

**Some notes on drawing and reading in the form of a
common place book**

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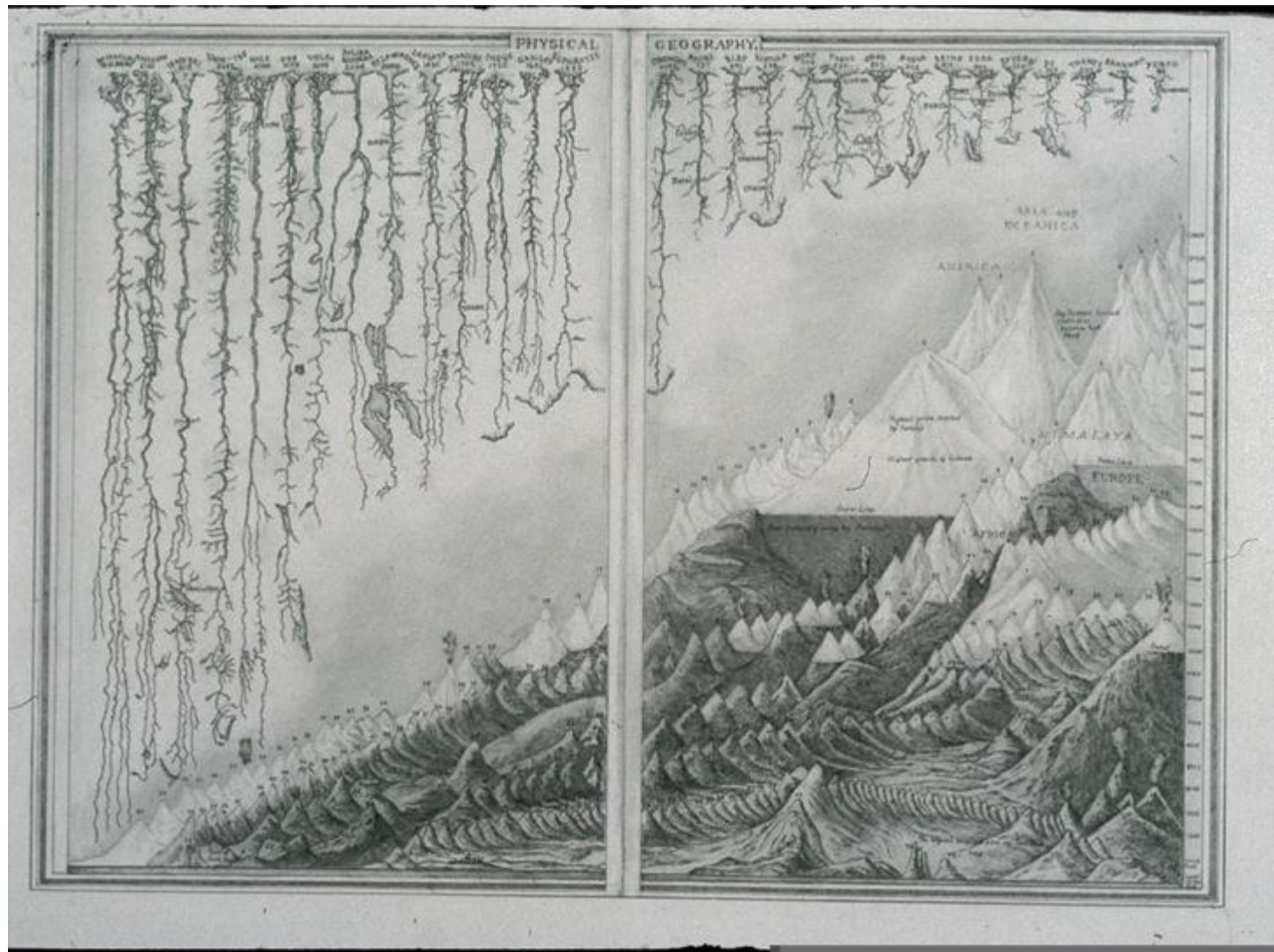
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Penny McCarthy

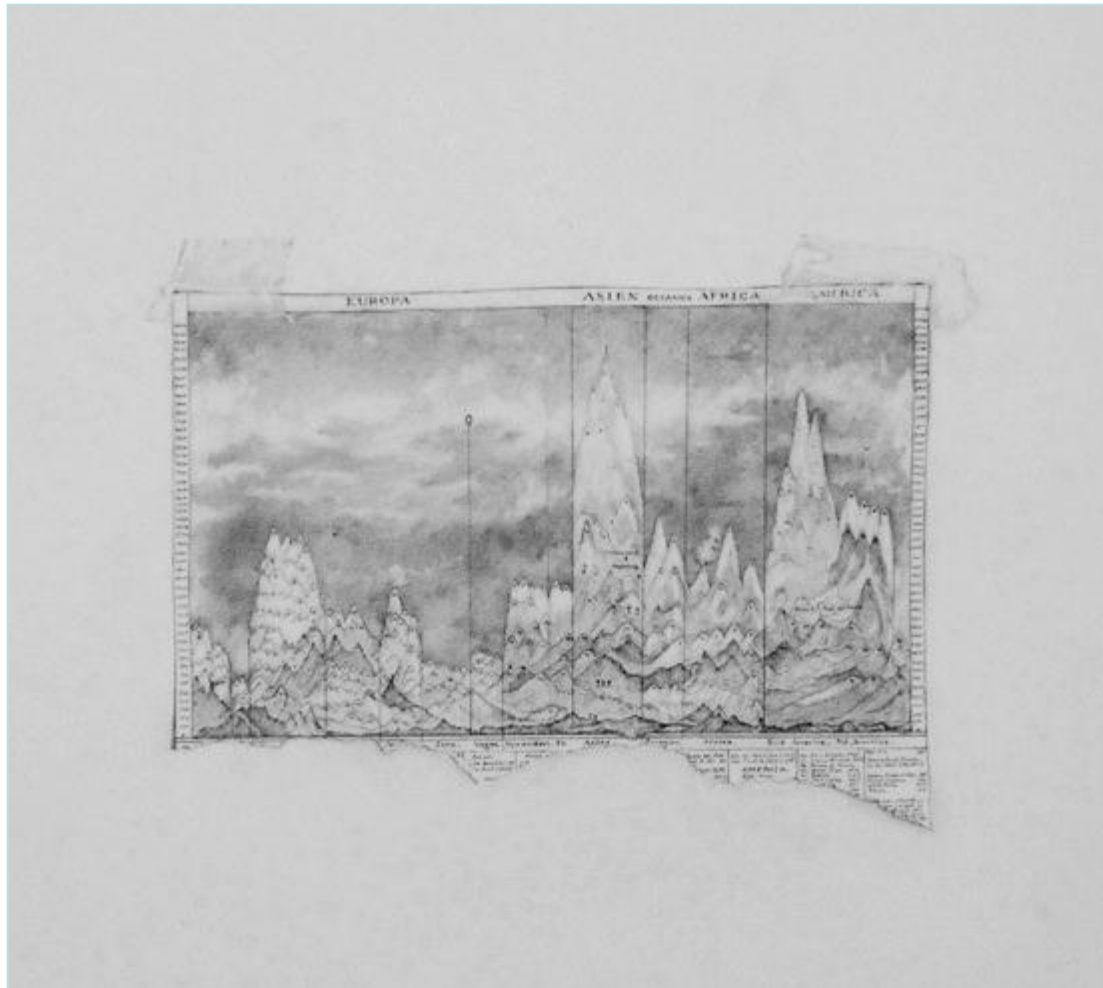
some notes on drawing and reading

*this world dense with writing
that surrounds us on all sides*

Italo Calvino, *If on a Winters Night a Traveller*
(London, Secker and Warburg), 1981, p.43



1. Geography Book
pencil on paper



2. Important Mountains

pencil on paper

animals are divided into: (a) belonging to the Emperor, (b) embalmed, (c) tame, (d) sucking pigs, (e) sirens, (f) fabulous, (g) stray dogs, (h) included in the present classification, (i) frenzied, (j) innumerable, (k) drawn with a very fine camelhair brush, (l) et cetera, (m) having just broken the water pitcher, (n) that from a long way off look like flies.

Jorges Luis Borges, *John Wilkins' Analytical Language*, in *Selected Non Fictions* (ed. Eliot Weinberger), (New York, Viking) 1999, p.231



3. Lullaby Constellation (for Walter Benjamin)
wall drawing, South London Gallery

STRUCTURE FOR D.N.A.

Pauling and Corey have recently proposed a structure for nucleic acid. They were kind enough to make their manuscript available to us in advance of publication. In our opinion their structure is unsatisfactory for two reasons:

1. ^{We believe that the} The material which gives the X-ray diagrams is the salt, not the acid. ^{free} The ^{without} ^{acidic} ^{it is not clear what} ^{bases} hydrogen atoms ^{are} that ^{is} ^{nothing} ^{to} ^{hold} ^{the} structure together.
2. Some of the Van der Waals distances appear to be too small.

We wish to put forward a radically different structure for the salt of Desoxyribose nucleic acid (D.N.A.). This structure has two helical chains each ^{same} ~~coiled~~ ^{coiled} round the ~~same~~ ^{same} axis. The two chains (but not their bases) are related by a dyad perpendicular to this axis. Both chains follow righthanded helices, but owing to the dyad the sequences of the atoms in the two chains run in opposite directions. Each chain loosely resembles ⁶ ¹¹ ~~Furberg's~~ ^{model No. 11} that is, the bases are on the inside of the helix and the phosphates on the outside. ^{What are} There is a ^{assumed} ~~supposed~~ ^{assumed} angle of 36° between adjacent residues ^{on the same chain, to be about 10000 after 10 residues} on each chain, that is, after 30 A. ~~One would expect therefore that this structure would be formed when the water content is high. The distance of a phosphorus atom from the fibre axis is 10 A. The structure is open and its inner surface will be accessible to light. As the phosphates are on the outside carbon have easy access to 3cm^2 .~~

4. First Draft (First Page)

pencil on paper

T O S A

E S S E

Co-workers at Kings College, London.

J.D. Watson

F.H.C. Crick

C. - U

The Medical Research Council Unit
for the Study of the Molecular
Structure of Biological Systems.
The Cavendish Laboratory, Cambridge

References:

1. Pauling and Corey ^{RB,} ~~trans.~~ Nature, 131, 346 (1953); Proc. Nat. Acad. Sci. Wash.
2. Furberg, S. Acta Chem. Scand. 6, 674 (1952)
3. Chargaff, E. ^{for reference} ~~et al.~~ See Zamenhof, S., Brasterman, G. and Chargaff, E. Biophys. Acta 9, 110 (1952)
4. Watt, G.R. Jour. Gen. Phys. 36, 201 (1952)
5. Astbury, M.T. I.F.B. Symposium on Nuclear Acid, 1, 66 (1947)
6. Wilkins, M.H.F. & Randall, J.T. Biophys. Acta 10, 152 (1952)
7. Wilkins - personal communication

4. First Draft (Last Page)
detail, one section of six, *pencil on paper*

King's College, London, One of us (Z. D. W.) has been aided by a fellowship from the National Foundation for Infantine Paralysis.

J. D. Watson
F. H. C. Crick

National Research Council Unit for the Study of the Molecular Structure of Biological Systems, Cavendish Laboratory, Cambridge, April 2.

- *Boring L. and Crick F. H. C. Nature 176, 244 (1952); Proc. 122, 101-102 (1952).
- *Boring L. and Crick F. H. C. Nature 176, 244 (1952).
- *Watson J. D. and Crick F. H. C. Nature 177, 27 (1953).
- *Watson J. D. and Crick F. H. C. Nature 177, 27 (1953).
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Molecular Structure of Deoxyribose Nucleic Acids

While the biological properties of deoxyribose nucleic acid suggest a molecular structure consisting of great complexity, X-ray diffraction studies described here (cf. Astbury) show the basic molecular configuration has great simplicity. The purpose of this communication is to describe, in a preliminary way, some of the experimental evidence for the polynucleotide chain configuration being helical, and pointing in this sense when in the relaxed state. A fuller statement of the work will be published shortly.

The structure of deoxyribose nucleic acid is the same in all tissues although the nitrogen base ratios differ considerably in composition, extracted or in cells, and in purified nucleates. The same linear group of polynucleotide chains may pack together parallel to different axes to give crystalline 2- or 3-helix crystallites or amorphous material. In all cases the X-ray diffraction photograph consists of two regions, one determined chiefly by the regular spacing of nucleotides along the chain, and the other by the regular spacing of the chain configuration. The position of all relevant nitrogen bases along the chain is not made visible.

Controlled crystallites of deoxyribose nucleic acid (structure 2) in the following communication by Franklin and Gosling gives a fibre diagram as shown in Fig. 3 (cf. ref. 4). Astbury suggested that the strong 3-4 Å reflexion corresponded to the inter-nucleotide repeat along the fibre axis. This ~34 Å layer line, however, did not arise from a repeat of a polynucleotide composition, but to the chain configuration repeat, which causes strong diffraction as the nucleotide chains have higher density than the interstitial space. The absence of reflexion in one meridian immediately suggests a helical structure with one particle in five layers.

Diffraction by Helices

It may be shown (see Ecker, unpublished) that the intensity distribution in the diffraction pattern of a helix of particles along a fibre is given by the squares of Bessel functions. A uniform helical screw has given a series of layer lines of spacing corresponding to the helix pitch, the intensity distribution along the six layer line being proportional to the square of J_n the n th order Bessel function. A straight line may be drawn approximately through



Fig. 1. The diffraction pattern of deoxyribose nucleic acid fibre. This axis vertical.

The inter-nucleotide distance of each Bessel function and the angle. The angle θ is the angle with the equator is roughly equal to $\sin \theta$ between an electron of the helix and the fibre axis. If a unit repeat is taken along the helix there will be a meridional reflexion (L_n) on the n th layer line. The helical configuration produces side bands on the fundamental reflexion about the origin around the new origin, on the n th layer line, corresponding to C_n in Fig. 2.

What will now chiefly matter is physical form, the effects of the shape and size of the nucleotide on its position on the diffraction pattern. First, if the nucleotide consists of a unit being smaller approximately one axis parallel to the fibre axis, the whole diffraction pattern is modified by the form factor of the nucleotide, defined as the relative contents of a series of points on a radius at right angles to the helix axis, the points of rotation marked by the helices of different diameter passing through each point on the same. Location of the corresponding Bessel function gives reinforcement for the lines

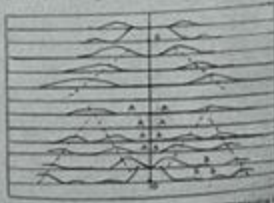


Fig. 2. Diffraction pattern of helix of spheres corresponding to structure of deoxyribose nucleic acid. The upper part of the figure shows the intensity distribution of the Bessel functions and the lower part shows the intensity distribution of the Bessel functions and the relative contents of a series of points on a radius at right angles to the helix axis. The points of rotation marked by the helices of different diameter passing through each point on the same. Location of the corresponding Bessel function gives reinforcement for the lines

of the nucleotide overlapping to form a continuous helix. This suggests the presence of nitrogen bases arranged in a 'file of particles' in the radial regions of the helical system.

There is a marked absence of reflexion on a layer line beyond the first. Disorientation in the specimen will cause more extension along the outer ends of the Bessel function struts on the seventh, eighth and thirteenth layer lines than on the sixth, eighth and seventh. For this reason the reflexions on the higher-order layer lines will be less readily visible. The form factor of the nucleotide is also probably causing distribution of intensity in this region. Tinting of the nitrogen base could have such an effect.

Reflexions on the equator are rather indistinct in the decomposition of the radial distribution of density in the helical system. There are, however, indications that a high-density shell, as suggested above, exists of diameter ~20 Å.

The material is apparently not completely polycrystalline, as there appear to be several regions of the second layer line, indicating a partial degree of order of the helical units relative to one another in the direction of the helix axis. Photographs similar to Fig. 1, have been obtained from sodium nucleate from calf and pig lymph, wheat sodium nucleate from calf and pig lymph, yeast sodium nucleate from yeast, human fibrin and 2% lactoferrin. The most marked correspondence with Fig. 2 is shown by the experimental photograph obtained by our colleagues, N. E. Franklin and R. G. Gosling, from calf lymph deoxyribose nucleate (see Franklin's communication).

Interpretation of the X-Ray Photograph

It must first be decided whether the structure consists of essentially one helix giving an intensity distribution along the layer lines corresponding to J_n^2 or two similar (or axial) helices of finite pitch and relatively distanced along the axis. For one helix the pitch giving J_n^2 is $2\pi r \sin \theta$, where r is the distance equal to half the pitch giving J_n^2 and θ is the angle of the helix. Examination of the width of the diffraction pattern is then required as a whole with attention to the C_n reflexions. The C_n reflexions are spaced at $C_n = 2\pi r \sin \theta$, then to $2\pi r \sin \theta$ is about the diameter of the helix, its diameter is found to be ~20 Å. The strong equatorial reflexion at ~20 Å suggests that the helical have a maximum diameter of ~20 Å and are hexagonally packed with 10% compression. Apart from the width of the Bessel function struts, the possibility of the helices being free to show compression is also made unlikely by the absence of equatorial reflexion at ~54 Å. To obtain a reasonable number of nucleotides per unit volume in the fibre, two or three helices are needed, unless a helix is required, three being nucleotides in one turn of each helix.

The absence of reflexion on or near the meridian (axial region AAA in Fig. 2) is a direct consequence of the helical structure. On the photograph there is also a relatively empty region to and near the meridian, corresponding to region BBS in Fig. 2. As sketched above, the absence of secondary Bessel function maxima can be produced by a radial distribution of the nucleotide shape. To make the helix struts sufficiently narrow, it is necessary to place a large fraction of the nucleotide mass at ~20 Å diameter. In Fig. 2 the squares of Bessel functions are plotted for half the mass at 20 Å, and the mass distributed along a radius, the way at a given radius being proportional to the radius.

In the same layer line there appears to be a marked J_1^2 and on the first, second and third layer lines, that is, J_1^2, J_2^2, J_3^2 , etc., respectively. This means that the location of a plane at right angles to the helix axis, the radius and the relative contents of a series of points on a radius at right angles to the helix axis. The points of rotation marked by the helices of different diameter passing through each point on the same. Location of the corresponding Bessel function gives reinforcement for the lines

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It must be stressed that some of the above discussion is not without ambiguity, but in general there appears to be reasonable agreement between the experimental data and the kind of model described by Watson and Crick (see also preceding communication).

It is interesting to note that if there are ten phosphate groups attached on each base of diameter 20 Å and pitch 34 Å, the phosphate mass balances out to an almost fully extended state, hence when sodium nucleate fibres are stretched, the helix is evidently extended in length like a spring in tension.

Structure in vivo

The biological significance of a two-chain nucleic acid will be seen below (see preceding communication). The evidence that the helical structure discussed above does, in fact, exist in intact biological systems is briefly as follows:

Density results. It may be shown that the intensity of the X-ray spectra from crystalline sperm heads is determined by the helical form-factor in Fig. 2. Crystallized sperm heads give the same pattern of the diffraction as extracted or isolated sperm heads used previously. The sperm heads also give a diffraction pattern given by extracted or isolated polynucleotides or extracted calf thymus nucleotides.

Photographs. Crystallized sperm heads of 2% phosphate crystallized with X-rays while paired in a cell with nucleotides give a diffraction pattern containing the main features of polynucleotide fibres, including an almost first order of crystalline nucleoprotein, as described above.

Transferring principle. In collaboration with H. E. Spence and J. D. Watson, we have shown that the structure of the nucleic acid in sperm heads is the same as the structure of the nucleic acid in calf thymus nucleotides.

5. Nature No. 4352, 25th April, 1953 (detail) pencil on paper



20. TREES WITH INTERLACED BRANCHES, 1497. Detail from the ceiling decoration of the Sala delle Armi in the Castello Sforzesco, Milan.

6. Art History Book
pencil on paper

To : H. S. Matthews
From: Bill Sartin July 28, 1968

IN FRONT OF YOUR CHILDREN

There has evolved that theory, who want to the universe
without to pass will stay in the same to rest in peace.

There have been, Bill Armstrong and Edwin Aldrin, have
that there is no hope for their recovery. But they also know that there
is hope for mankind in their quest.

There are men are trying down their line in mankind's
most noble goal: the search for truth and understanding.

They will be returned by the 4 families and friends they
will be surrounded by their nation, they will be surrounded by the people of
the world, they will be surrounded by Mother Earth that shared with her
of her own love the universe.

In their exploration they attract the people of the world to
find an answer to their questions, they find more tightly the brotherhood
of man.

In another dimension linked in time and space their journey in
the constellations. In another time, we do reach the same, but our hearts
are a part of each and every.

Others will follow, and surely find their way home. Man's
search will not be denied. For those men were the first, and they
will search the heavens in our hearts.

For every human being who looks up at the stars in the
night to come will know that there is some person of another world
that is forever mankind.

BEFORE THE PRESIDENT'S STATEMENT

The President should inform each of the nations to be
**AFTER THE PRESIDENT'S STATEMENT, AT THE POINT WHEN HE
ENDS COMMUNICATIONS WITH THE MEN.**

A Congress should adopt the same procedure as a basis of
law, commending their souls to "the Supreme of the Deep," concluding
with the Lord's Prayer.

7. Lost in Space Scenarios
pencil on paper

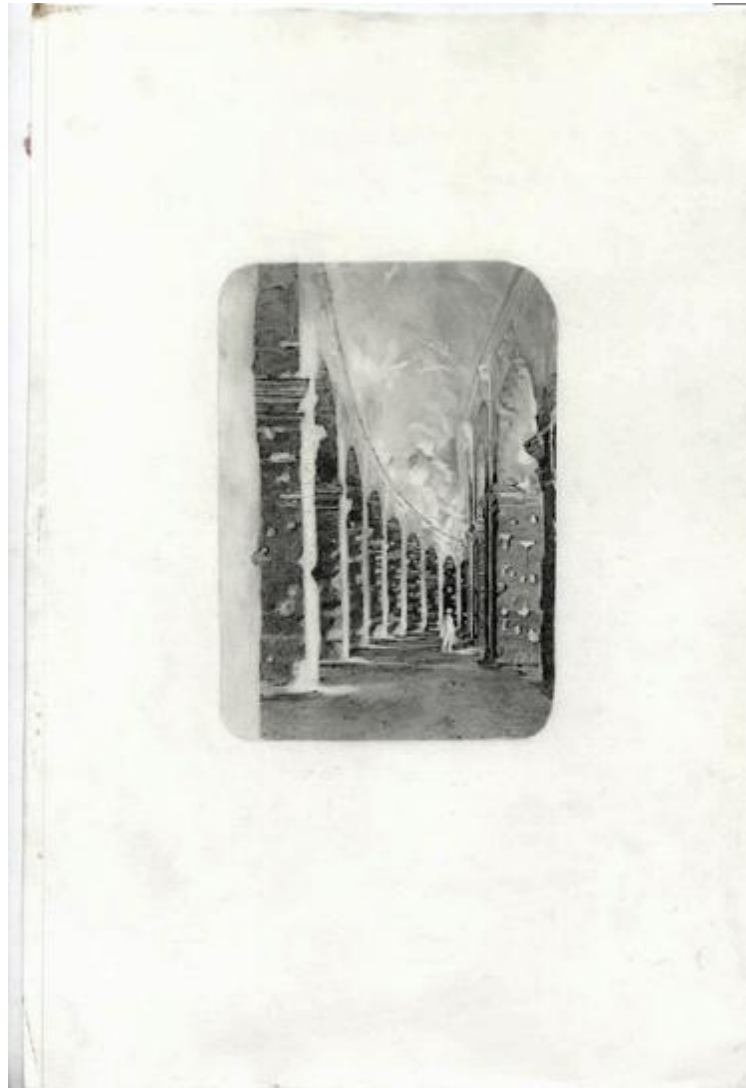
Table 3
Average Radiation Doses of the Flight
Crews for the Apollo Missions

Apollo Mission	Skin Dose, rads
7	0.16
8	.16
9	.20
10	.26
11	.18
12	.58
13	.24
14	1.14
15	.30
16	.57
17	.50

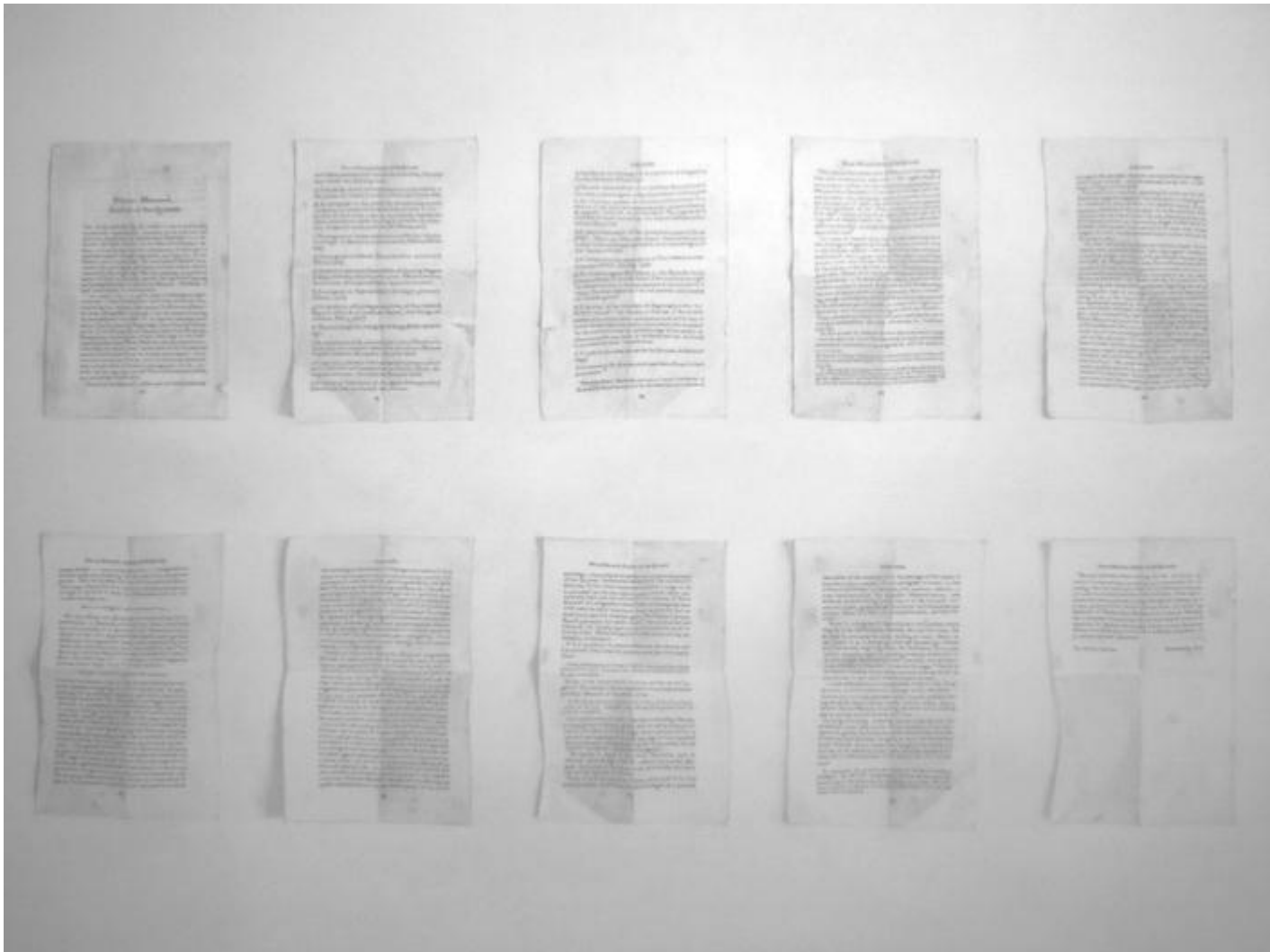
8. Astronaut's Radiation Exposure Chart (Apollo 13)
pencil on paper



9. Hades, California
print



10. Colosseum
pencil on paper



11. Pierre Menard, Author of the Quixote
pencil on paper

Pierre Menard,
Author of the *Quixote*

The visible work left by this novelist is easily and briefly enumerated. Imperdonable, therefore, are the omissions and additions perpetrated by Moisés Hanci Batcheller in a fallacious catalogue which a certain daily, whose Protestant tendency is no secret, has had the inconsideration to inflict upon its deplorable readers - though these be Jew and Cabalist, if not Masonic and circumcised. The true friends of Menard have viewed this catalogue with alarm and even with a certain melancholy. One might say that only yesterday we gathered before his final monument, amidst the lugubrious cypresses and already Error has to tarnish his Memory... Decidedly, a brief rectification is unavoidable.

I am aware that it is quite easy to challenge my slight authority. I hope, however, that I shall not be prohibited from mentioning two eminent testimonies. The Baroness de Bacourt (at whose unforgettable *terracotta* I had the honour of meeting the lamented poet) has seen fit to approve the pages which follow. The Countess de Bagueregis, one of the most delicate spirits of the Principality of Monaco (and now at Pittsburgh, Pennsylvania, following her recent marriage to the international philanthropist Simon Kevtstsch, who has been so inconsiderately slandered, alas! by the victims of his disinterested manoeuvres) has sacrificed 'to veracity and to death' (such were her words) the stately reserve which is her destination, and in an open letter published in the magazine *Luxe*, concedes me her approval as well. These authorizations, I think, are not entirely insufficient.

I have said that Menard's visible work can be easily enumer-

Pierre Menard, Author of the Quixote

ated. Having examined with care his personal files, I find that they contain the following items:

- a) A Symbolist sonnet which appeared twice (with variants) in the review *La zongue* (issues of March and October 1900).
- b) A monograph on the possibility of constructing a poetic vocabulary of concepts which would not be synonyms or periphrases of those which make up our everyday language, but rather ideal objects created according to convention and essentially designed to satisfy poetic needs' (Nîmes, 1901).
- c) A monograph on 'certain connexions or affinities' between the thought of Descartes, Leibniz and John Wilkins (Nîmes, 1903).
- d) A monograph on Leibniz's *Characteristica universalis* (Nîmes, 1904).
- e) A technical article on the possibility of improving the game of chess, eliminating one of the rook's pawns. Menard proposes, recommends, discusses and finally rejects this innovation.
- f) A monograph on Raymond Lully's *Ars magna generalis* (Nîmes, 1906).
- g) A translation, with prologue and notes, of Roy López de Segura's *Libro de la invención liberal y arte del juego del axedrez*. (Paris, 1907).
- h) The work sheets of a monograph on George Boole's symbolic logic.
- i) An examination of the essential metric laws of French prose, illustrated with examples taken from Saint-Simon (*Revue des langues romanes*, Montpellier, October 1909).
- j) A reply to Luc Durtain (who had denied the existence of such laws), illustrated with examples from Luc Durtain (*Revue des langues romanes*, Montpellier, December 1909).
- k) A manuscript translation of the *Agenda de newspaper* of Quavedo, entitled *La boussole des poètes*.

Pierre Menard, Author of the Quixote (detail)

Pierre Menard, Author of the Quixote

This, then, is the visible work of Menard, in chronological order (with no omission other than a few vague scraps of circumstance written for the hospitable or avid sinner of Madame Henri Bachelier). I turn now to his other work: the subterranean, the interminably hermit, the postic. And such are the capacities of mind - the unfinished. This work, perhaps the most significant of our time, consists of the ninth and thirty-eight chapters of the first part of *Don Quixote* and a fragment of chapter twenty-two. I know such an affirmation seems an absurdity; to justify this absurdity is the primordial object of this note.*

The texts of unequal value inspired this undertaking. One is that philological fragment by Novak - the one numbered 2005 in the Dresden edition - which outlines the theme of a fatal identification with a given author. The other is one of those parasitic books which situate Christ on a boulevard, Hamleten La Comedienne or *Don Quixote on Wall Street* (like all men of good taste, Menard abhorred those useless animals, fit only - as he would say - to produce the plebeian pleasure of astonishment or (what is worse) to enthrall us with the elementary idea that all epochs are the or one different. More interesting, though contradictory and superficial of execution, seemed to him the famous plan of Daudet: to conjoin the Ingenious Gentleman and his squire in one figure which was Tartarin... Those who have insinuated that Menard dedicated his life to writing a contemporary *Quixote* calumniate his illustrious memory.

He did not want to compose another *Quixote* - which is easy - but the *Quixote* itself. Needless to say, he never contemplated a mechanical transcription of the original; he did not propose

St Francis of Sales. There are no traces of such a work in Menard's library. It must have been a jest of our friend, misunderstood, by the lady.

*I also had the secondary intention of sketching a personal portrait of Pierre Menard. But how could I dare to tamper with the golden pages which I am told the Barons de Baccot is possessing or with the delicate and punctual pencil of Cervus Fleuveide?

Labyrinth

to copy it. His admirable intention was to produce a few pages which would coincide - word for word and line for line - with those of Miguel de Cervantes.

My intent is no more than astonishing; he wrote me the 30 September 1934, from Bayona. The final term in a theological or metaphysical demonstration - the objective world, God, causality, the forms of the universe - is no less previous and common than my famed novel. The only difference is that the philosophers publish the intermediary stages of their labour in pleasant volumes and I have resolved to do away with those stages? In truth, not one worksheet remains to bear witness to his years of effort.

The first method he conceived was relatively simple. Know Spanish well, recover the Catholic faith, fight against the Moors or the Turk, forget the history of Europe between the years 1600 and 1918. *Se Miguel de Cervantes*. Pierre Menard studied this procedure. (I know he attained a fairly accurate command of seventeenth century Spanish) but discarded it as too arduous. Rather as impossible! my reader will say. Granted, but if the undertaking was impossible from the very beginning and of all the impossible ways of carrying it out, this was the least interesting. To be, in the twentieth century, a popular novelist of the seventeenth seemed to him a distinction. To be, in some way, Cervantes and reach the *Quixote* seemed less arduous to him - and, consequently, less interesting. He thought of being Pierre Menard and reach the *Quixote* through the experiences of Pierre Menard. (His conviction, we might say in passing, made him omit the autobiographical prologue to the second edit of *Don Quixote*. To include that prologue would have been to create another character - Cervantes - but it would also have meant presenting the *Quixote* in terms of that character and not of Menard. The latter, naturally, declined that facility.) My undertaking is not difficult, essentially; I read in another part of his letter: "I should only have to be immortal to carry it out." Shall I confess that I often imagine he did finish it and that I read the *Quixote* - all of it - as if Menard had conceived it? Some nights, past, while leading through

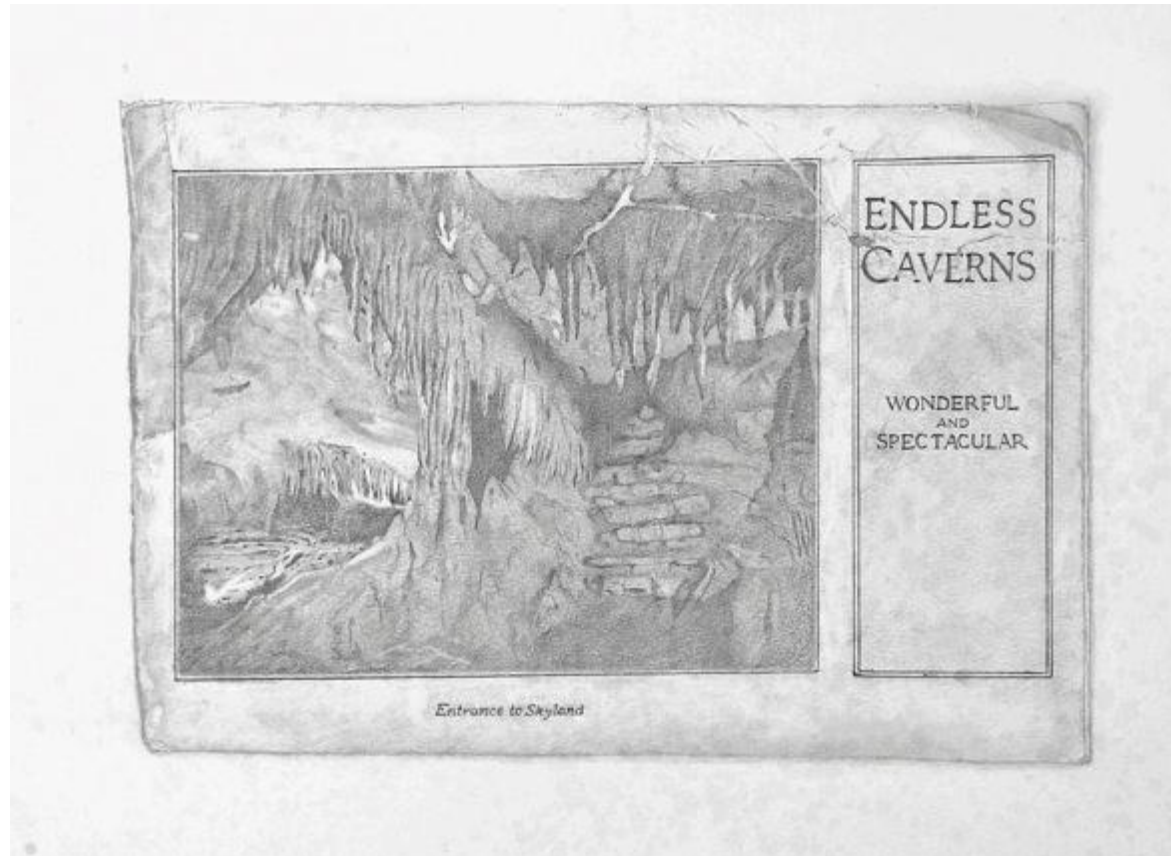
Pierre Menard, Author of the Quixote (detail)

The Garden of Forking Paths

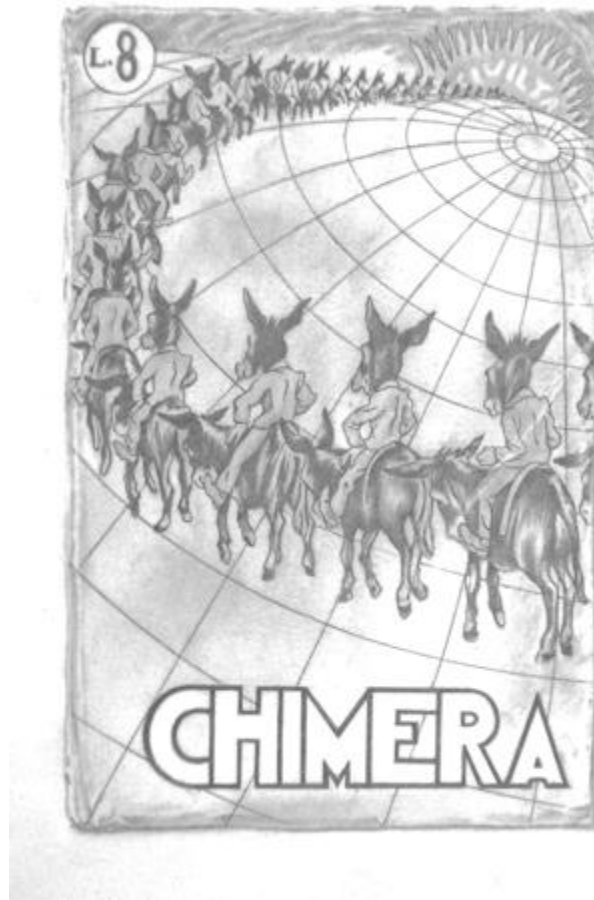
and who renounced worldly power in order to write a novel that might be even more populous than the *Hong Lu Meng* and to construct a labyrinth in which all men would become lost. Thirteen years he dedicated to these heterogeneous tasks, but the hand of a stranger murdered him – and his novel was incoherent and no one found the labyrinth. Beneath English trees I meditated on that lost maze: I imagined it inviolate and perfect at the secret crest of a mountain; I imagined it erased by rice fields or beneath water; I imagined it infinite, no longer composed of octagonal blocks and returning paths, but of rivers and provinces and kingdoms.... I thought of a labyrinth of labyrinths, of one sinuous spreading labyrinth that would encompass the past and the future and in some way invite the stars. Absorbed in these illusory images, I forgot my destiny of one pursued. I felt myself to be, for an untoward period of time, an abstract perceiver of the world. The vague, living countryside, the moon, the remains of the day worked on me as well as the slope of the road which eliminated any possibility of weariness. The afternoon was intimate, infinite. The road descended and forked among the now confused meadows. A high pitched, almost syllabic music approached and receded in the shifting of the wind, dimmed by leaves and distance: I thought that a note can be an enemy of other men of the moments of other men, but not of a country: not of fireflies, words, gardens, streams of water, sunsets. Thus I arrived before a tall, rusty gate. Between the iron bars I made out a poplar grove and a pavilion. I understood suddenly two things, the first trivial, the second almost unbelievable: the music came from the pavilion, and the music was Chinese. For precisely that reason I had openly accepted it without paying it any heed. I do not remember whether there was a bell or whether I knocked with my hand. The sparkling of the music continued.

From the rear of the house within a lantern approached: a lantern that the trees sometimes striped and sometimes eclipsed, a paper lantern that had the form of a drum and the colour of the moon. A tall man bore it. I didn't see his face

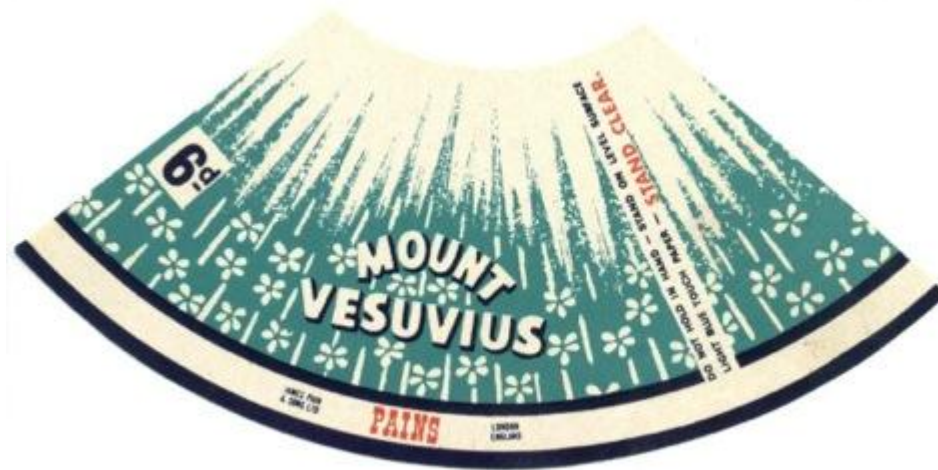
12. Labyrinth
pencil on paper



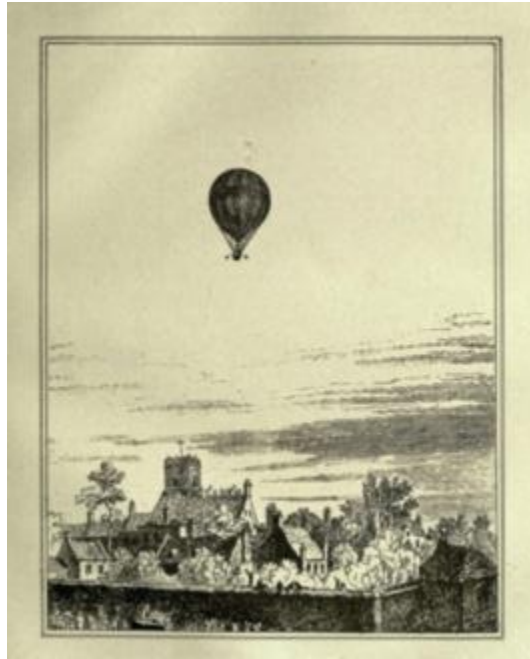
13. Endless Caverns
pencil on paper



14. Chimera
pencil on paper



15. Vesuvius
paint on paper



17. Balloon (observation effect)



18. Pearl Diver
pencil on paper



No index entries found. Fog (Venice)



19. The Odyssey (Penelope section, final page)
pencil on paper



yes when I put the rose in my hair like the Arabidiah
girls used or shall I wear a red yes and how he kissed me
under the Moorish wall and I thought well as well him
as another and then I asked him with my eyes to ask
again yes and then he asked me would I yes to say yes
my mountain flower and first I put my arms around him
yes and drew him down to me so he could feel my breasts
all perfume yes and his heart was going the mad and yes
I said yes I will Yes.

Theresa-Zurich-Paris, 1914-1921

20. Ulysses (final page)
pencil on paper

On Exactitude in Science

...In that Empire, the Art of Cartography attained such Perfection that the map of a single Province occupied the entirety of a City, and the map of the Empire, the entirety of a Province. In time, those Unconscionable Maps no longer satisfied, and the Cartographers Guilds struck a Map of the Empire whose size was that of the Empire, and which coincided point for point with it. The following Generations, who were not so fond of the Study of Cartography as their Forebears had been, saw that that vast Map was Useless, and not without some Pitilessness was it, that they delivered it up to the Inclemencies of Sun and Winters. In the Deserts of the West, still today, there are Tattered Ruins of that Map, inhabited by Animals and Beggars; in all the Land there is no other Relic of the Disciplines of Geography.

Jorge Luis Borges, *Collected Fictions*, translated by Andrew Hurley.

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