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Building the Stair Spiral of Evolution:
The Index Museum of Sir Patrick Geddes

How does one describe a genius who wanted to be universal? How does one speak about the sources of his thinking, his relations with his contemporaries, his appropriation of various disciplines? Patrick Geddes (1854–1932) was a biologist, sociologist, botanist, geographer, urban planner, educator, founder of museums, schools, and institutions, leader of meetings and associations, poet, and guru. A list of his teachers, students, friends, collaborators, and financiers would fill several pages. An extremely prolific author, an enthusiastic correspondent, an authoritarian lecturer who prepared and distributed excerpts from his own papers so that his audiences would not waste time taking notes: a quick biography, a brief analysis of his works, might be worse than useless. How does one describe a genius who wanted to be universal? How does one speak about the sources of his thinking, his relations with his contemporaries, his appropriation of various disciplines? Patrick Geddes (1854–1932) was a biologist, sociologist, botanist, geographer, urban planner, educator, founder of museums, schools, and institutions, leader of meetings and associations, poet, and guru. A list of his teachers, students, friends, collaborators, and financiers would fill several pages. An extremely prolific author, an enthusiastic correspondent, an authoritarian lecturer who prepared and distributed excerpts from his own papers so that his audiences would not waste time taking notes: a quick biography, a brief analysis of his works, might be worse than useless.® A list of his written works and grandiose projects, most of which were never executed, would fail to convey the complexity and impact of Geddes’s thinking. I therefore propose in this piece to make only a few reflections, taking some of his favorite definitions and neologisms as starting points.

Evolutionary Ethics

“Evolutionary ethics” was a recurrent theme in Geddes’s writings and the title of a course in ten lectures that he gave at the University of London in 1905. In a note introducing the monograph that brought together the contents of these lectures, Geddes warns that he will explain his own “personal thinking,” not a recognized
doctrine, and that therefore he cannot provide his students with a standard bibliography. I will try to suggest a probable list of titles. Restless and brilliant, Geddes subjected himself to scholastic discipline with much reluctance (he detested examinations, stubbornly refusing to earn academic diplomas). In 1874, however, at the age of twenty, he decided to enroll in a botany program at the University of Edinburgh. He stayed one week. Reading the first pages of Thomas H. Huxley’s _Lay Sermons_ convinced him that Huxley, Darwin’s champion, was the only teacher for him. Geddes immediately went to London to the School of Mines, where, after a year of preliminary studies (chemistry, physics, geology), he was admitted to Huxley’s courses on the natural sciences. He was fascinated by Huxley’s methods of teaching, especially the idea of presenting students “type-series” instead of innumerable examples from the collections of the great museums and botanical gardens. (Geddes would return to the concept of type as developed by Huxley in his formulation of the Index Museum.) But Huxley was not his only teacher: in these years Geddes read and greatly admired the moral content of the works of Thomas Carlyle, attended meetings of the Positivist Society, discovered Herbert Spencer’s _Principles of Biology_, and embraced John Ruskin’s theses on economics.

The result of these heterogeneous readings was clearly manifested in _Co-operation versus Socialism_ (1888), a text that represents one of Geddes’s first incursions into the field of social and economic science. In this work he quickly demolishes the writings of John Stuart Mill, Karl Marx, William Stanley Jevons, Alfred Marshall, and Thomas Robert Malthus, none of whom, in his opinion, has a true scientific foundation. It is impossible, Geddes maintains, to study political economy without knowing biological and physical science. One cannot speak about production without analyzing the quantity and quality of objects and materials. One cannot analyze the so-called laws of population without referring to the reproduction rate of living organisms. The doctrine of “competition” exists only in relation to the “struggle for existence.” The notion of “progress”
cannot be understood except through the concept of “evolution.” And he explains that even Darwin’s classic thesis — progress understood as the survival, in a superabundant population, of those favored individuals in the struggle for existence — should be considered as a simplistic reading of natural laws. Darwin’s analysis is still too tied to Malthusianism and the “current individualistic economics.”

Now, Geddes continues, it has been possible to verify scientifically that survival and the progress of living beings are determined not by struggle, but “1. by the degree of adaptation of the sexes, 2. by the increasing reproductive sacrifice for the production of offspring, 3. by the subsequent increase of parental care, 4. by the degree of association attained by members of the species.” Therefore the new scientific economy will be based on the idea of progress as the product of love, association, and cooperation. The duty of the economist, the social operator, and the enlightened capitalist will be to favor and direct, insofar as possible, the natural process of evolution, keeping in mind these fundamental “scientific” truths. They should behave like every other man of science: “think and experiment alternately.”

Thinking Machines

In an unpublished manuscript “Museum: Actual and Possible” (excerpted in this journal), Geddes explains that a folded piece of paper represents the smallest “Index Museum.” The Index Museum is a “thinking machine.” During an expedition in Mexico in 1879, Geddes, threatened by blindness, was for weeks kept in a dark room. Desperate (he defined himself as eminently “visual”), he one day traced the contours of some windowpanes with his fingers. Suddenly he was illuminated: “The fingers see!” The window became a kind of geographical map, subdivided by meridians and parallels. An intrepid navigator, Geddes ventured out onto the seas of a new knowledge. The panes of glass were replaced by pieces of paper folded so as to form various compartments in which one could organize, for example, the sciences, following the hierarchy suggested by Auguste Comte. One thus obtains — as in a matrix —
5. Geddes, diagram of the Valley Section, 1925

6. Alexander von Humboldt, Géographie des plantes équinoxiales, from Tableau Physique des Andes, 1805–7
fascinating, suggestive combinations of data that might give rise to new chains of thinking. Thanks to these agile and synthetic diagrams, one can manage and correlate the enormous quantities of data furnished by various disciplines and achieve a "synoptic vision" (another definition much loved by Geddes) of the social organism and its relation to the environment. There is no point in listing other famous examples of utopian classification and combinatorial madness. I shall merely suggest a curious parallel between Geddes's ideas and the interests of his contemporary Karl Pearson (1857–1936), professor of eugenics in London and father of modern statistics. Geddes's first essay on a subject not strictly tied to biology was entitled "The Classification of Statistics and its Results" (1881); in addition, there is clear documentation for his ties with Francis Galton and the growing science of eugenics (which is based on a statistical study of the population).

The Valley Section

The Valley Section is the most famous of the diagrams developed by Geddes. It represents the section of a valley along which are distributed (in this order, from the mountains to the sea): miners, woodsmen, hunters, shepherds, poor peasants, farmers, and fishermen. To each occupation corresponds a precise type of society and culture. Geddes claimed that in drawing this diagram he was inspired by the thinking of the French sociologist Pierre-Guillaume-Frédéric Le Play, author of Les Ouvriers européens, an analysis of thirty-six family units. Le Play's remarks are divided into four chapters, treating the definition of the place, of the organization of industry, and of the family; the family's means of subsistence (mostly concerned with artisans and specialized workers); the family's life-style; and the history of the family. In the first volume of Les Ouvriers européens there appears the formula that particularly fascinated Geddes and that became the basis of the Valley Section: place-work-folk. It has been emphasized elsewhere how Geddes's interpretation was in reality very far from Le Play's thesis. Geddes seems to have found in this particular formula a further confirmation of his convictions on the correspondence between the social sciences and biology. In fact, he did not hesitate to emphasize the way in which this sociological triad coincided with the biological one of environment-function-organism. Yet Le Play never sought justifications of a geographical or environmental kind to explain the culture of the social groups he was examining.

A more interesting hypothesis about the genesis of the Valley Section has, however, been put forward by Keith Wheeler in an article from 1972 entitled "From Goethe to Geddes and the Search for Environmental Understanding," which I will quickly run through. Wheeler recalls some of Goethe's intuitions on the relationship between organisms and their environment, in particular, his studies on the metamorphoses of plants and the foundation of morphology. In this regard, Geddes observed that in Goethe the term morphology represents the culmination not only of his scientific works, but also the greatest of his poems. Wheeler goes on to emphasize the connections between Goethe's thinking and the work of Alexander von Humboldt, especially the latter's studies on the distribution of flora in relation to changes in altitude and climate. In 1804, in Paris, von Humboldt had a landscape painter paint a diagram illustrating the results of his research on tropical flora. Also important was Ernst Haeckel's definition of ecology as "extremely varied and complex phenomena which show us the relations of organisms to the surrounding world, to the organic and inorganic conditions of existence: the so-called economy of nature, the correlation between all organisms which live together in one and the same locality." Wheeler concludes by mentioning the works of the German geographer Carl Ritter and those of the American George Perkin Marsh, both of whom were strongly influenced by von Humboldt's thinking; Ritter and Marsh, in turn, had a decisive influence on the anarchic French geographer Elisée Reclus. In 1869 Reclus published his "Histoire d'un ruisseau" in which he tells the story of a river, following its course from the mountains to the sea, accompanying his tale with reflections very close to Geddes's in the Valley Section. Reclus held a series of classes between
1895 and 1896 in the “summer meetings” organized by Geddes in Edinburgh (summer courses for teachers, university students, artists, musicians, and men of letters interested in reconciling their specialized fields with a synthetic vision of knowledge).\(^9\) In 1898 Geddes threw himself into a campaign to finance the Great Terrestrial Globe, conceived by Reclus, which was to be built at the Universal Exposition of 1900 in Paris. The very costly globe, designed by the architect Louis Bonnier, was not executed, but would be proposed again by Geddes in 1902, once again without success, in an article suggesting the creation of a national institute of geography.\(^\) In this text, Geddes describes an enormous building intended to house — besides Reclus’s globe — a “celestial globe” conceived by French architect Paul-Louis Galeron; an immense panorama of Switzerland and the Alps; panoramas of scenarios typical of all countries; rooms dedicated to the study of various regions; and a room for conventions and conferences. A gigantic Tower of Regional Survey would crown the whole.

The Outlook Tower

One of the first panoramas was painted by the Scottish artist Robert Baker, who executed a View of Edinburgh using the Calton Hill Observatory.\(^\) Geddes recalled this event in a lecture he gave at the Sociological Society of London in 1906. The title is significant: “A Suggested Plan for a Civic Museum and its Associated Studies.” It is essential, Geddes explained during the lecture, that every town museum be provided with a tower, an observatory that might offer a synoptic view of the city and its region. The statistics, research, and data provided by various sciences must indeed be integrated and reread in the light of a real vision of the urban panorama. “I press, then,” Geddes writes, “for the actual experimental establishment of such literal synoptic outlooks, since from the outlook towers or heights of any city all that is in this paper may be discovered, and much else besides; so that whoever climbs may read.”\(^\) The Outlook Tower is a building, still standing, in the
9. View of the Outlook Tower, Edinburgh

10. Outlook Tower, diagram illustrating Geddes's organization of his "civic museum"
11. Views of Edinburgh as seen from the camera obscura of the Outlook Tower

12. Cover of J. Kelman, The Interpreter's House, 1905, the first guide to the Outlook Tower
old center of Edinburgh. Around 1880 it was known as Short's Observatory, a name deriving from the instruments installed on its summit by an optician, Mr. Short. At the time he took possession of it, in the 1890s, Geddes renamed it the Outlook Tower to indicate symbolically a new vision of social biology. He transformed it into a sociological laboratory in which he assembled maps, instruments, books, diagrams, episopes, globes, plastics, herbariums, aquariums, and functioning models of geyers and lunar volcanoes.

A visit to this “museum of the city and its region” began at the top. The new “tourist” first viewed the surrounding area from the turret, then from the camera obscura. Lower down, a series of instruments (barometers for meteorology, herbariums for botany) underlined the various aspects of the urban panorama visible from the belvedere. An episcope on the inside enabled the visitor to observe the entire world as seen from the perspective of the tower. Descending, floor by floor, one found sections dedicated, respectively, to Edinburgh, Scotland, the Empire (English-speaking countries), Europe, and the World.22 In a chapter from the book project “Museum: Actual and Possible,” Geddes notes that “to our Index Museum we must . . . add its complement — the regional museum.”23 The latter would be based on geography and the real world, not on the philosophy of science. What, Geddes asks himself again, are our geographical interests? He answers, “Obviously, first of all, proceeding from known toward less known, our immediate surroundings, our Perspect, next our City, again our Region or Province or State, next again our Nation, our Language, next again the larger Occidental civilization of which it forms but a part; next again culture-Orient from which it has historically derived so much; and next again, the simpler world of Uncivilized or less Civilized man. This may of course be arranged in various ways: widening circles upon a single plane . . . or more conveniently on the vertical storeys of a tower.”24 On one of the windows of the Outlook Tower appeared the diagram of the Valley Section.25
Mother Liquor

Universal exhibitions are the “primordial liquid” from which museums are born, Geddes wrote, recalling the well-known cases of the Kensington Museum and the Commercial Museum of Philadelphia. Exhibitions also represent the greater and more vital form of the museum. The visitor must, however, be prepared to analyze in an orderly and constructive way the exuberant placement of machines, objects, and works of art. With this in mind, Geddes urged the formation of an international association to work toward this goal at the Paris Exposition of 1900 — an initiative that, for once, met with success. That year found Geddes intent on organizing an Outlook Tower and Index Museum on the highest gallery of the Trocadéro. His guided tour of the exhibition buildings left from there. When the exhibition closed, he suggested that a few of the pavilions built by various countries along the rue des Nations be preserved and turned into museums. At the Paris Exposition Geddes met, perhaps for the first time, Paul Otlet, the Belgian patron, promoter, and leader in Brussels of a series of internationalist initiatives. One may briefly recall Otlet’s participation in the foundation of the International Institute of Bibliography (1895), in the institution of an International Museum of the Press (1907), in the establishment of the first conferences for peace, as well as his efforts to create an organization of international associations, which would culminate, on the occasion of the Universal Exposition of 1910, in the convocation in Brussels of the first congress of such institutions. The congress approved the formation of a museum for the documentation of international life, in which the exhibit organized by Otlet could be housed and developed. In a monograph by Otlet from 1914 one reads that “the museum would be a world in miniature, a cosmoScope that permits one to examine and understand humanity, society, and the universe; it will give a vision of the future, a combination and synthesis of all the factors of past and present progress.” This is pure Geddes. The preceding year Geddes had won the Grand Prix at the Ghent Exposition with his henceforth famous Cities and Town Planning Exhibition (the itinerant exhibit initially presented in London at the historical review of urban planning of 1910). At Ghent,
Otlet illustrated his own proposal for the construction of a Mundaneum, or "World City," and urged the institution of a museum that might permanently house the Cities and Town Planning Exhibition. Otlet saw in Geddes's work a synthesis capable of informing the public about "the various factors of historical and contemporary evolution of the city" and found in it, moreover, methodological hints useful in organizing his International Museum. In 1914 Geddes strove to organize an exhibit on the "World City" in Edinburgh and in a number of British and American cities. Otlet's own efforts would be rewarded with the execution, in Brussels, of the Palais Mondial, while the idea of the "World City" would be glorified in Le Corbusier's grandiose projects for the Mundaneum to be built in 1929 near Geneva. One should note the analogies between the Otlet and Le Corbusier projects and those of Geddes, including the stepped pyramid that was to be visited starting at the top and the great terrestrial globe. Even the lapidarium, where Otlet imagined the greatest expressions of human intelligence and the names of its most illustrious exponents would be sculpted in stone, resembled the museums of philosophy that Geddes suggested ought to contain busts of great thinkers and graphic summaries of their thinking.

The Index Museum

The clearest exposition of the principles informing the constitution of the Index Museum is contained in the document excerpted here. It is part, as I have already mentioned, of an unpublished manuscript, probably the project for a book. The manuscript is undated, but we can situate it between 1902 and 1903: Geddes speaks in the past tense of the Universal Expositions of Paris and Glasgow (1900 and 1901) and in the future of the one in St. Louis (1903). The text, Geddes informs us, came out of an invitation to open a discussion on the problems related to building a museum in a small city. Typically, Geddes dealt with the question in the widest and clearest terms possible and entitled his reflections "Museum: Actual and Possible." In the introduction, after posing questions about the nature and aims of museums — which are not to be warehouses or "treasures," but vital governing and educational centers — he begins to examine a whole series of examples, underlining their merits and faults. It is an extremely interesting list that deserves closer analysis. I will confine myself to citing the cases that most fascinated Geddes: the reorganization of the Horniman Museum in London; Ruskin's experiments in Sheffield; the Pitt-Rivers collections (the one at Oxford, but also the merger of park and museum that Pitt-Rivers realized in Larmor Park, near Salisbury); Hutchinson's museum in Haslemere in Surrey (a kind of outdoor museum); Hull House, created in Chicago by the feminist Jane Addams; and the Natural History Museum in London. The Natural History Museum had been inaugurated in 1881, thanks, above all, to the great efforts of Richard Owen, doctor in medicine, curator of the Hunterian Collection at the College of Surgeons in London, Hunterian professor (from 1837), and superintendent of the Department of Natural History of the British Museum (from 1856). At the time he assumed his post at the British Museum, Owen was a recognized authority in the field of comparative anatomy and paleontology as well as a renowned lecturer who firmly believed in popularization (he was one of the promoters of the Great Exposition of 1851). In a pamphlet written in 1862, in which he illustrated his project for the construction of a new museum of natural history, Owen supported ideas altogether similar to those Geddes would propound in the early years of the following century. A museum, Owen maintained, ought to amuse and amaze. Geddes, commenting on the window display of a curiosity shop — in his opinion the simplest form of the museum experience — wrote that "it awakens something of our depressed faculty of wonder, and as wonder deepens it becomes admiration, as it sharpens it becomes curiosity. But admiration is the real, the only beginning of art, and curiosity of science." A museum, Owen goes on to say in his pamphlet, must teach the ignorant, offer objects for study and comparison to specialists, provide materials to local collectors, furnish information to employees, merchants, and intelligent professionals. In the same vein, Geddes insists upon the need to organize museums so that they may be useful to the most diverse categories of visitors. Owen concludes that the metropolitan museum of natu-
ral history of a great nation should offer a “comprehensive, philosophic, and connected view” of all the various classes.35 (It is perhaps useful to stress the affinity between this statement and Geddes’s ideas.) Owen’s project for the museum of natural history thus foresees two systems of galleries (one public and the other reserved for scholars) and a great central hall that would hold two collections. The first would illustrate the natural history of the British Isles. The second would “constitute an epitome of natural history” and illustrate “the characters of the Provinces, Classes, and Orders and Genera of the Animal Kingdom.”36 This second collection is called an Index Museum. Geddes, in a chapter of his manuscript on museums, proclaims that “it is in the central Hall of the Natural History Museum, from which the many specialist galleries range and ramify, that we have not only the marble presence of Darwin, but the most lucid and vivid presentations of his master-thought.”37 A little earlier, he defends the practicability of his proposal for the Index Museum, citing as examples Huxley’s idea of type-series and the central hall of the Natural History Museum.

In 1904 Geddes published City Development: A Study of Parks, Gardens, and Culture-Institutes. A Report to the Carnegie Dunfermline Trust. The report was the result of a comprehensive inquiry into the Scottish town of Dunfermline. This small city had received a large park, with a residential building at the center, and the sum of five hundred thousand pounds as a gift from Andrew Carnegie. Carnegie had given the donation to a trust that would administer it in such a way as to bring “sweetness and light” into the monotonous lives of the inhabitants of Dunfermline. Sweetness and Light is the title of a recent book by Mark Girouard on English culture and architecture in the period from 1860 to 1900. The phrase comes from Matthew Arnold’s Culture and Anarchy of 1869, in which Arnold invited the middle classes to preserve the qualities he defined as “Hebraic” (energy, determination, self-control) and urged them to develop the “Hellenic virtues.” The essence of Hellenism was synthesized in the formula “sweetness and light.” Sweetness stood for the creation and enjoyment of beauty in all its forms; light was the result of intellec-
18. Geddes, proposal for Pittencrieff Park, Dunfermline, Scotland, 1904, general plan
tual curiosity. This distinction between “Hebraic” and “Hellenic” thought returned in many of Geddes’s writings, for example, in the text of his famous first lecture at the Sociological Society of London. To fulfill Carnegie’s desires, the trust invited Geddes to submit a proposal for the reorganization of the donated property. Geddes responded by presenting an elaborate and ambitious series of proposals. In the park and around it, he foresaw the creation of social institutes of various kinds and sizes: greenhouses, ponds, educational gardens for children, formal gardens, fields for tennis and bowls, a rock garden, a “wild garden,” a botanical garden, a zoo, terraces and stairs, a historical garden, a Nature Palace (which would contain a globe designed by Reclus), labor museums (to include an outdoor museum and a craft village), an Institute of History, a History Palace (with an Outlook Tower reached by a Stair Spiral of Evolution), an art institute, an arena, a music hall, and so on. At the end of his report, Geddes illustrates the “general conception of civic development and cultural policy within which all these proposals fall.” He speaks from the point of view of the scholar of social sciences “to whom the observation and interpretation of the growth and development, the progress and decay of human societies . . . constitute the central problem to which all sciences lead up, to which all the arts converge, and to which all the problems of the individual are related.” Geddes proceeds, asserting that the city is the place to which contemporary sociology must pay attention. Sociology, indeed, must place itself at the service of a new science — civic science. The latter represents the practical application of the principles elaborated by the former. Sociology is for civic science what mechanics is for engineering, chemistry for agriculture, bacteriology for hygiene. The institutes united in the new Acropolis of Dunfermline are laboratories from which the future of its inhabitants might be directed. The park and the museums represent an inspirational center designed to give rise to a new civic renaissance. Geddes’s grand design would not be realized, but the report on Dunfermline signaled the entry into history of a new, and equally ill-starred, discipline: urban planning.
21. Geddes, Medieval Building, History Palace, Pittencrieff Park, west elevation

22. Geddes, Medieval Building, section

23. Geddes, Renaissance and Modern portion of History Palace, continuing Medieval Building southward
24. Geddes, Monastery Palace, Pittencriff Park, plan
Notes

1. For biographies of Patrick Geddes, see Amelia Defries, The Interpreter Geddes: The Man and His Gospel (London: Routledge, 1927), and Philippe Mairet, Pioneer of Sociology: The Life and Letters of Patrick Geddes (London: Hund Humphries, 1957); the most complete account can be found in Philip Boardman, The Worlds of Patrick Geddes: Biologist, Town Planner, Re-educator, Peace-warrior (London: Routledge and Kegan Paul, 1978). I have mentioned only a few of the many writings on Geddes.

2. Patrick Geddes, Syllabus of a Course of Ten Lectures on Evolutionary Ethics, Based on Natural Science and Sociology (London, 1905). Geddes compiled many of these monographs during the course of his intense career as popularizer and educator. Let me signal, for example, Patrick Geddes, Syllabus of a Course of Ten Lectures on Contemporary Social Evolution (London, 1906), and idem, Syllabus of a Course of Ten Lectures on Evolution in Life, Mind, Molars and Society (London, 1910).

3. Geddes often cites Sartor Resartus: The Life and Opinions of Herr Teufelsdröckh, first published by Carlyle in Fraser’s Magazine (1833–34), and a few years later as a separate volume (Boston: James Monroe and Co., 1895). A work written under the influence of the German romantic school, it consists of two parts: in the first, an imaginative professor discusses the philosophy of clothing, arguing that all human institutions are properly dressed and, for that reason, temporary; in the second, autobiographical part, in an interesting chapter the author describes the spiritual crisis that he experienced during his first days in Edinburgh.

4. Geddes was interested in Herbert Spencer’s theories of cooperation in evolution and in his classification of the sciences.

5. In these years Geddes read Ruskin’s Time and Tide, by Weare and Tyne (London: Smith, Elder and Co., 1867) and his Unto this Last (London: Smith, Elder and Co., 1860). Geddes explicitly recognized his debt to Ruskin (with whom he was also corresponding) and immediately wrote an essay on his economic thought, John Ruskin Economist (Edinburgh: B.W. Brown, 1884). This particular aspect of Geddes’s thinking has been studied by J.P. Reilly, “The Early Social Thought of Patrick Geddes,” Ph.D. diss., Columbia University, New York, 1972.

6. Patrick Geddes, Co-operation versus Socialism (Manchester, 1888), 9n.

7. Ibid.

8. Ibid., 14.

9. A clear explanation of the functioning of the Thinking Machines can be found in Boardman, The Worlds of Patrick Geddes, 46ff.

10. The line comes from an autobiographical poem by Geddes; cited in Boardman, The Worlds of Patrick Geddes, 46.


13. Three distinct movements participated in the foundation of the Sociological Society of London: the group of “civics” to which Geddes belonged, the eugenists, and the “social works schools.” In this regard, see Boardman’s account in The Worlds of Patrick Geddes, 198ff., 434.


15. In this connection, see the reflections of Paul F. Lazarsfeld, Philosophie des Sciences Sociales (Paris, 1970).


22. For a more complete description of the Outlook Tower and a related bibliography, see Ponte, “Le macchine pensanti.”


24. Ibid.

25. The window was located on one of the landings of the Outlook Tower. On two other windows (also on the landings) were diagrams illustrating the Lapis Philosophum and Arbor Sacculorum. Regarding these diagrams, see the bibliography in Ponte, “Le macchine pensanti,” and Boardman.
The Worlds of Patrick Geddes, 142ff.
28. On Otlet and the theme of the "World City" in general, see Giuliano Gresleri and Dario Matteoni, La Città Mondiale: Anderssen, Hebrard, Otlet, Le Corbusier (Venice: Marsilio, 1982).
29. Ibid., 66.
30. A description of the Ghent exhibition was published in Patrick Geddes, "Two Steps in Civics: Cities and Town Planning Exhibition" and the 'International Congress of Cities,' Ghent Exposition, 1913," Town Planning Review 4, no. 2 (July 1913): 78–94. See, too, the catalogue of the Cities and Town Planning Exhibition (Edinburgh, 1913); various other versions also exist.
33. The information on Owen and in general the content of his paragraph on the Natural History Museum in London comes from Mark Girouard, Alfred Waterhouse and the Natural History Museum (New Haven: Yale University Press, 1981).
36. Ibid., 12.

Figure Credits
2–4, 8, 13. Catalogue of the Papers of Sir Patrick Geddes, Strathclyde University, Glasgow.
15. L'Architecture vivante (Summer 1929).