imagebank&Itemid=32&imageld=28)  
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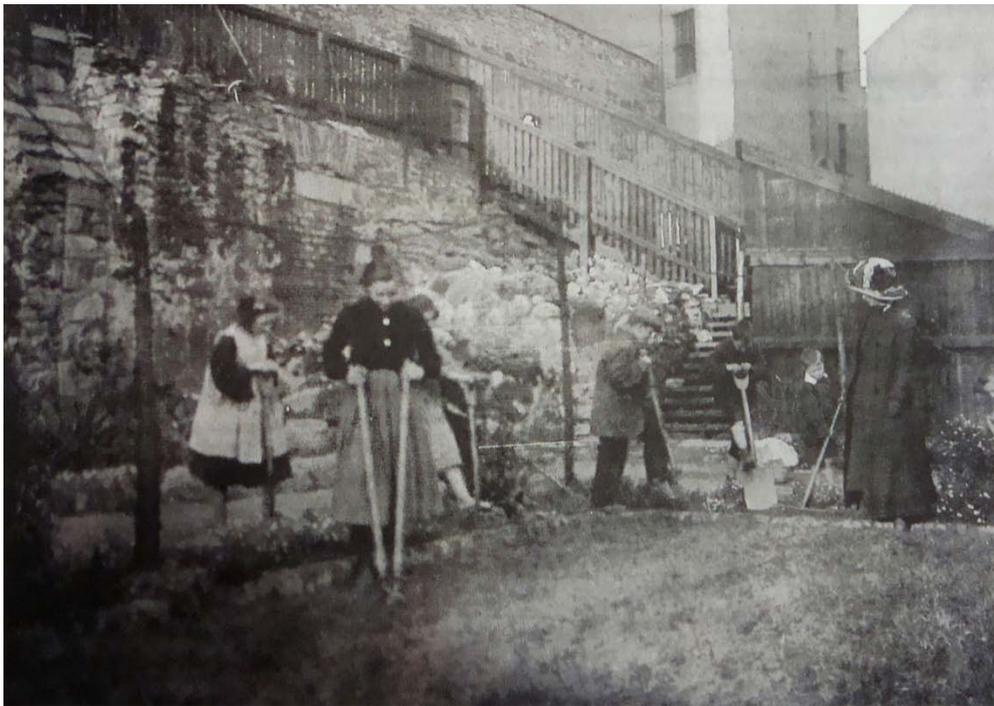


**Figure 4.13:** photograph of Alasdair Geddes, dressed as Pied Piper, leading procession of children along the Royal Mile. the Castle is in the background, and the Outlook Tower is the last building on the right side of the street.

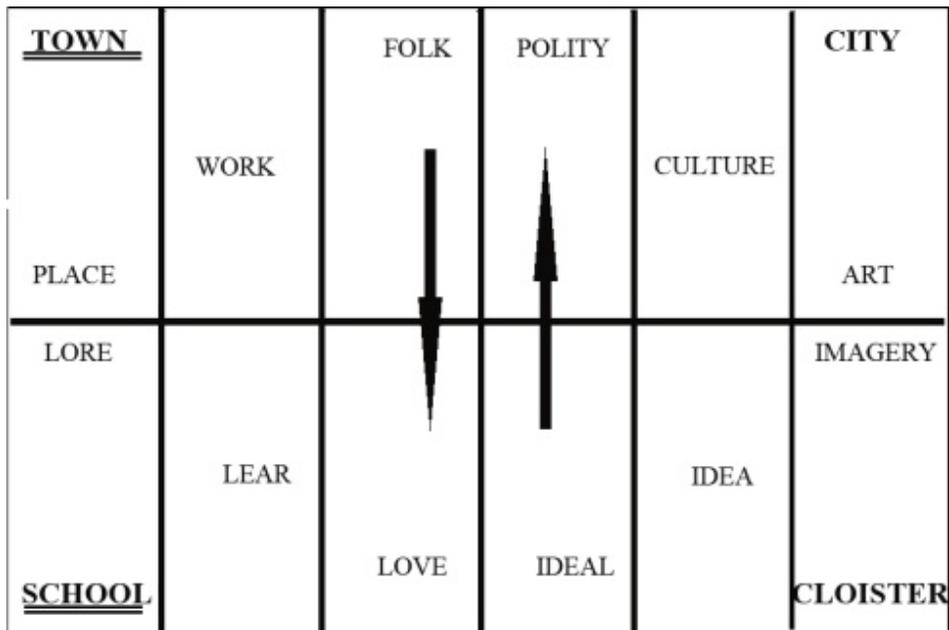
Source: University of Strathclyde Archives T-GED 22/1/475



**Figure 4.14:** detail of photograph of children's procession. Geddes in window?



**Figure 4.15:** photograph Johnson Terrace Children's Garden, c 1910.  
Source: University of Edinburgh Archives Sec J Cat J9 Neg Green Box 119



**Figure 4.16:** diagram from lecture , "Civics: As Concrete and Applied Sociology, Part II,," London, 1905  
Source: Meller, Helen E. (1979) *The Ideal City*. Leicester University Press. P 132-133

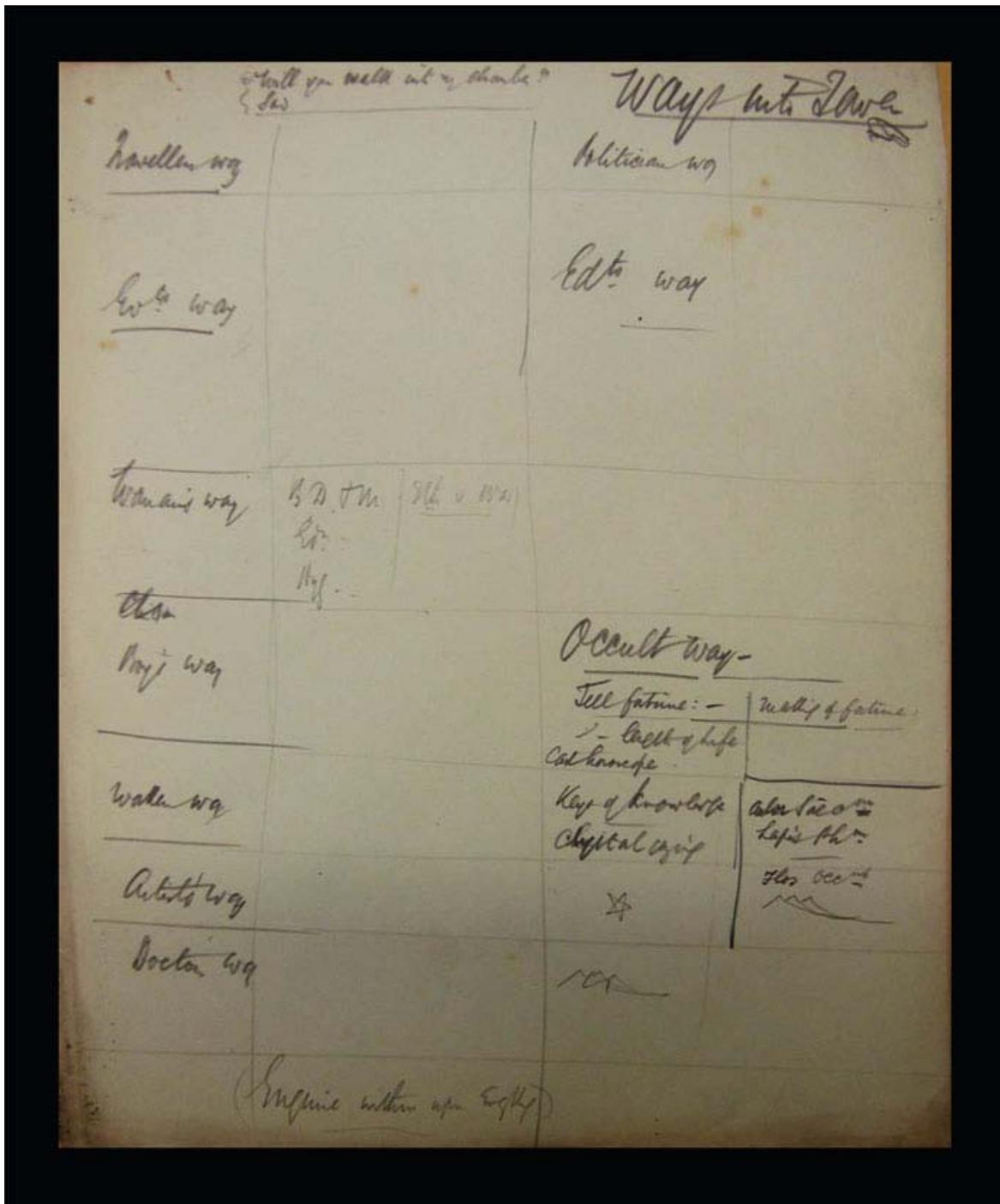


Figure 4.17: "Ways into the Tower" thinking machine, undated.  
 Source: University of Strathclyde Archives. T-GED 7/3/35

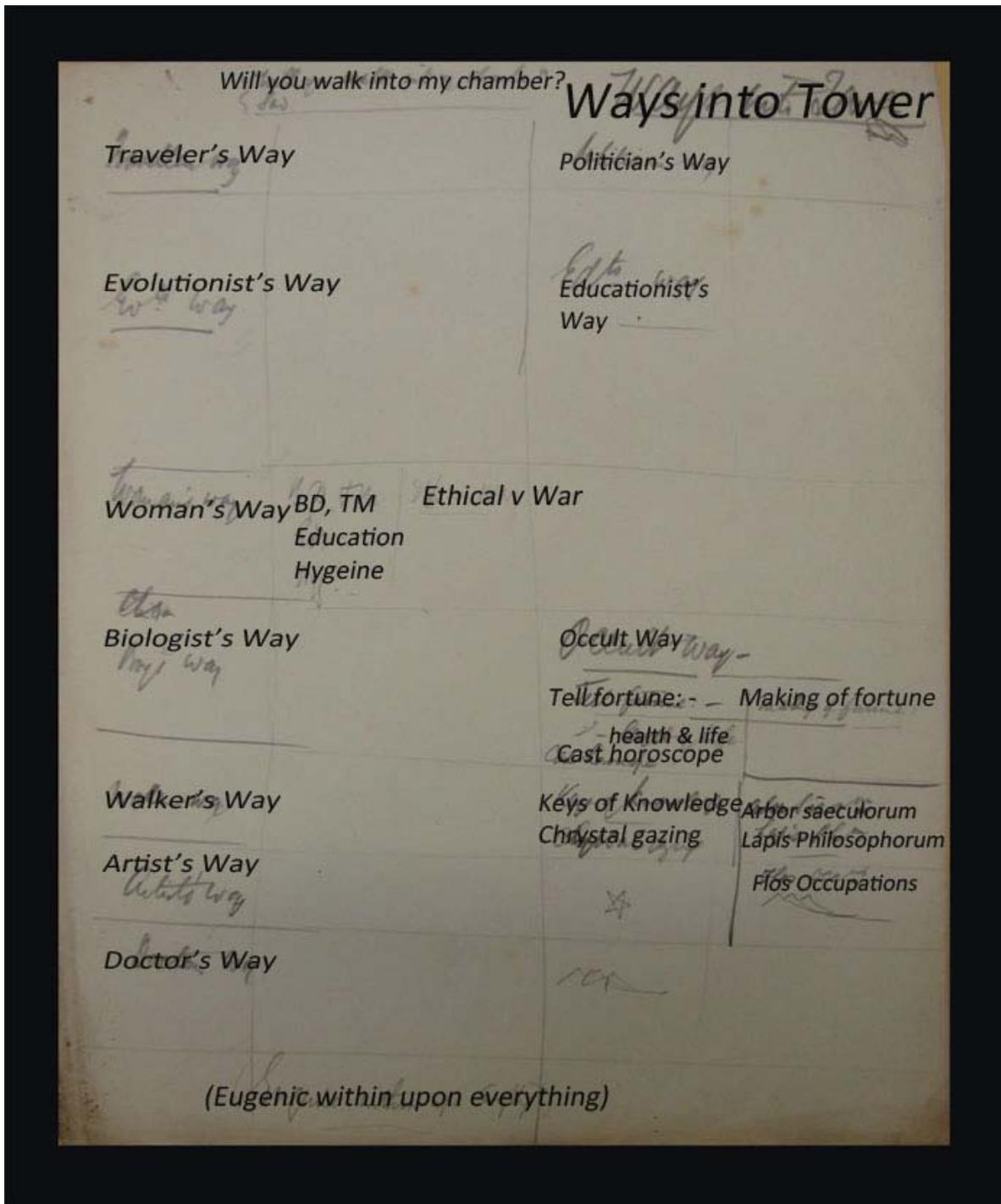
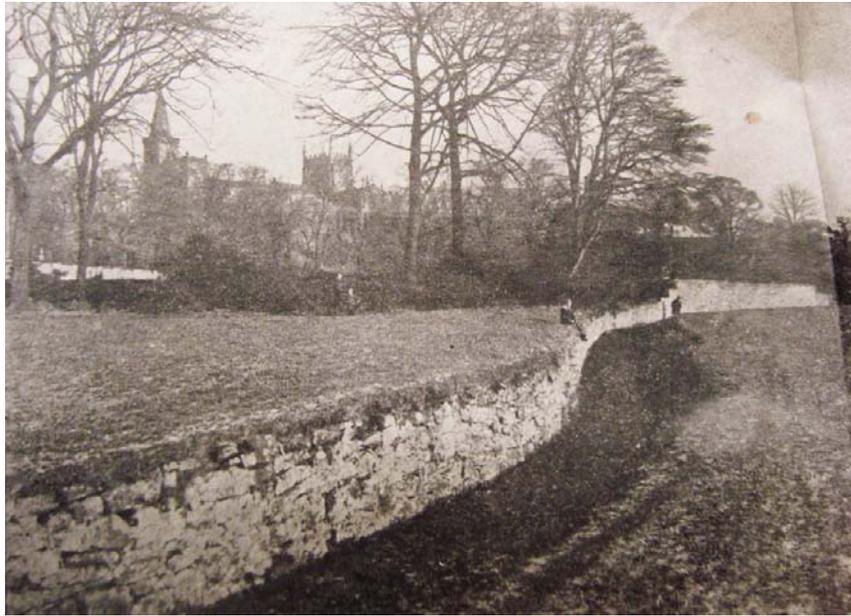


Figure 4.18: transcription of "Ways into the Tower" thinking machine.



**Figure 4.19:** photograph showing Geddes' technique of retouching photographs to indicate proposed improvements

Source: University of Strathclyde Archives



**Figure 4.20:** untouched photograph of a setting in Dunfermline  
Source: University of Strathclyde Archives



**Figure 4.21:** "retouched" photograph of same setting, indicating proposed improvements  
Source: University of Strathclyde Archives



**Figure 4.22:** "retouched" photograph of a stream in Pittencrief Park, Dunfermline  
Source: University of Strathclyde Archives

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