Charles S. Peirce



1839 - 1914

El señor C. S. Peirce, matemático y lógico americano de reputación internacional, ha muerto a la edad de 74 años... Durante algunos años fue profesor de lógica en la Universidad de Johns Hopkins y ocasionalmente ofreció conferencias en Harvard, pero la mayor parte de su vida estuvo dedicada al estudio y la investigación... Editó varios de los trabajos matemáticos de su padre y fue el autor de Investigaciones Fotométricas,

así como de numerosos artículos en lógica, historia de la ciencia, psicología, astronomía, óptica, sensación del color, proyecciones de mapas, química, ingeniería, pronunciación del inglés clásico, catalogación de bibliotecas, etc. El señor Peirce fue uno de los pioneros de la lógica simbólica y el primero en formular el principio filosófico que denominó pragmatismo.

Nature, 7 de mayo de 1914

Menciones

1859 Graduado BA en Harvard.

1861 – 91 Investigador del *Coast and Geodetic Survey*.

1863 Graduado en química (summa cum laude).

1867 Miembro de la Academia Americana de Artes y Ciencias.

1875 Primer delegado americano a una asociación científica internacional.

1877 Miembro de la Academia Nacional de Ciencias.

Menciones

1880 Miembro de la Sociedad Matemática de Londres.

1881 Elegido miembro de la Asociación Americana para el Avance de la Ciencia.

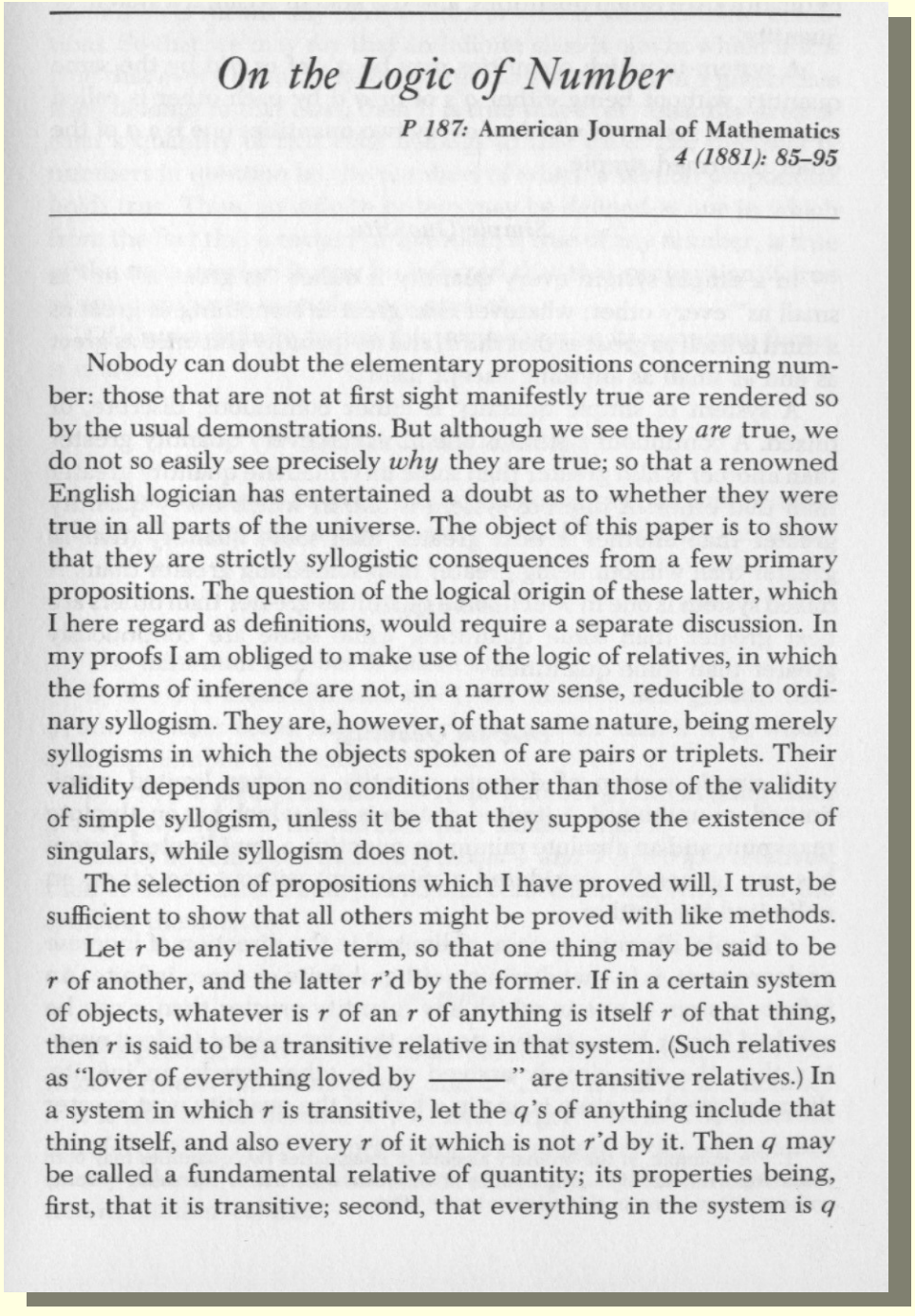
1883 Studies in Logic (volumen colectivo editado por Peirce)

1896-1902 Ingeniero químico consultor para St. Lawrence Power Co.

APORTES EN MATEMÁTICAS

Axiomatización de la aritmética

(primera en la historia)



On the Logic of Number

P 187: American Journal of Mathematics *4 (1881): 85–95*

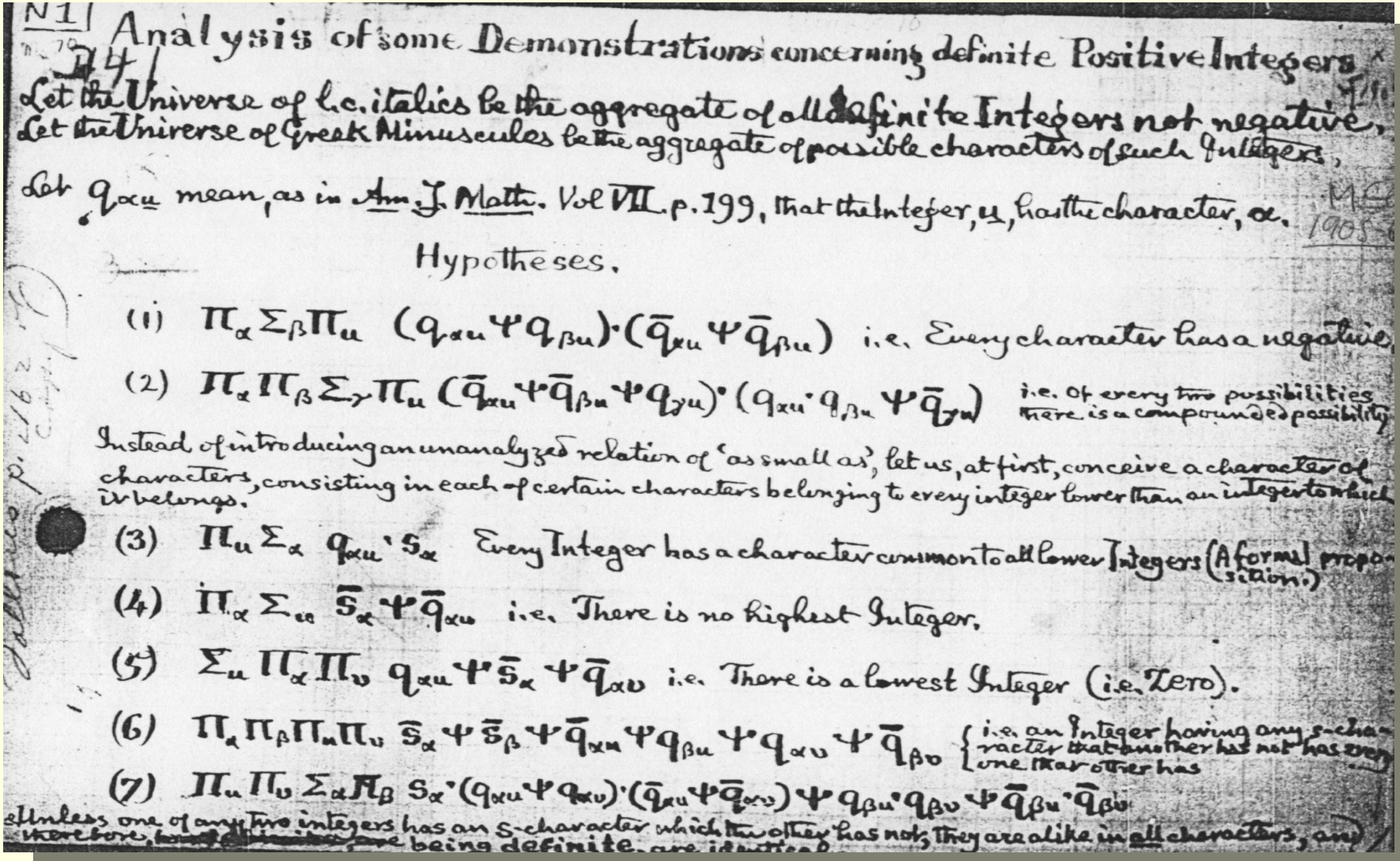
Nobody can doubt the elementary propositions concerning number: those that are not at first sight manifestly true are rendered so by the usual demonstrations. But although we see they *are* true, we do not so easily see precisely *why* they are true; so that a renowned English logician has entertained a doubt as to whether they were true in all parts of the universe. The object of this paper is to show that they are strictly syllogistic consequences from a few primary propositions. The question of the logical origin of these latter, which I here regard as definitions, would require a separate discussion. In my proofs I am obliged to make use of the logic of relatives, in which the forms of inference are not, in a narrow sense, reducible to ordinary syllogism. They are, however, of that same nature, being merely syllogisms in which the objects spoken of are pairs or triplets. Their validity depends upon no conditions other than those of the validity of simple syllogism, unless it be that they suppose the existence of singulars, while syllogism does not.

The selection of propositions which I have proved will, I trust, be sufficient to show that all others might be proved with like methods.

Let r be any relative term, so that one thing may be said to be r of another, and the latter r'd by the former. If in a certain system of objects, whatever is r of an r of anything is itself r of that thing, then r is said to be a transitive relative in that system. (Such relatives as "lover of everything loved by ———" are transitive relatives.) In a system in which r is transitive, let the q's of anything include that thing itself, and also every r of it which is not r'd by it. Then q may be called a fundamental relative of quantity; its properties being, first, that it is transitive; second, that everything in the system is q

APORTES EN MATEMÁTICAS

Matemáticas de las colecciones finitas



N1 / 74 /

Analysis of some Demonstrations concerning definite Positive Integers.

Let the Universe of i.e. italics be the aggregate of all definite Integers not negative.
Let the Universe of Greek Minuscules be the aggregate of possible characters of such Integers.

Let $q_{\alpha u}$ mean, as in Am. J. Math. Vol VII. p. 199, that the Integer, u, has the character, α.

Hypotheses.

(1) $\Pi_\alpha \Sigma_\beta \Pi_u \ (q_{\alpha u} \Psi q_{\beta u}) \cdot (\bar{q}_{\alpha u} \Psi \bar{q}_{\beta u})$ i.e. Every character has a negative,

(2) $\Pi_\alpha \Pi_\beta \Sigma_\gamma \Pi_u \ (\bar{q}_{\alpha u} \Psi \bar{q}_{\beta u} \Psi q_{\gamma u}) \cdot (q_{\alpha u} \cdot q_{\beta u} \Psi \bar{q}_{\gamma u})$ i.e. Of every two possibilities there is a compounded possibility

Instead of introducing an unanalyzed relation of 'as small as', let us, at first, conceive a character of characters, consisting in each of certain characters belonging to every integer lower than an integer to which it belongs.

(3) $\Pi_u \Sigma_\alpha \ q_{\alpha u} \cdot s_\alpha$ Every Integer has a character common to all lower Integers (A formal proposition.)

(4) $\Pi_\alpha \Sigma_u \ \bar{s}_\alpha \Psi \bar{q}_{\alpha u}$ i.e. There is no highest Integer.

(5) $\Sigma_u \Pi_\alpha \Pi_v \ q_{\alpha u} \Psi \bar{s}_\alpha \Psi \bar{q}_{\alpha v}$ i.e. There is a lowest Integer (i.e. Zero).

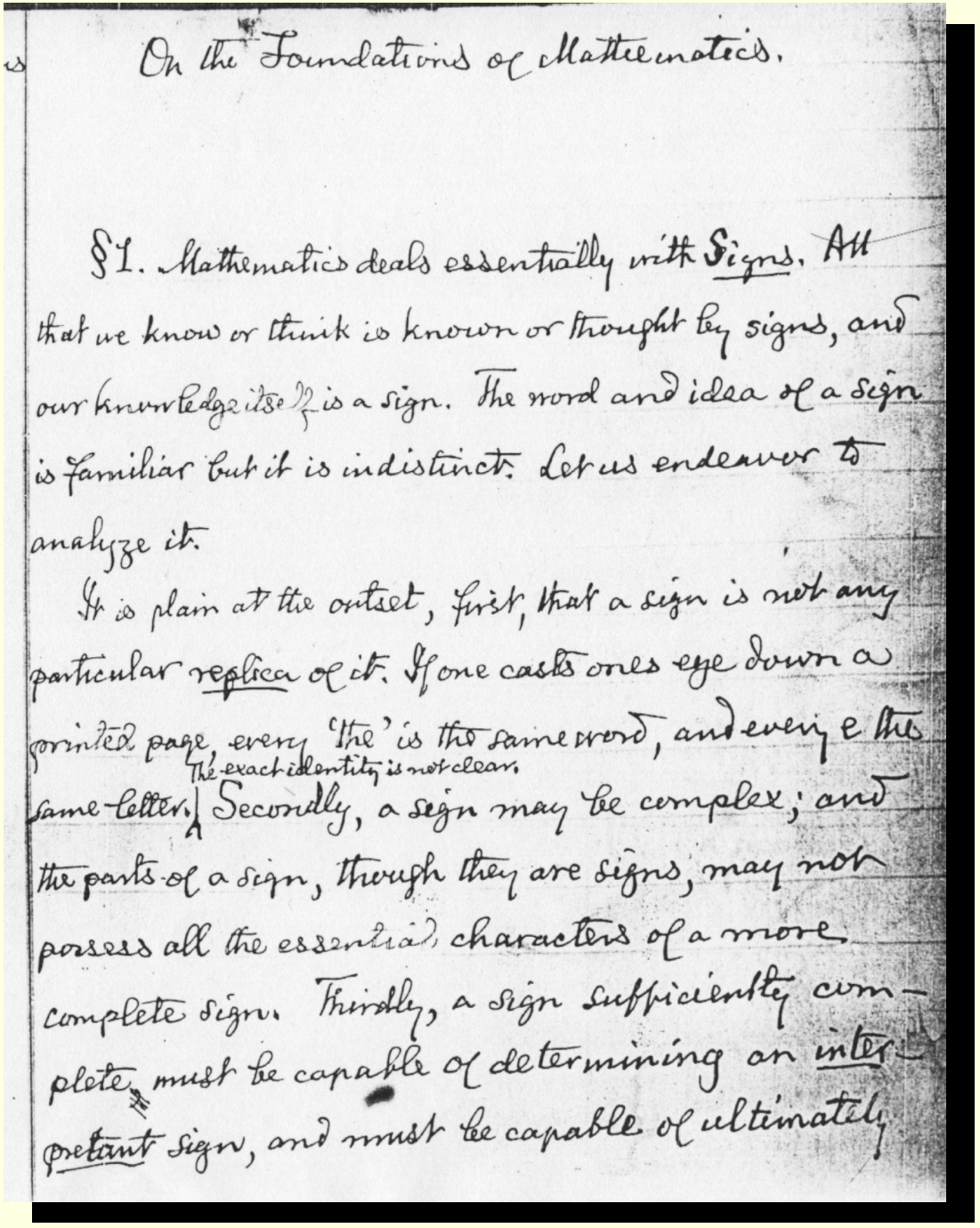
(6) $\Pi_\alpha \Pi_\beta \Pi_u \Pi_v \ s_\alpha \Psi \bar{s}_\beta \Psi \bar{q}_{\alpha u} \Psi q_{\beta u} \Psi q_{\alpha v} \Psi \bar{q}_{\beta v}$ { i.e. an Integer having any s-character that another has not has every other has one that

(7) $\Pi_u \Pi_v \Sigma_\alpha \Pi_\beta \ s_\alpha \cdot (q_{\alpha u} \Psi q_{\alpha v}) \cdot (\bar{q}_{\alpha u} \Psi \bar{q}_{\alpha v}) \Psi q_{\beta u} \cdot q_{\beta v} \Psi \bar{q}_{\beta u} \cdot \bar{q}_{\beta v}$

Unless one of any two integers has an s-character which the other has not, they are alike in all characters, and therefore, being definite, are identical.

APORTES EN MATEMÁTICAS

Fundamentos de las matemáticas



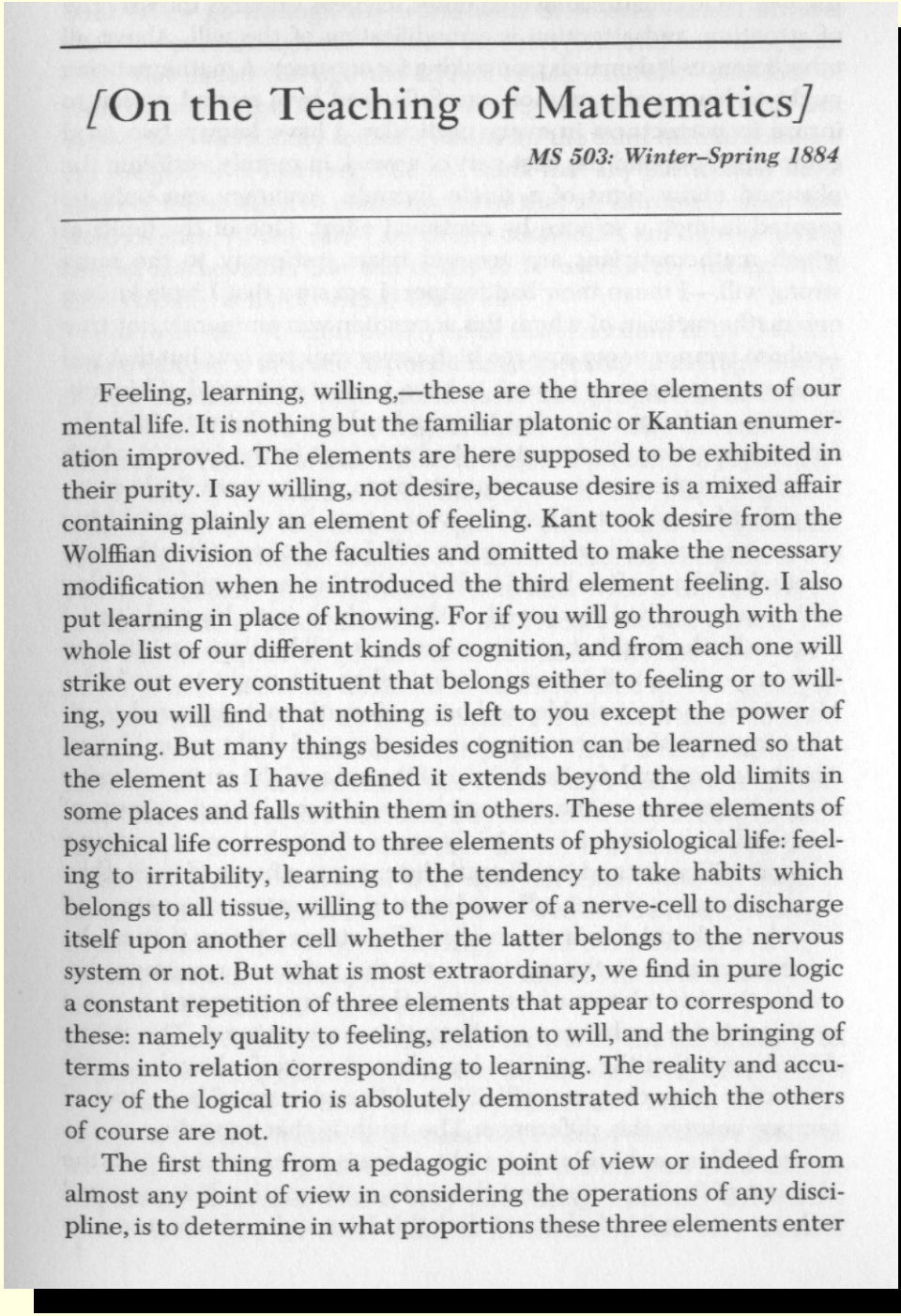
On the Foundations of Mathematics.

§1. Mathematics deals essentially with Signs. All that we know or think is known or thought by signs, and our knowledge itself is a sign. The word and idea of a sign is familiar but it is indistinct. Let us endeavor to analyze it.

It is plain at the outset, first, that a sign is not any particular replica of it. If one casts ones eye down a printed page, every 'the' is the same word, and every the same letter. The exact identity is not clear. Secondly, a sign may be complex; and the parts of a sign, though they are signs, may not possess all the essential characters of a more complete sign. Thirdly, a sign sufficiently complete must be capable of determining an interpretant sign, and must be capable of ultimately

APORTES EN MATEMÁTICAS

Pedagogía de las matemáticas



[On the Teaching of Mathematics]

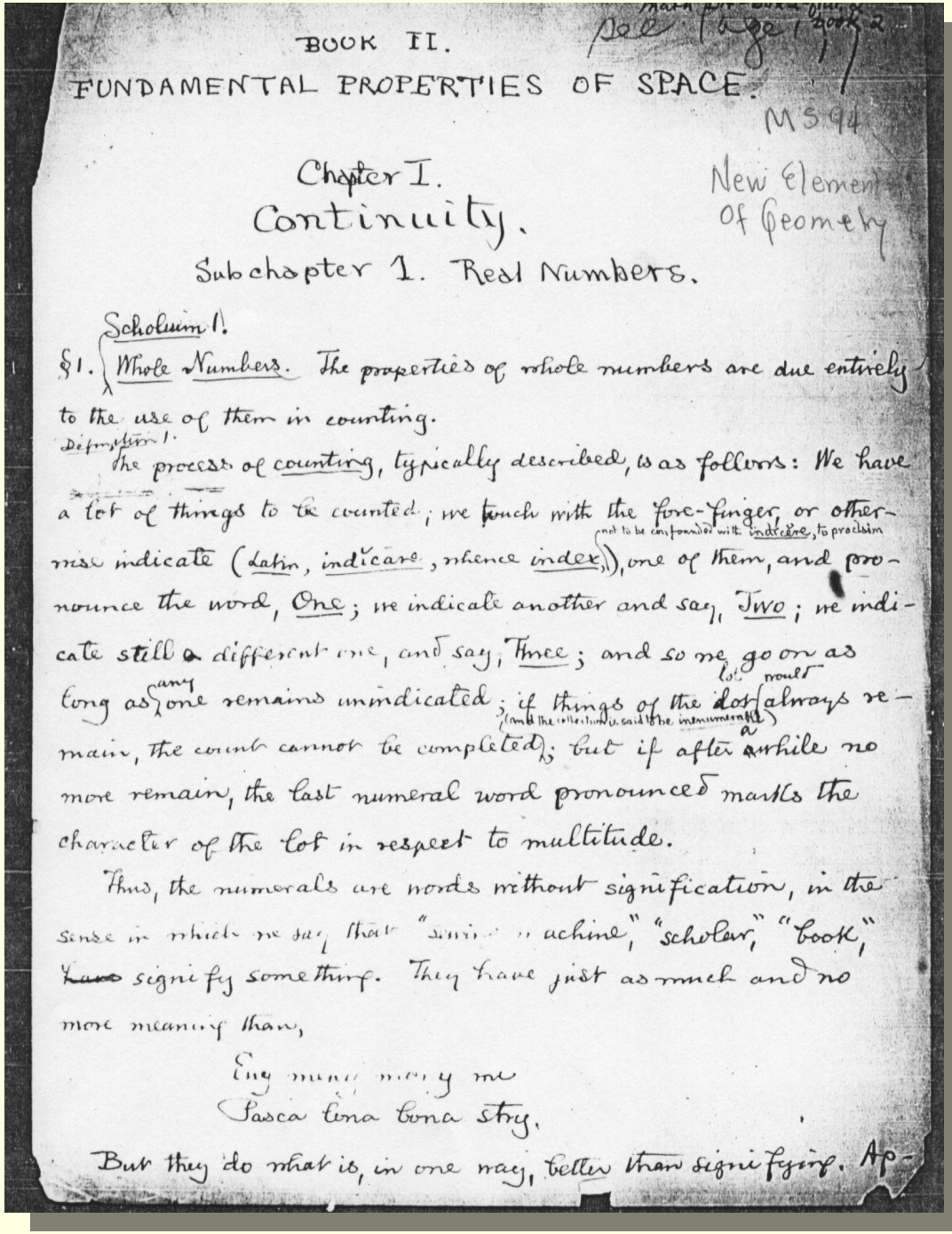
MS 503: Winter–Spring 1884

Feeling, learning, willing,—these are the three elements of our mental life. It is nothing but the familiar platonic or Kantian enumeration improved. The elements are here supposed to be exhibited in their purity. I say willing, not desire, because desire is a mixed affair containing plainly an element of feeling. Kant took desire from the Wolffian division of the faculties and omitted to make the necessary modification when he introduced the third element feeling. I also put learning in place of knowing. For if you will go through with the whole list of our different kinds of cognition, and from each one will strike out every constituent that belongs either to feeling or to willing, you will find that nothing is left to you except the power of learning. But many things besides cognition can be learned so that the element as I have defined it extends beyond the old limits in some places and falls within them in others. These three elements of psychical life correspond to three elements of physiological life: feeling to irritability, learning to the tendency to take habits which belongs to all tissue, willing to the power of a nerve-cell to discharge itself upon another cell whether the latter belongs to the nervous system or not. But what is most extraordinary, we find in pure logic a constant repetition of three elements that appear to correspond to these: namely quality to feeling, relation to will, and the bringing of terms into relation corresponding to learning. The reality and accuracy of the logical trio is absolutely demonstrated which the others of course are not.

The first thing from a pedagogic point of view or indeed from almost any point of view in considering the operations of any discipline, is to determine in what proportions these three elements enter

APORTES EN MATEMÁTICAS

Naturaleza del *continuum* matemático



BOOK II.

FUNDAMENTAL PROPERTIES OF SPACE.

MS 94

Chapter I.

Continuity.

New Elements of Geometry

Subchapter 1. Real Numbers.

Scholium 1.

§1. Whole Numbers. The properties of whole numbers are due entirely to the use of them in counting.

Definition 1.

The process of counting, typically described, is as follows: We have a lot of things to be counted; we touch with the fore-finger, or otherwise indicate (Latin, indicare, whence index (not to be confounded with indicere, to proclaim)), one of them, and pronounce the word, One; we indicate another and say, Two; we indicate still a different one, and say, Three; and so we go on as long as any one remains unindicated; if things of the lot always remain (and the collection is said to be innumerable), the count cannot be completed; but if after a while no more remain, the last numeral word pronounced marks the character of the lot in respect to multitude.

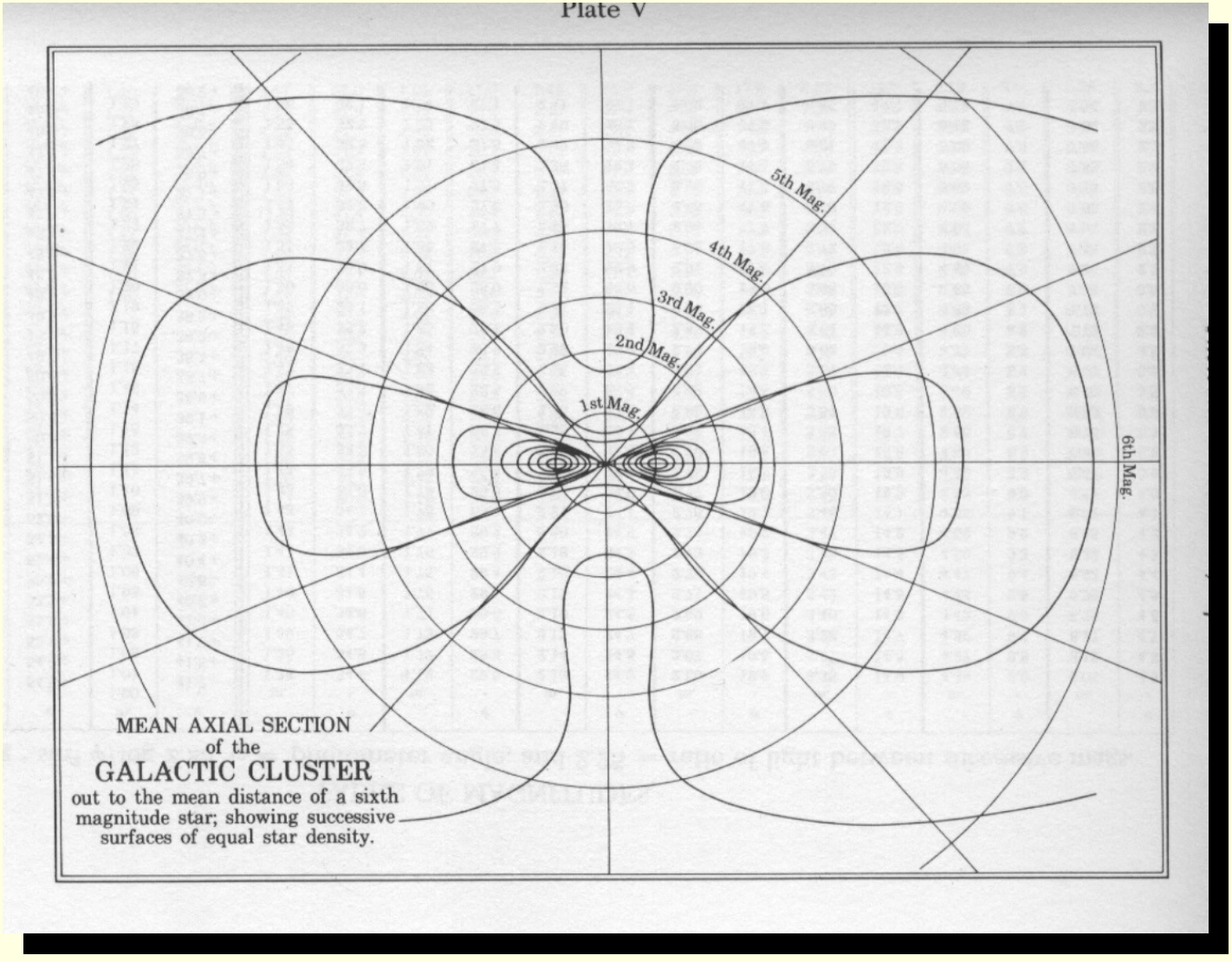
Thus, the numerals are words without signification, in the sense in which we say, that "sewing machine," "scholar," "book," ~~have~~ signify something. They have just as much and no more meaning than,

Eny meny miny mo
Pasca tina tona stry.

But they do what is, in one way, better than signifying. Ap-

APORTES EN ASTRONOMÍA

Estudios fotométricos de las estrellas



APORTES EN GRAVIMETRÍA

Determinación de la medida de la gravedad

Determinations of Gravity at Allegheny, Ebensburgh, and York, Pa., in 1879 and 1880

Item 1 — ***P 290:*** **Coast Survey Report 1883, *473–87***

I.—GRAVITY AT THE ALLEGHENY OBSERVATORY.

The Allegheny Observatory is situated in—
Latitude 40° 27′ 41″.6 north,
Longitude $5^h\ 20^m\ 2^s.93$ west of Greenwich.
It stands 1,140 feet (=348 metres) above the mean sea-level.[1] From a few yards in front of the observatory the descent is very sharp into the valley of the Ohio, and as this has been formed by erosion, it must be supposed to diminish the acceleration of gravity, perhaps by the one hundred thousandth part. Unfortunately the necessary calculation, which a topographical sketch would enable us to perform at once, remains impossible for the present.

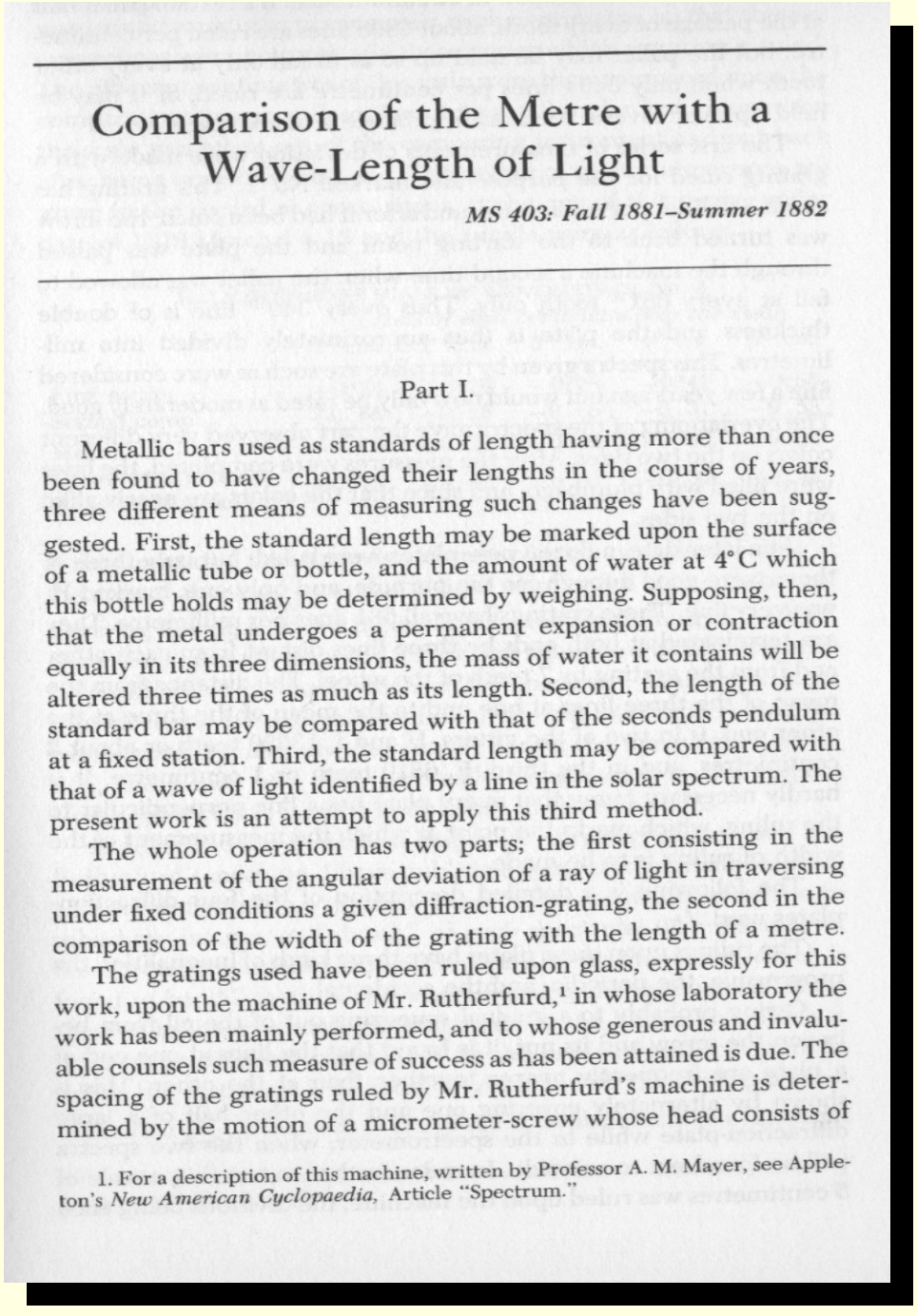
The operations were conducted nearly as described in my "Measurements of Gravity at Initial Stations." The Repsold reversible pendulum was oscillated *in vacuo* on the Geneva support, in the cellar of the observatory, the feet of the support resting on iron bars laid upon other bars let into the great pier of the equatorial at one end and into a stone wall at the other.

Measures of the length of the pendulum were commenced 1879, January 2; but owing to the difficulty of maintaining a tolerably constant temperature in any part of the observatory that was otherwise suited for a comparing-room, no valuable results were obtained before January 18; and even after that date, it was found necessary to reject the work of several days, owing to bad conditions. The first

1. The latitude and longitude here given have been extracted from the *American Ephemeris*. The elevation is from data furnished to Professor Langley by the Allegheny City surveyor and by the engineer of the Pennsylvania Railway.

APORTES EN METROLOGÍA

Corrección del valor de la medida del metro aceptada en París (por la longitud de onda de la luz) en 1880.



Comparison of the Metre with a Wave-Length of Light

MS 403: Fall 1881–Summer 1882

Part I.

Metallic bars used as standards of length having more than once been found to have changed their lengths in the course of years, three different means of measuring such changes have been suggested. First, the standard length may be marked upon the surface of a metallic tube or bottle, and the amount of water at 4°C which this bottle holds may be determined by weighing. Supposing, then, that the metal undergoes a permanent expansion or contraction equally in its three dimensions, the mass of water it contains will be altered three times as much as its length. Second, the length of the standard bar may be compared with that of the seconds pendulum at a fixed station. Third, the standard length may be compared with that of a wave of light identified by a line in the solar spectrum. The present work is an attempt to apply this third method.

The whole operation has two parts; the first consisting in the measurement of the angular deviation of a ray of light in traversing under fixed conditions a given diffraction-grating, the second in the comparison of the width of the grating with the length of a metre.

The gratings used have been ruled upon glass, expressly for this work, upon the machine of Mr. Rutherfurd,[1] in whose laboratory the work has been mainly performed, and to whose generous and invaluable counsels such measure of success as has been attained is due. The spacing of the gratings ruled by Mr. Rutherfurd's machine is determined by the motion of a micrometer-screw whose head consists of

1. For a description of this machine, written by Professor A. M. Mayer, see Appleton's *New American Cyclopaedia*, Article "Spectrum."

Note on the Progress of Experiments for comparing a Wave-length with a Metre

P 136: **American Journal of Science and Arts,**
3rd ser. 18 (July 1879): 51

To C. P. PATTERSON, Superintendent U.S. Coast and Geodetic Survey:—

DEAR SIR

The following is the present state of the Spectrum metre business. The deviation of a spectral line (Van der Willigen's No. 16) has had three complete measures using a certain gitter of $340\frac{1}{2}$ lines to the millimetre. The double deviation (the angle measured) was found to be

1877			
June 23	89°	54′	19″.5
June 29 and July 2			19.25
Sep. 4 and Aug. 27			19.65
Mean———	89°	54′	19″.5

An error of 0″.4 in this would occasion an error of one micron in the metre. These measures were previously communicated to you, but owing to an erroneous value of the coëfficient of expansion of glass having been used (the value for iron having been inadvertently substituted) they did not seem to agree so well as they do. There were two other complete measures but in regard to one of them there is a doubt about the thermometer used, and in regard to the other there is a doubt about the part of the line set on.

This line seems on the whole to be a bad one for the purpose. Another line near it was therefore selected and another much finer gitter. The deviations obtained were on the different days

1879			
May 8	90°	03′	51″.7
May 9			51.75
May 10			52.0
May 15			50.35
May 21			51.75
May 22			51.2
Mean———	90°	03′	51″.45

Notwithstanding the bad result of May 15, which is unaccountable, these measures are evidently good enough.

One of these gitters has been compared with all the centimetres of a decimetre scale of centimetres. The other is still to be compared with all the even two centimetres of the same scale.

Mr. Chapman is now comparing this decimetre scale with all the decimetres of a metre scale of decimetres.

As soon as that is done *a metre* will have been compared with a wave-length. But shortly after, this will be improved by comparing the other gitter and also a third upon which I propose to measure a deviation.

It will remain, *first,* to find the coëfficient of expansion of the glass metre. The apparatus is all ready for this and it will not take a fortnight. Second, the glass metre will have to be compared with a brass metre. This will be an operation of some difficulty but I think we shall complete it before long.

Yours respectfully, C. S. PEIRCE, *Assistant.*

Cambridge 1879 May 23

APORTES EN GEODESIA

Proyección de mapas 1876

Ecuación:

$$\cos^2\phi = \frac{\sqrt{1-\cos^2 l\ \cos^2\theta} - \text{sen}\ l}{1+\sqrt{1-\cos^2 l\ \cos^2\theta}}$$

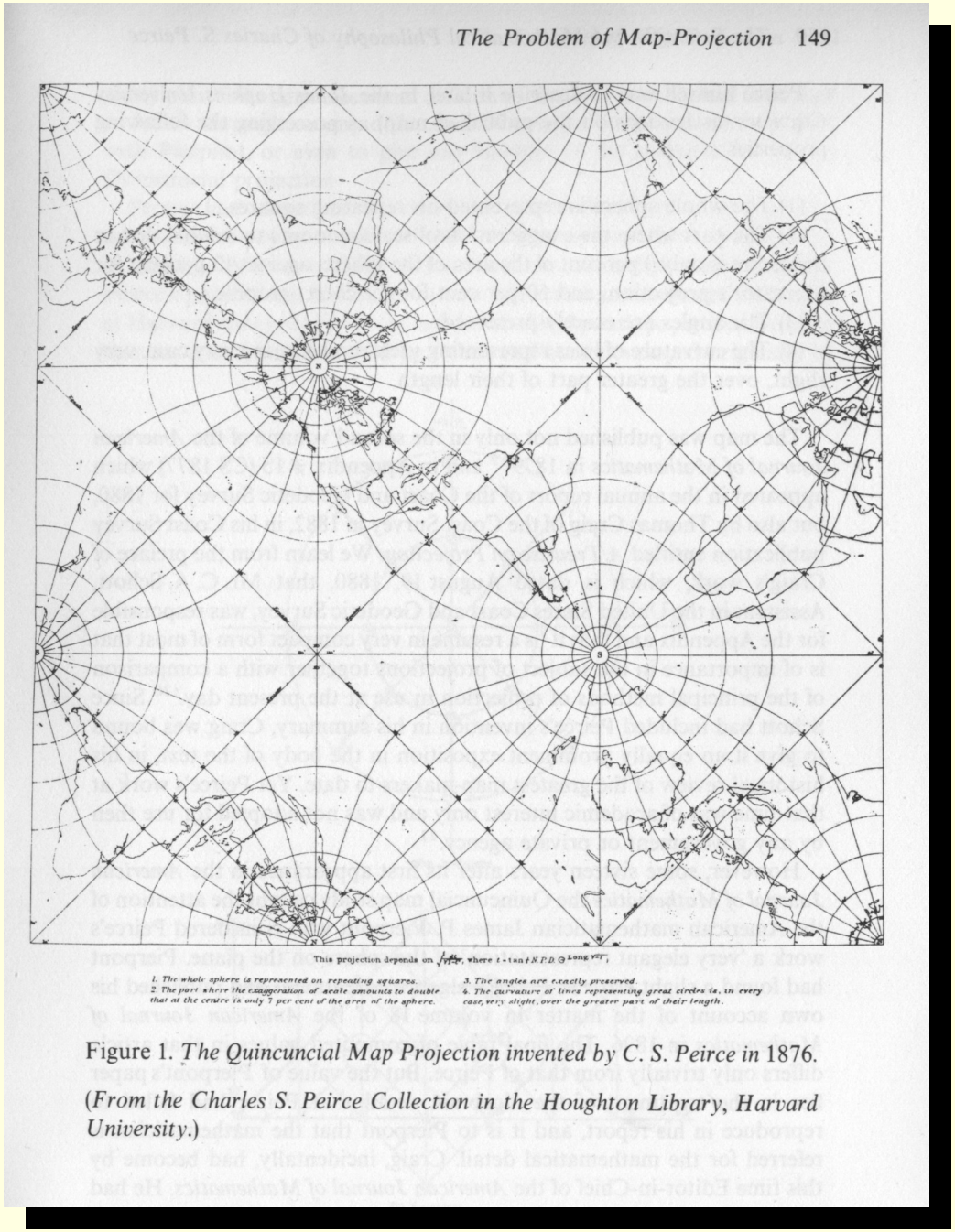


Figure 1. *The Quincuncial Map Projection invented by C. S. Peirce in* 1876.

(*From the Charles S. Peirce Collection in the Houghton Library, Harvard University.*)

A Quincuncial Projection of the Sphere

P 135: **American Journal of Mathematics**
2 (1879): 394–96

For meteorological, magnetological and other purposes, it is convenient to have a projection of the sphere which shall show the connection of all parts of the surface. This is done by the one shown in the plate. It is an orthomorphic or conform projection formed by transforming the stereographic projection, with a pole at infinity, by means of an elliptic function. For that purpose, l being the latitude, and θ the longitude, we put

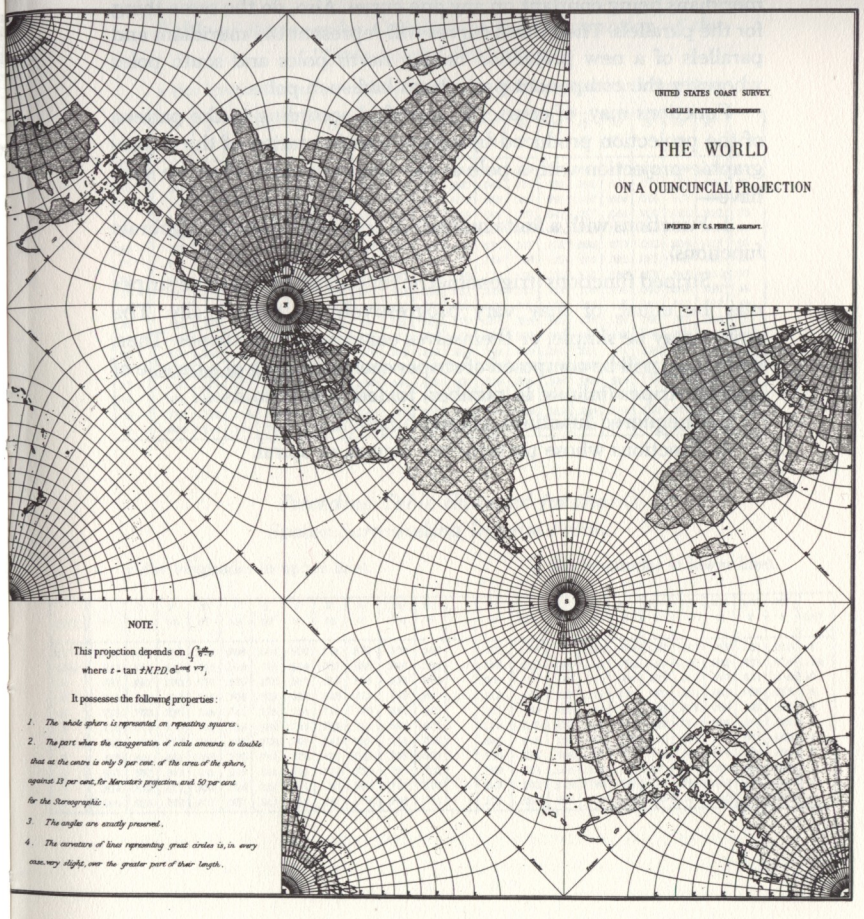
$$\cos^2\varphi = \frac{\sqrt{1-\cos^2 l\cos^2\theta}-\sin l}{1+\sqrt{1-\cos^2 l\cos^2\theta}},$$

and then $\frac{1}{2}F\varphi$ is the value of one of the rectangular coördinates of the point on the new projection. This is the same as taking

$$\cos am\,(x+y\sqrt{-1})\,(\text{angle of mod.} = 45^\circ) = \tan\frac{p}{2}(\cos\theta+\sin\theta\sqrt{-1}),$$

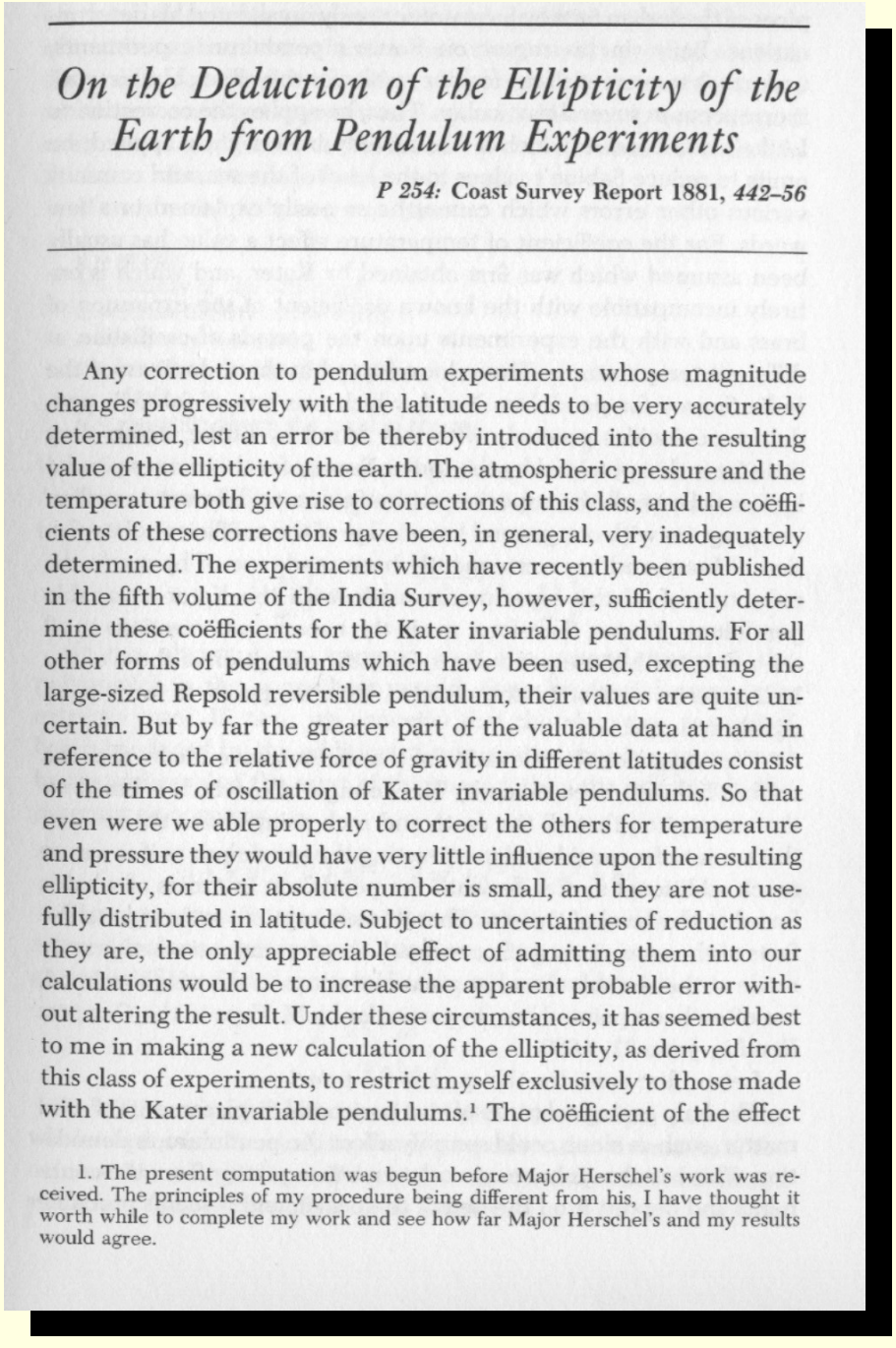
where x and y are the coördinates on the new projection, p is the north polar distance. A table of these coördinates is subjoined.

Upon an orthomorphic projection the parallels represent equipotential or level lines for the logarithmic potential, while the meridians are the lines of force. Consequently we may draw these lines by the method used by Maxwell in his *Electricity and Magnetism* for drawing the corresponding lines for the Newtonian potential. That is to say, let two such projections be drawn upon the same sheet, so that upon both are shown the same meridians at equal angular distances, and the same parallels at such distances that the ratio of successive values of $\tan\frac{p}{2}$ is constant. Then, number the meridians and also the parallels. Then draw curves through the intersections of meridians with meridians, the sums of numbers of the intersecting



APORTES EN GEODESIA

Estudios sobre la elipticidad de la Tierra



On the Deduction of the Ellipticity of the Earth from Pendulum Experiments

P 254: Coast Survey Report 1881, *442–56*

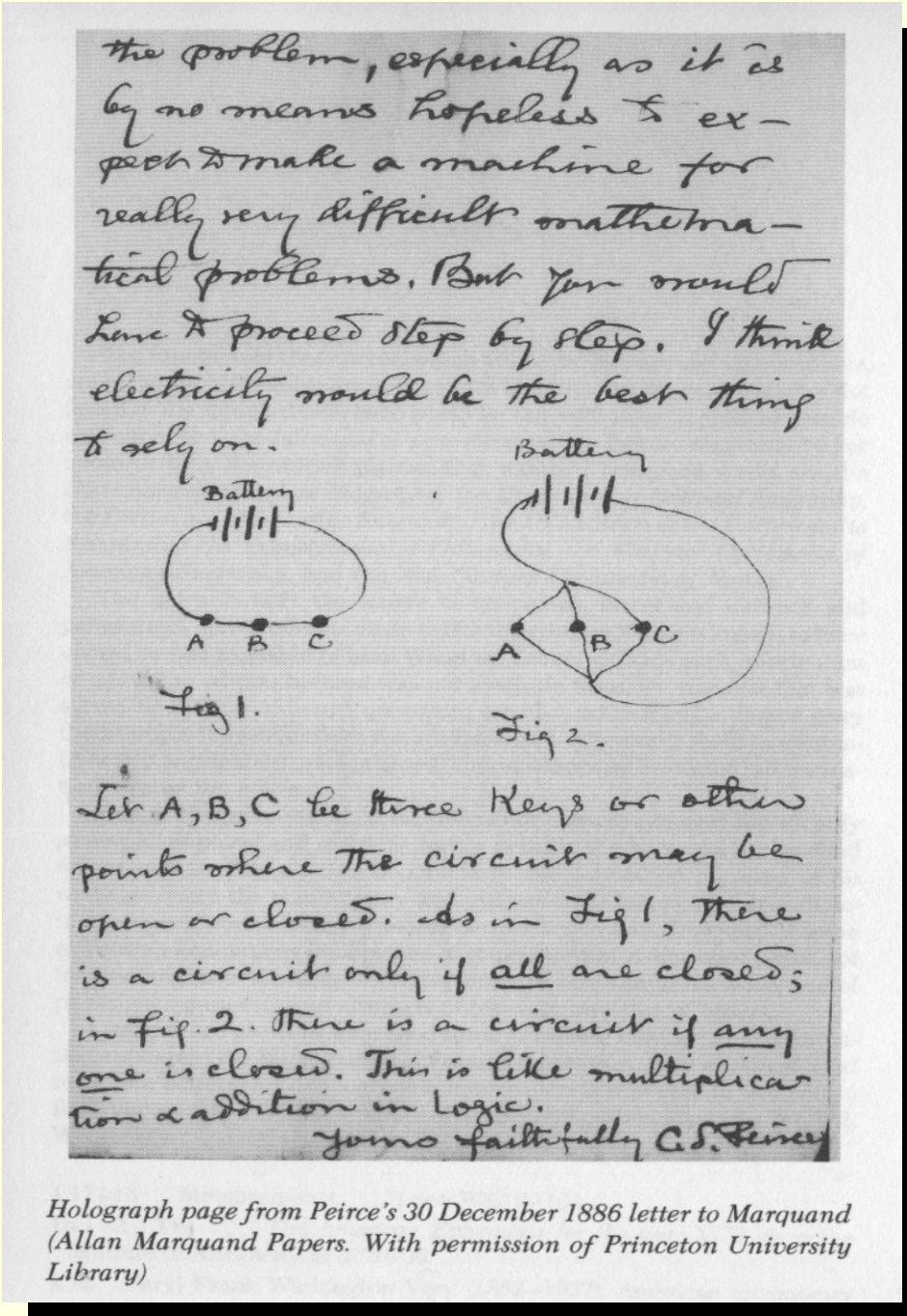
Any correction to pendulum experiments whose magnitude changes progressively with the latitude needs to be very accurately determined, lest an error be thereby introduced into the resulting value of the ellipticity of the earth. The atmospheric pressure and the temperature both give rise to corrections of this class, and the coëfficients of these corrections have been, in general, very inadequately determined. The experiments which have recently been published in the fifth volume of the India Survey, however, sufficiently determine these coëfficients for the Kater invariable pendulums. For all other forms of pendulums which have been used, excepting the large-sized Repsold reversible pendulum, their values are quite uncertain. But by far the greater part of the valuable data at hand in reference to the relative force of gravity in different latitudes consist of the times of oscillation of Kater invariable pendulums. So that even were we able properly to correct the others for temperature and pressure they would have very little influence upon the resulting ellipticity, for their absolute number is small, and they are not usefully distributed in latitude. Subject to uncertainties of reduction as they are, the only appreciable effect of admitting them into our calculations would be to increase the apparent probable error without altering the result. Under these circumstances, it has seemed best to me in making a new calculation of the ellipticity, as derived from this class of experiments, to restrict myself exclusively to those made with the Kater invariable pendulums.[1] The coëfficient of the effect

1. The present computation was begun before Major Herschel's work was received. The principles of my procedure being different from his, I have thought it worth while to complete my work and see how far Major Herschel's and my results would agree.

APORTES EN ELECTRÓNICA

Primer diseño conocido de una máquina que ejecuta operaciones lógicas y matemáticas.

1886



the problem, especially as it is by no means hopeless to expect to make a machine for really very difficult mathematical problems. But you would have to proceed step by step. I think electricity would be the best thing to rely on.

Battery

A B C

Fig 1.

Battery

A B C

Fig 2.

Let A, B, C be three Keys or other points where the circuit may be open or closed. As in Fig 1, there is a circuit only if all are closed; in Fig. 2. there is a circuit if any one is closed. This is like multiplication & addition in Logic.

Yours faithfully C. S. Peirce

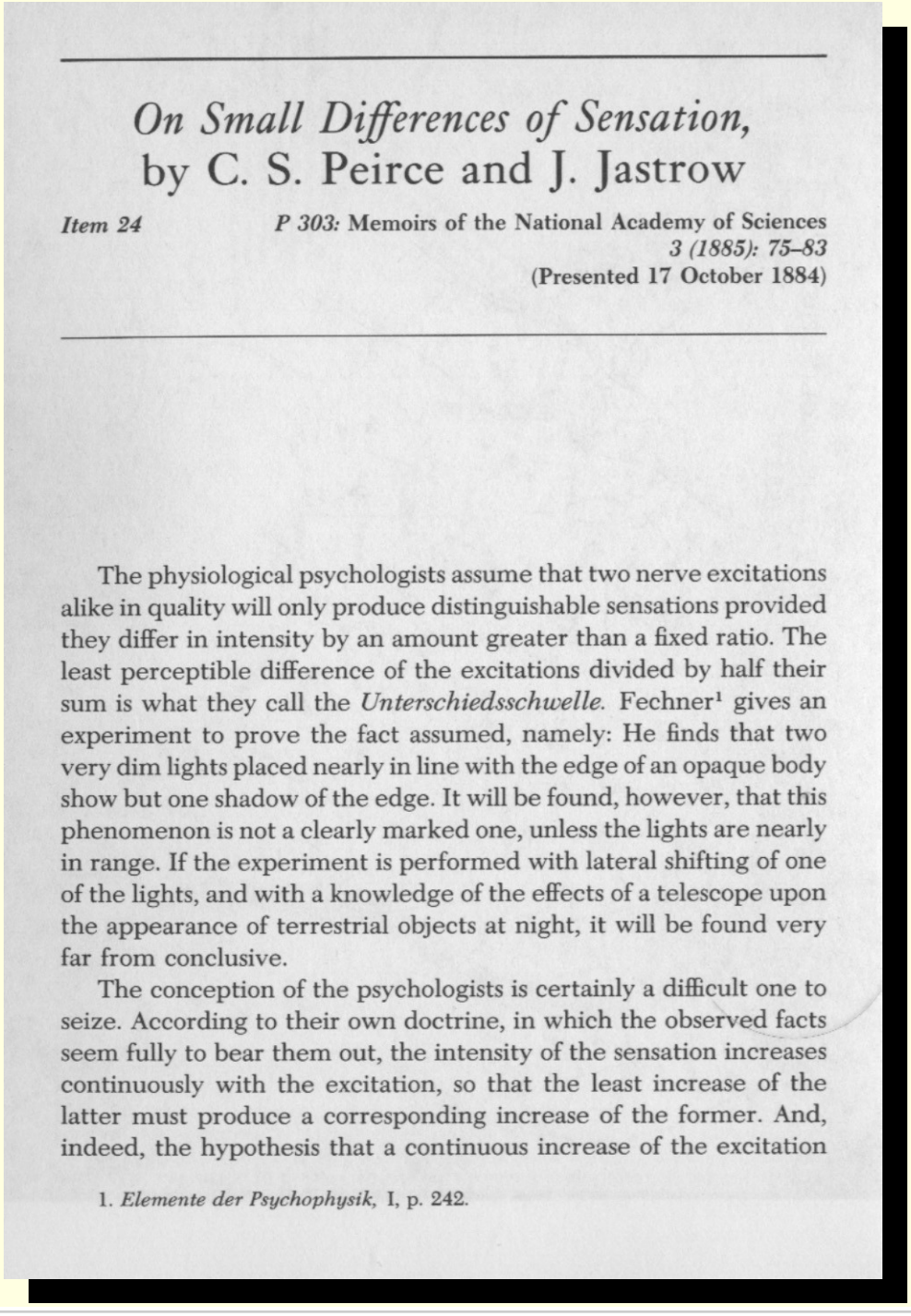
Holograph page from Peirce's 30 December 1886 letter to Marquand (Allan Marquand Papers. With permission of Princeton University Library)

APORTES EN PSICOLOGÍA

Primer

Psicólogo experimental americano

1884



On Small Differences of Sensation,
by C. S. Peirce and J. Jastrow

Item 24 *P 303:* Memoirs of the National Academy of Sciences
3 (1885): 75–83
(Presented 17 October 1884)

The physiological psychologists assume that two nerve excitations alike in quality will only produce distinguishable sensations provided they differ in intensity by an amount greater than a fixed ratio. The least perceptible difference of the excitations divided by half their sum is what they call the *Unterschiedsschwelle.* Fechner[1] gives an experiment to prove the fact assumed, namely: He finds that two very dim lights placed nearly in line with the edge of an opaque body show but one shadow of the edge. It will be found, however, that this phenomenon is not a clearly marked one, unless the lights are nearly in range. If the experiment is performed with lateral shifting of one of the lights, and with a knowledge of the effects of a telescope upon the appearance of terrestrial objects at night, it will be found very far from conclusive.

The conception of the psychologists is certainly a difficult one to seize. According to their own doctrine, in which the observed facts seem fully to bear them out, the intensity of the sensation increases continuously with the excitation, so that the least increase of the latter must produce a corresponding increase of the former. And, indeed, the hypothesis that a continuous increase of the excitation

1. *Elemente der Psychophysik,* I, p. 242.

Note on the Sensation of Color

P 100: **American Journal of Science and Arts,**
3d ser. 13 (April 1877): 247–51

It may, perhaps, be worth while to notice a few consequences of three theories concerning color which are usually regarded with some favor.

First hypothesis.—The appearance of every mixture of lights depends solely on the appearances of the constituents, without distinction of their physical constitution. This I believe is established.

Second hypothesis.—Every sensation of light is compounded of not more than three independent sensations, which do not influence one another. This is Young's theory. It follows that, if we denote the units of the three elementary sensations by i, j, and k, every sensation of light may be represented by an expression of the form,

$$Xi + Yj + Zk.$$

Third hypothesis.—The intensity of a sensation is proportional to the logarithm of the strength of the excitation, the barely perceptible excitation being taken of unit strength. Negative logarithms are to be taken as *zero.* This is Fechner's law. It is known to be approximately and only approximately true, for the sensation of light. From this it follows that, if x, y, z be the relative proportions of a mixture of three lights giving the elementary sensations i, j, k, the sensation produced by the mixture is

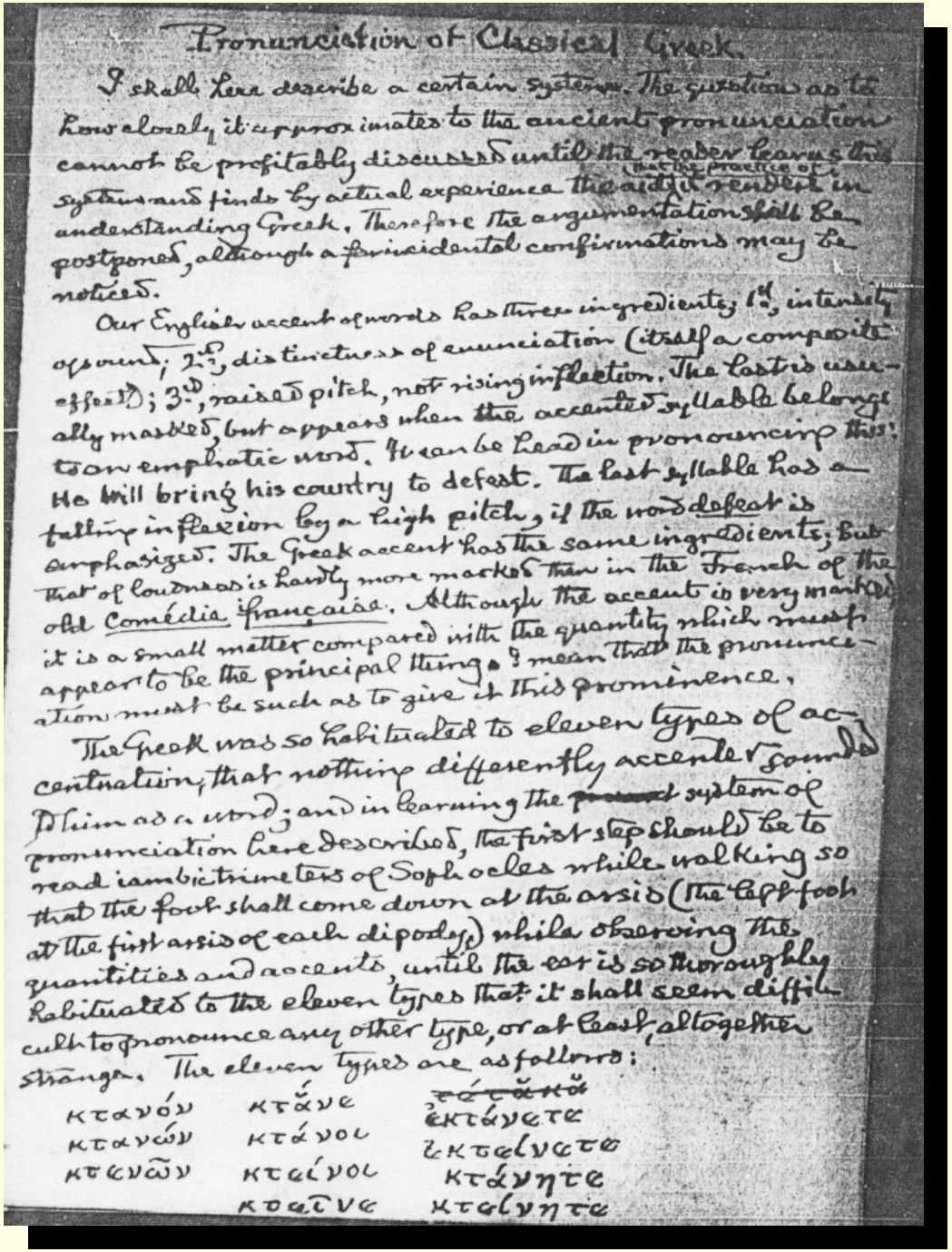
$$I \log x \,.\, i + J \log y \,.\, j + K \log z \,.\, k,$$

where I, J, K, are three constants.

From these principles, it follows that if a light giving any sensation such as that just written have its intensity increased in any ratio r, the resulting sensation will be,

APORTES EN LINGÜÍSTICA

Pronunciación del griego clásico



Pronunciation of Classical Greek.

I shall here describe a certain system. The questions as to how closely it approximates to the ancient pronunciation cannot be profitably discussed until the reader learns this system and finds by actual experience the aid it rendered in understanding Greek. Therefore the argumentation shall be postponed, although a few incidental confirmations may be noticed.

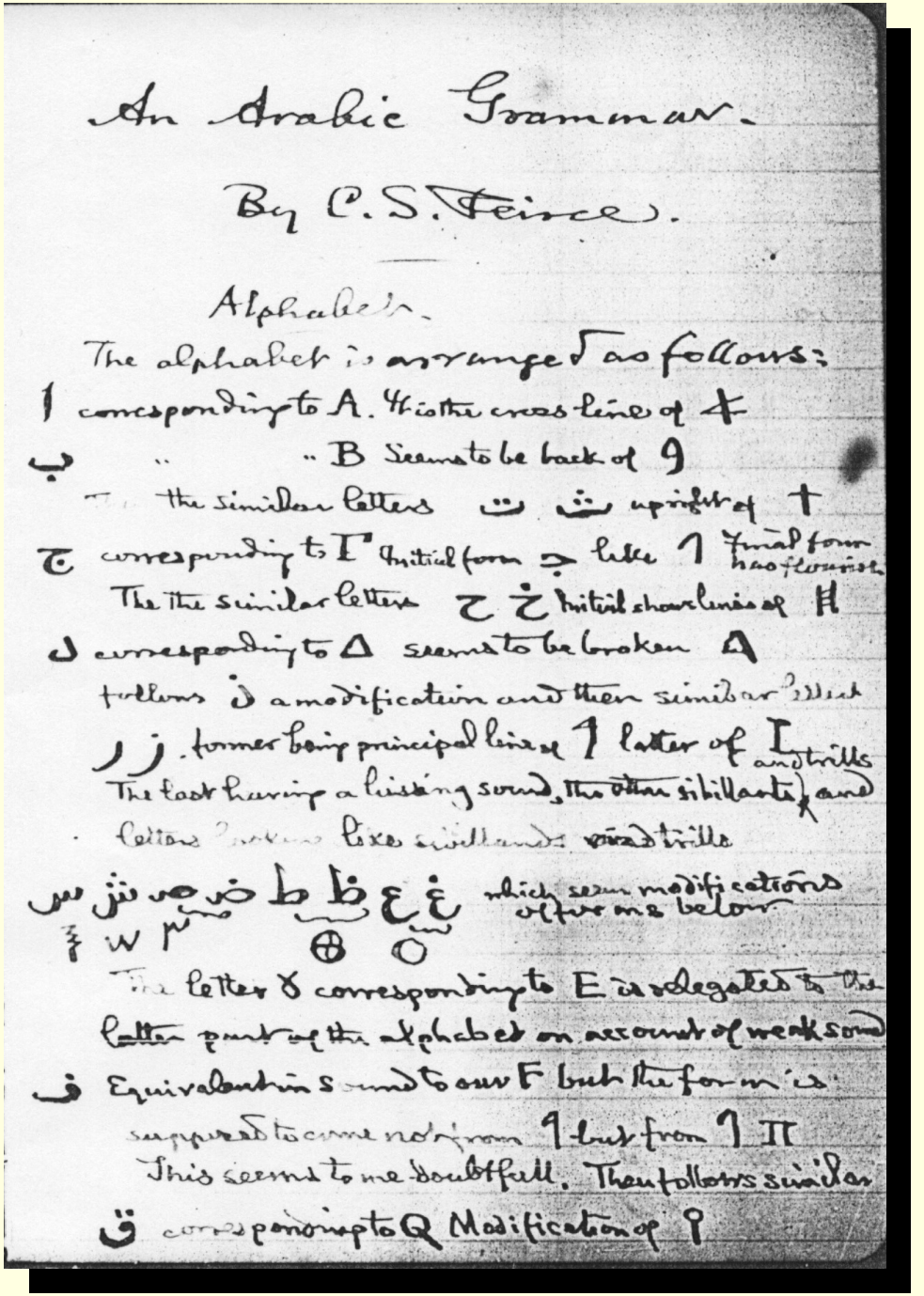
Our English accent of words has three ingredients; 1st, intensity of sound; 2nd, distinctness of enunciation (itself a composite effect); 3rd, raised pitch, not rising inflection. The last is usually marked, but appears when the accented syllable belongs to an emphatic word. It can be heard in pronouncing this: He will bring his country to defeat. The last syllable has a falling inflexion by a high pitch, if the word defeat is emphasized. The Greek accent had the same ingredients; but that of loudness is hardly more marked than in the French of the old Comédie française. Although the accent is very marked it is a small matter compared with the quantity which must appear to be the principal thing. I mean that the pronunciation must be such as to give it this prominence.

The Greek was so habituated to eleven types of accentuation, that nothing differently accented sounded to him as a word; and in learning the ~~pronunciation~~ system of pronunciation here described, the first step should be to read iambic trimeters of Sophocles while walking so that the foot shall come down at the arsis (the "left foot at the first arsis of each dipody) while observing the quantities and accents, until the ear is so thoroughly habituated to the eleven types that it shall seem difficult to pronounce any other type, or at least, altogether strange. The eleven types are as follows:

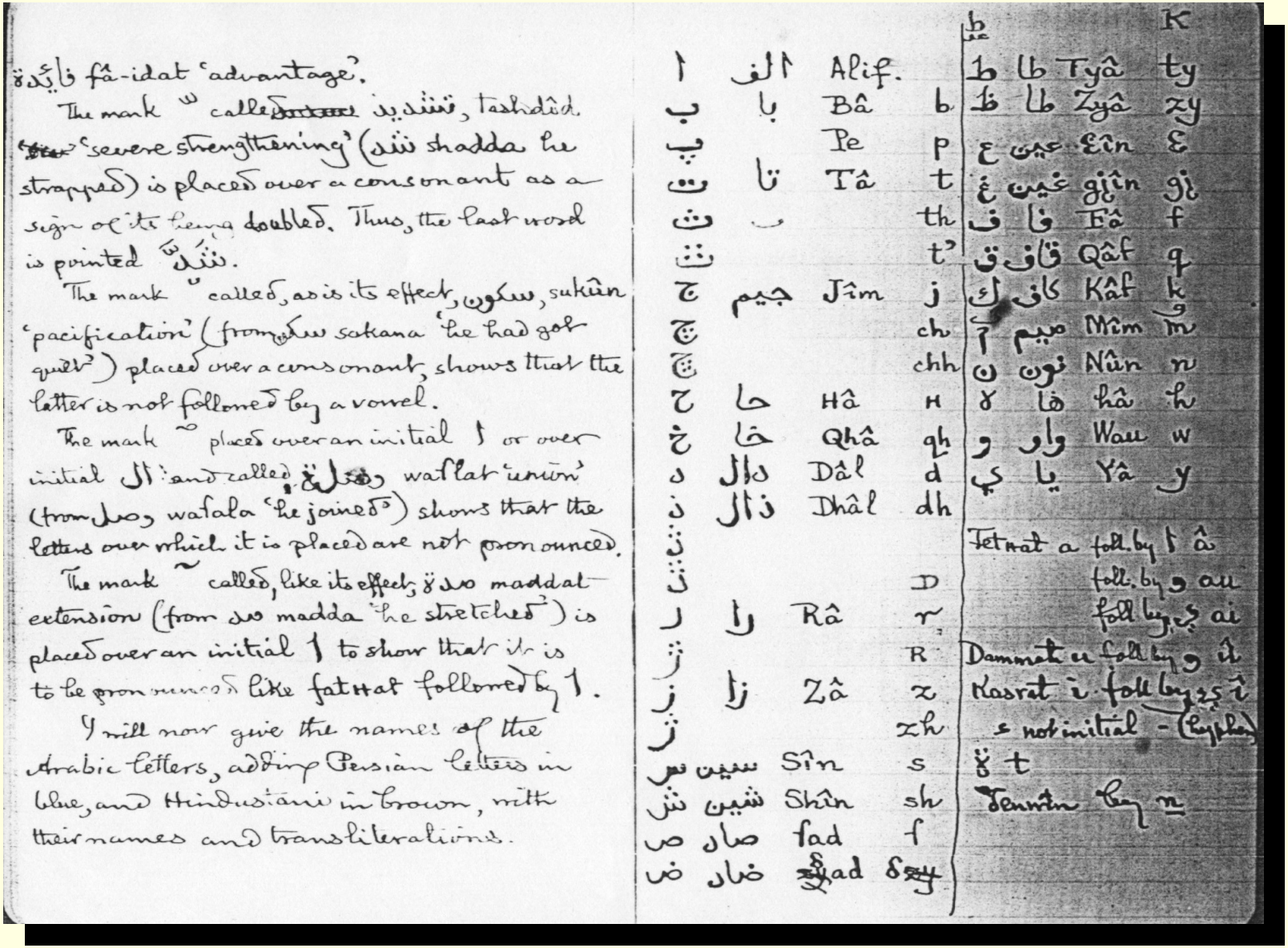
κτανόν	κτάνε	ἐκτάνετε
κτανώ̃ν	κτάνοι	ἐκτείνετε
κτενῶν	κτείνοι	κτάνητε
κτεῖνε		κτείνητε

APORTES EN LINGÜÍSTICA

Estudios sobre gramática árabe

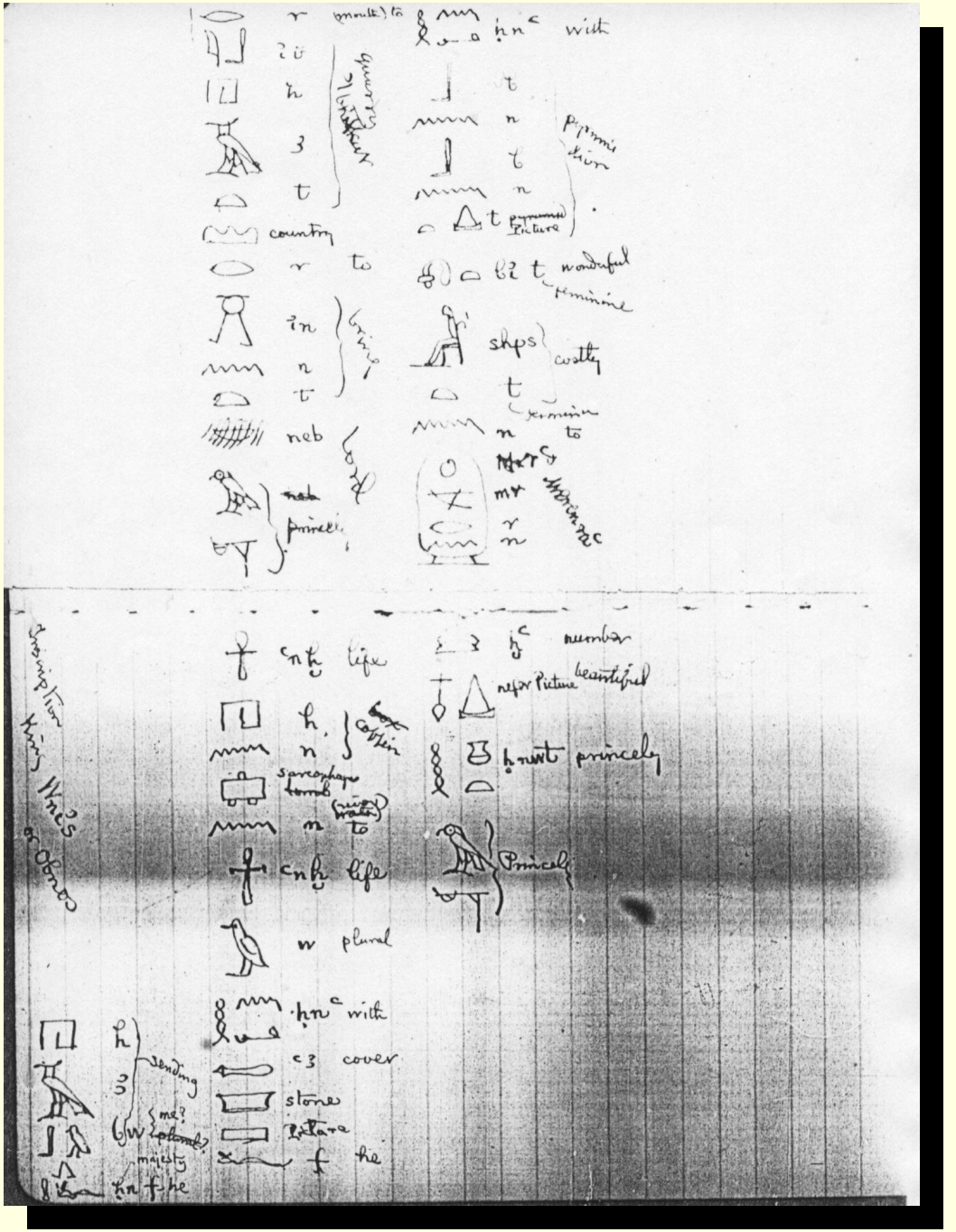


APORTES EN LINGÜÍSTICA



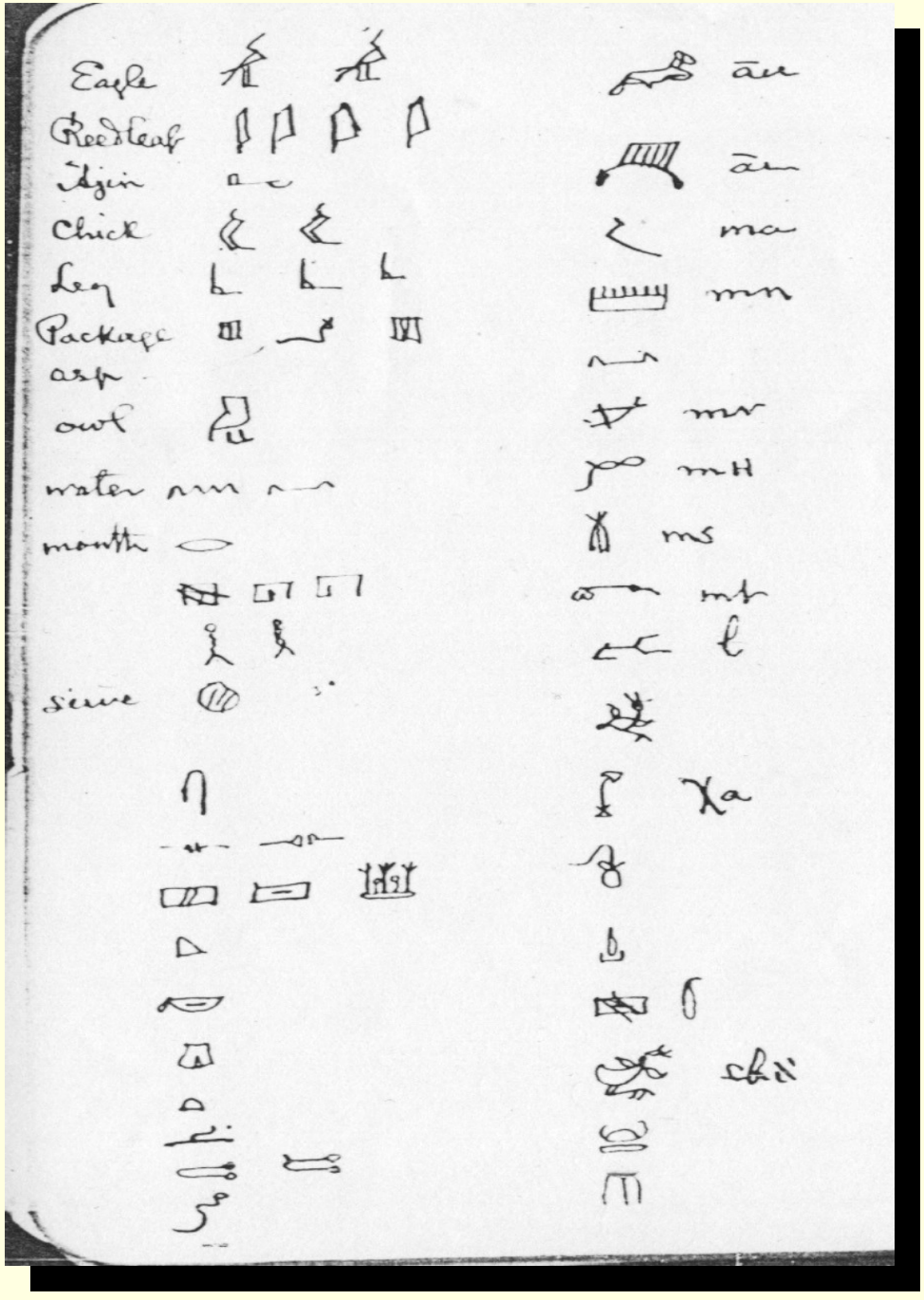
APORTES EN LINGÜÍSTICA

Estudios sobre jeroglíficos egipcios



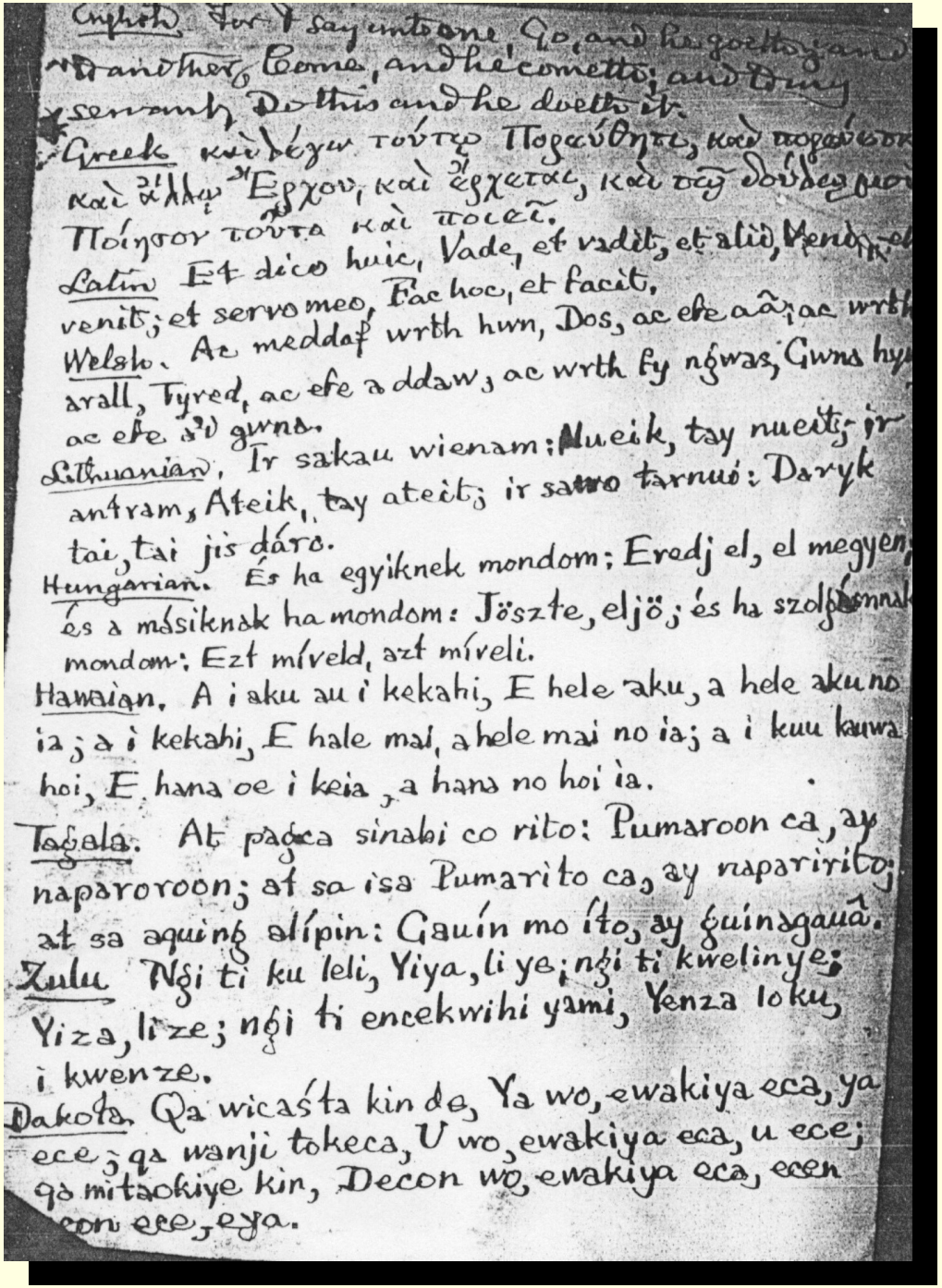
APORTES EN LINGÜÍSTICA

Estudios sobre jeroglíficos egipcios



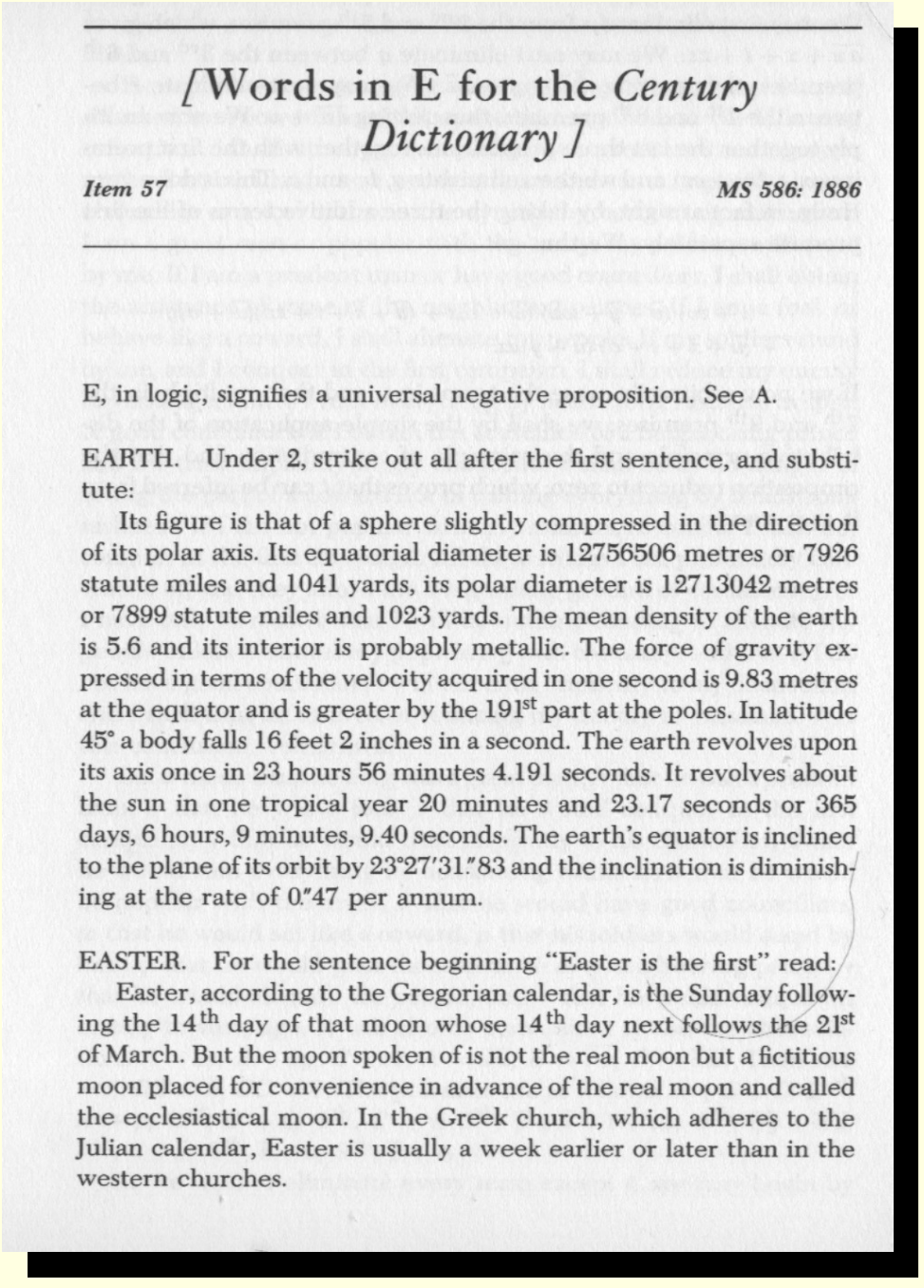
APORTES EN LINGÜÍSTICA

Lingüística comparada



APORTES EN LINGÜÍSTICA

Lexicografía



[Words in E for the *Century Dictionary*]

Item 57 *MS 586: 1886*

E, in logic, signifies a universal negative proposition. See A.

EARTH. Under 2, strike out all after the first sentence, and substitute:

Its figure is that of a sphere slightly compressed in the direction of its polar axis. Its equatorial diameter is 12756506 metres or 7926 statute miles and 1041 yards, its polar diameter is 12713042 metres or 7899 statute miles and 1023 yards. The mean density of the earth is 5.6 and its interior is probably metallic. The force of gravity expressed in terms of the velocity acquired in one second is 9.83 metres at the equator and is greater by the 191st part at the poles. In latitude 45° a body falls 16 feet 2 inches in a second. The earth revolves upon its axis once in 23 hours 56 minutes 4.191 seconds. It revolves about the sun in one tropical year 20 minutes and 23.17 seconds or 365 days, 6 hours, 9 minutes, 9.40 seconds. The earth's equator is inclined to the plane of its orbit by 23°27′31.″83 and the inclination is diminishing at the rate of 0.″47 per annum.

EASTER. For the sentence beginning "Easter is the first" read:

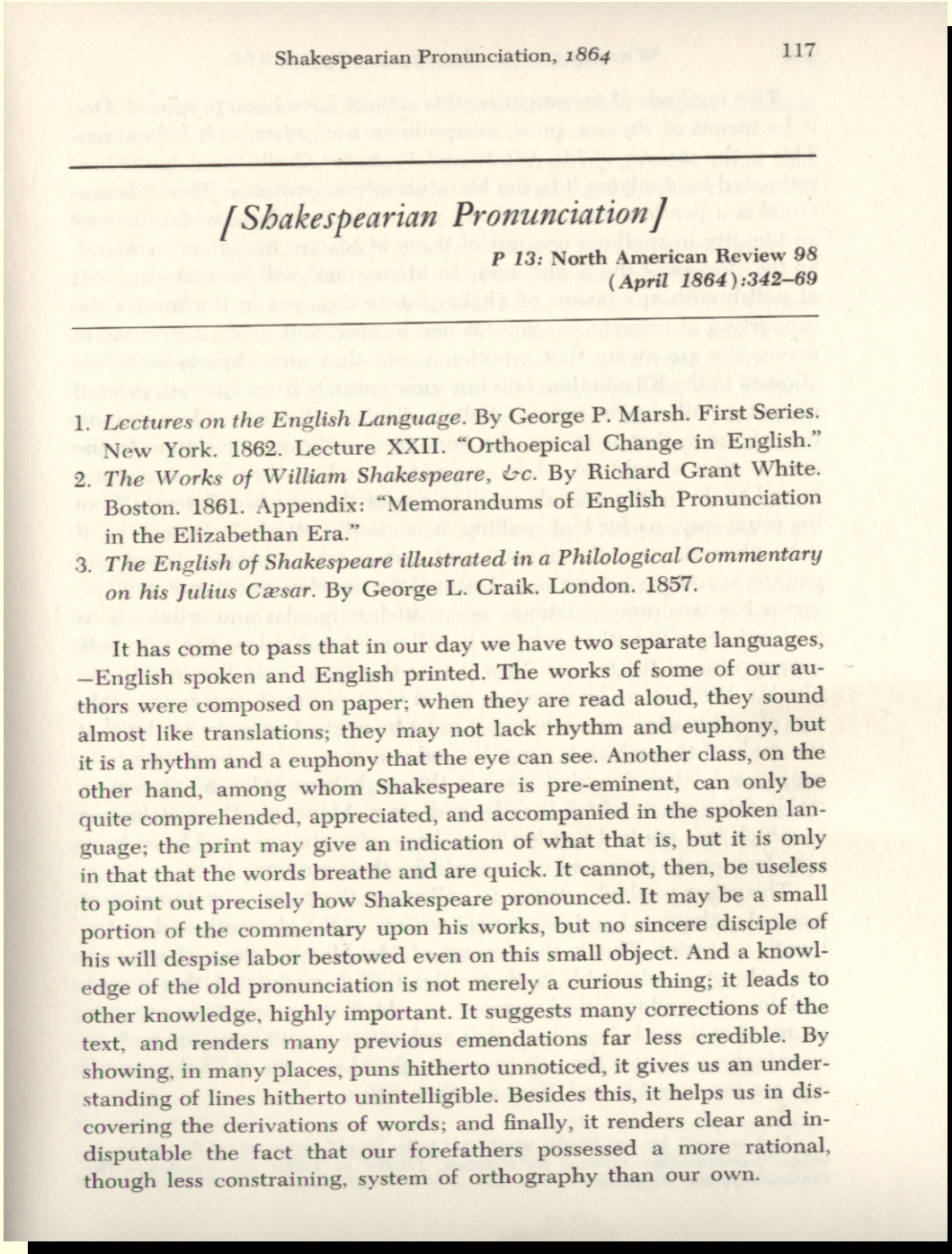
Easter, according to the Gregorian calendar, is the Sunday following the 14th day of that moon whose 14th day next follows the 21st of March. But the moon spoken of is not the real moon but a fictitious moon placed for convenience in advance of the real moon and called the ecclesiastical moon. In the Greek church, which adheres to the Julian calendar, Easter is usually a week earlier or later than in the western churches.

APORTES EN HISTORIA

- Estudios sobre historia de la lógica en las islas británicas.
- Estudios sobre historia de la lógica medieval.
- Historia de los métodos científicos.
- Estudios sobre historia de la ciencia.
- Estudios sobre biografía comparada.
- Traducción del Tratado de *Petrus Peregrinus* de 1269.
- Presentación de un manuscrito sobre matemáticas de 1424, escrito por *Leonardo Fibonacci*.
- Estudios sobre historia de la filosofía antigua.

APORTES EN HISTORIA

Pronunciación del inglés shakespeariano



[Shakespearian Pronunciation]

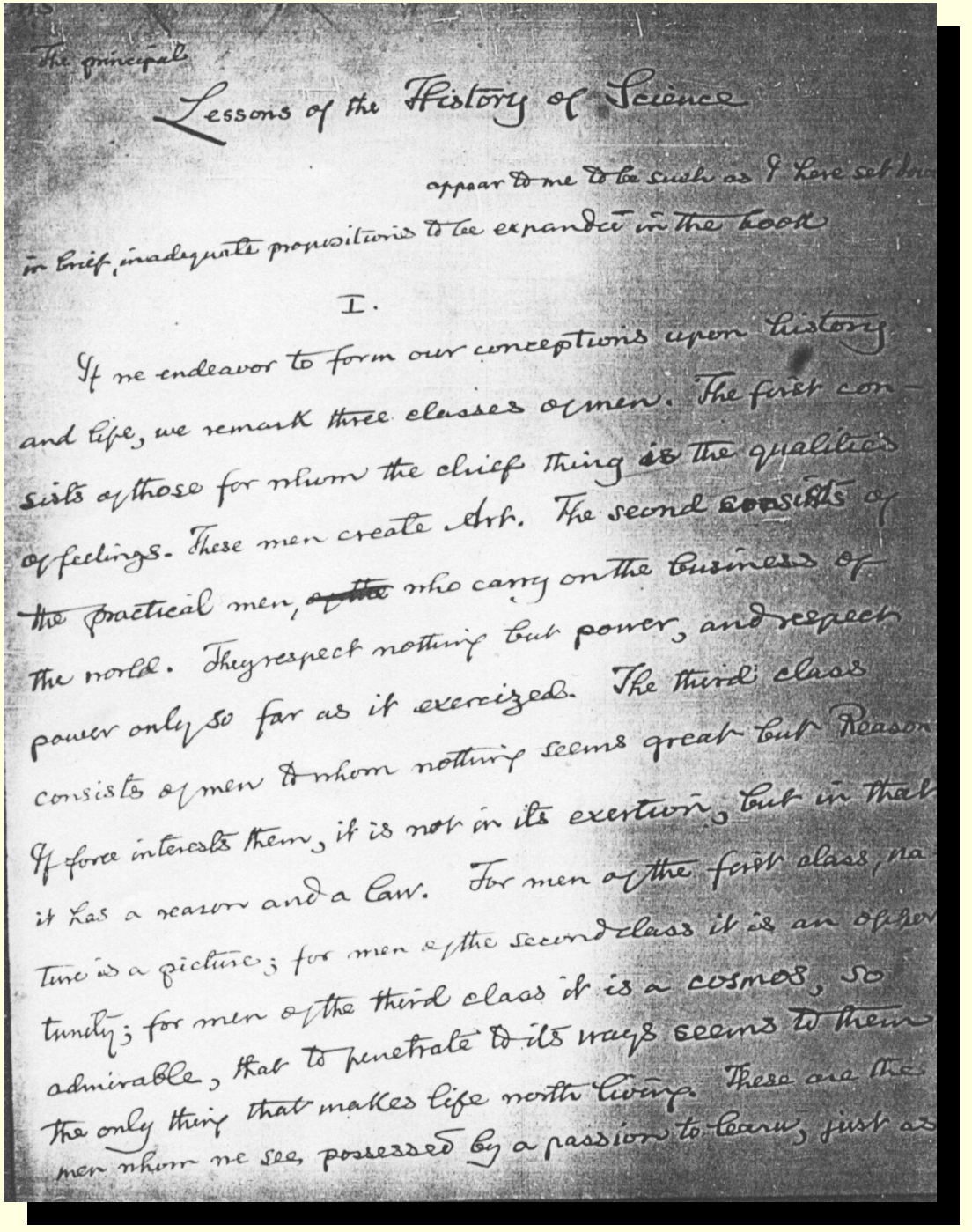
P 13: North American Review 98 (*April 1864*):342–69

1. *Lectures on the English Language*. By George P. Marsh. First Series. New York. 1862. Lecture XXII. "Orthoepical Change in English."
2. *The Works of William Shakespeare, &c.* By Richard Grant White. Boston. 1861. Appendix: "Memorandums of English Pronunciation in the Elizabethan Era."
3. *The English of Shakespeare illustrated in a Philological Commentary on his Julius Cæsar*. By George L. Craik. London. 1857.

It has come to pass that in our day we have two separate languages, —English spoken and English printed. The works of some of our authors were composed on paper; when they are read aloud, they sound almost like translations; they may not lack rhythm and euphony, but it is a rhythm and a euphony that the eye can see. Another class, on the other hand, among whom Shakespeare is pre-eminent, can only be quite comprehended, appreciated, and accompanied in the spoken language; the print may give an indication of what that is, but it is only in that that the words breathe and are quick. It cannot, then, be useless to point out precisely how Shakespeare pronounced. It may be a small portion of the commentary upon his works, but no sincere disciple of his will despise labor bestowed even on this small object. And a knowledge of the old pronunciation is not merely a curious thing; it leads to other knowledge, highly important. It suggests many corrections of the text, and renders many previous emendations far less credible. By showing, in many places, puns hitherto unnoticed, it gives us an understanding of lines hitherto unintelligible. Besides this, it helps us in discovering the derivations of words; and finally, it renders clear and indisputable the fact that our forefathers possessed a more rational, though less constraining, system of orthography than our own.

APORTES EN HISTORIA

Estudios sobre historia de la ciencia


The principal

Lessons of the History of Science

appear to me to be such as I here set down

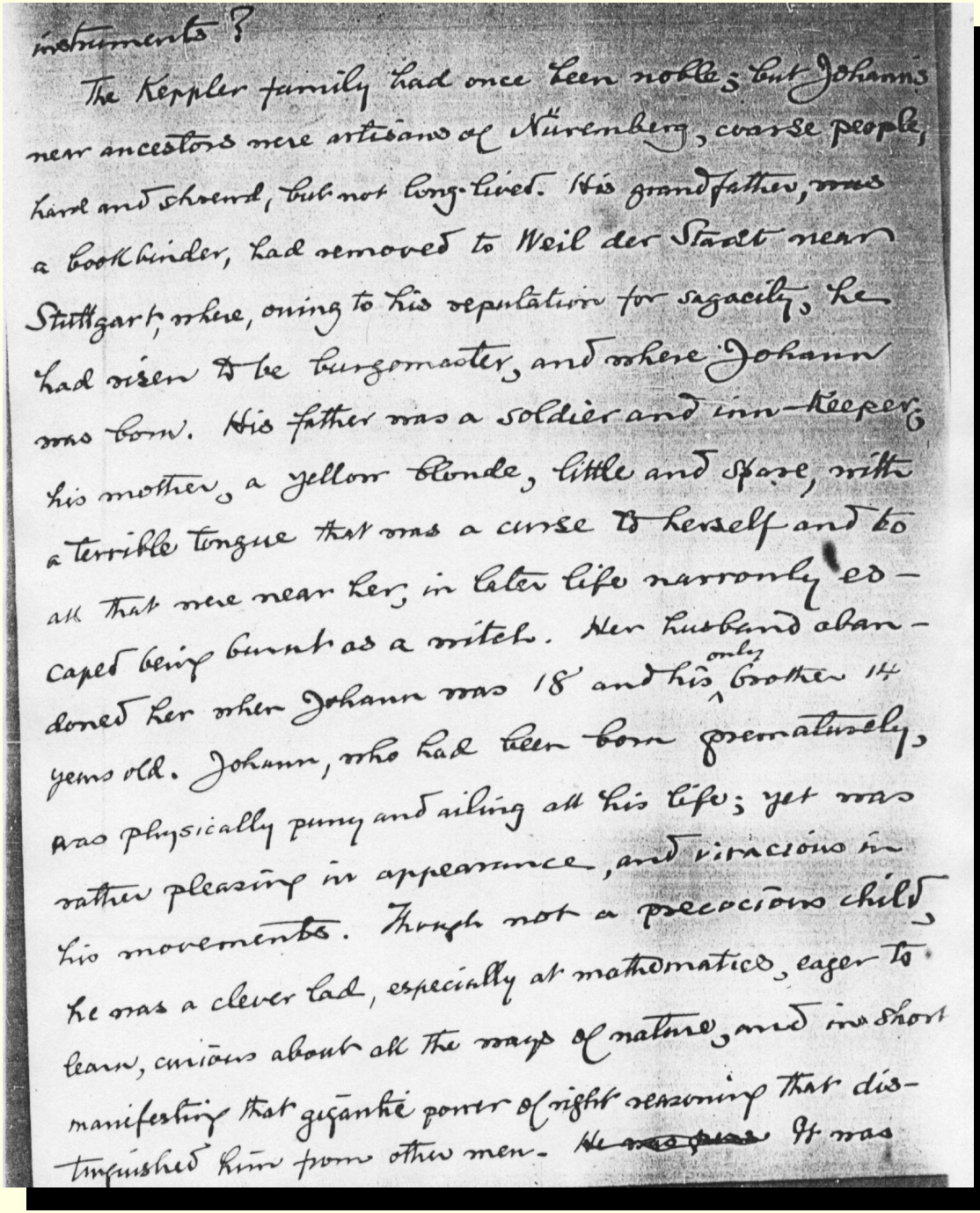
in brief, inadequate propositions to be expanded in the book

I.

If we endeavor to form our conceptions upon history and life, we remark three classes of men. The first consists of those for whom the chief thing is the qualities of feelings. These men create Art. The second consists of the practical men, who carry on the business of the world. They respect nothing but power, and respect power only so far as it exercized. The third class consists of men to whom nothing seems great but Reason. If force interests them, it is not in its exertion, but in that it has a reason and a Law. For men of the first class, nature is a picture; for men of the second class it is an object; for men of the third class it is a cosmos, so admirable, that to penetrate to its ways seems to them the only thing that makes life worth living. These are the men whom we see, possessed by a passion to learn, just as

APORTES EN HISTORIA

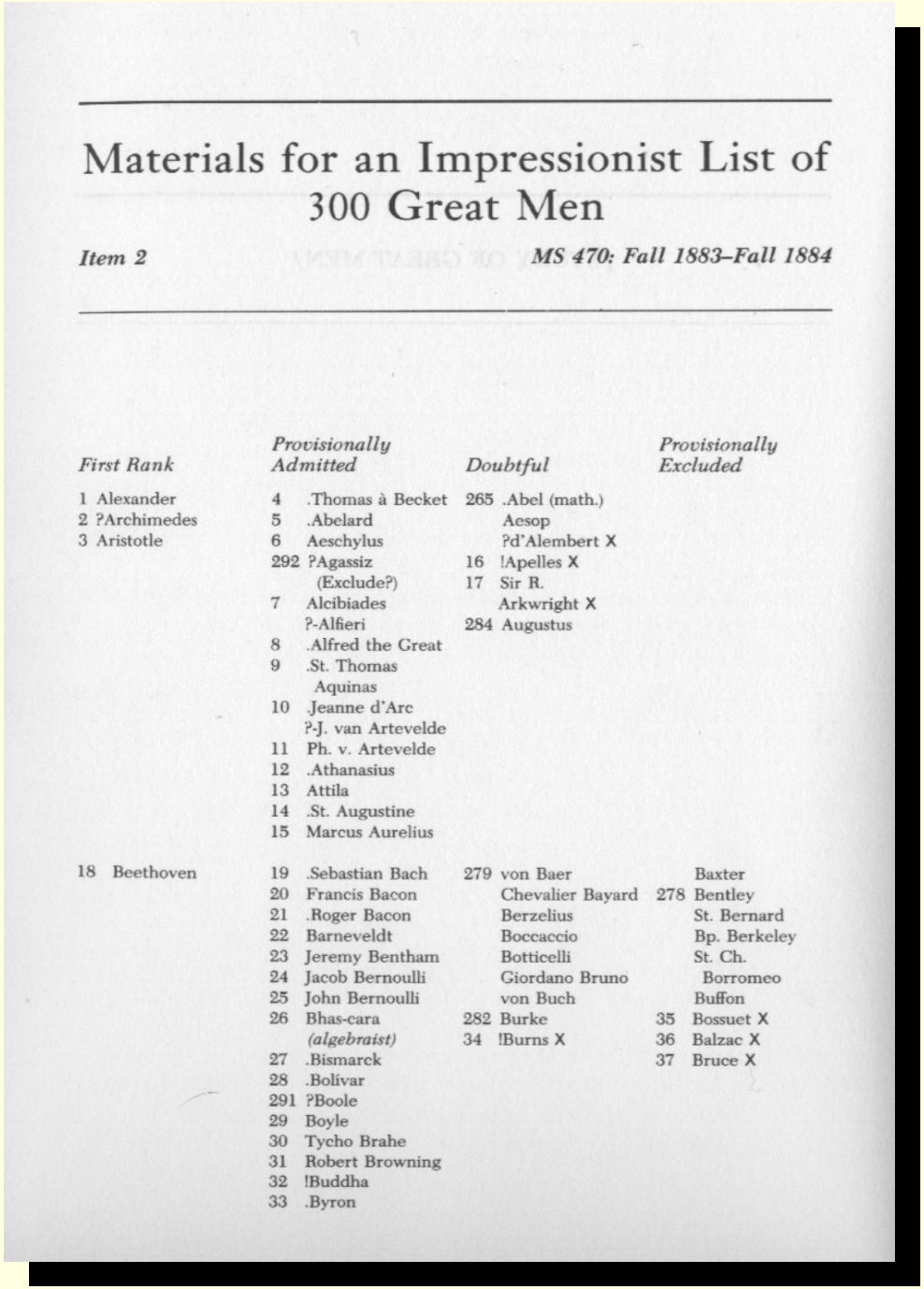
Historia de la astronomía


instruments?

The Keppler family had once been noble; but Johann's near ancestors were artisans of Nürenberg, coarse people, hard and shrewd, but not long-lived. His grandfather, was a bookbinder, had removed to Weil der Stadt near Stuttgart, where, owing to his reputation for sagacity, he had risen to be burgomaster, and where Johann was born. His father was a soldier and inn-keeper, his mother, a yellow blonde, little and spare, with a terrible tongue that was a curse to herself and to all that were near her; in later life narrowly escaped being burnt as a witch. Her husband abandoned her when Johann was 18 and his only brother 14 years old. Johann, who had been born prematurely, was physically puny and ailing all his life; yet was rather pleasing in appearance, and vivacious in his movements. Though not a precocious child, he was a clever lad, especially at mathematics, eager to learn, curious about all the ways of nature, and in short manifesting that gigantic power of right reasoning that distinguished him from other men. He was ~~[illegible]~~ It was

APORTES EN HISTORIA

Estudios sobre biografía comparada.

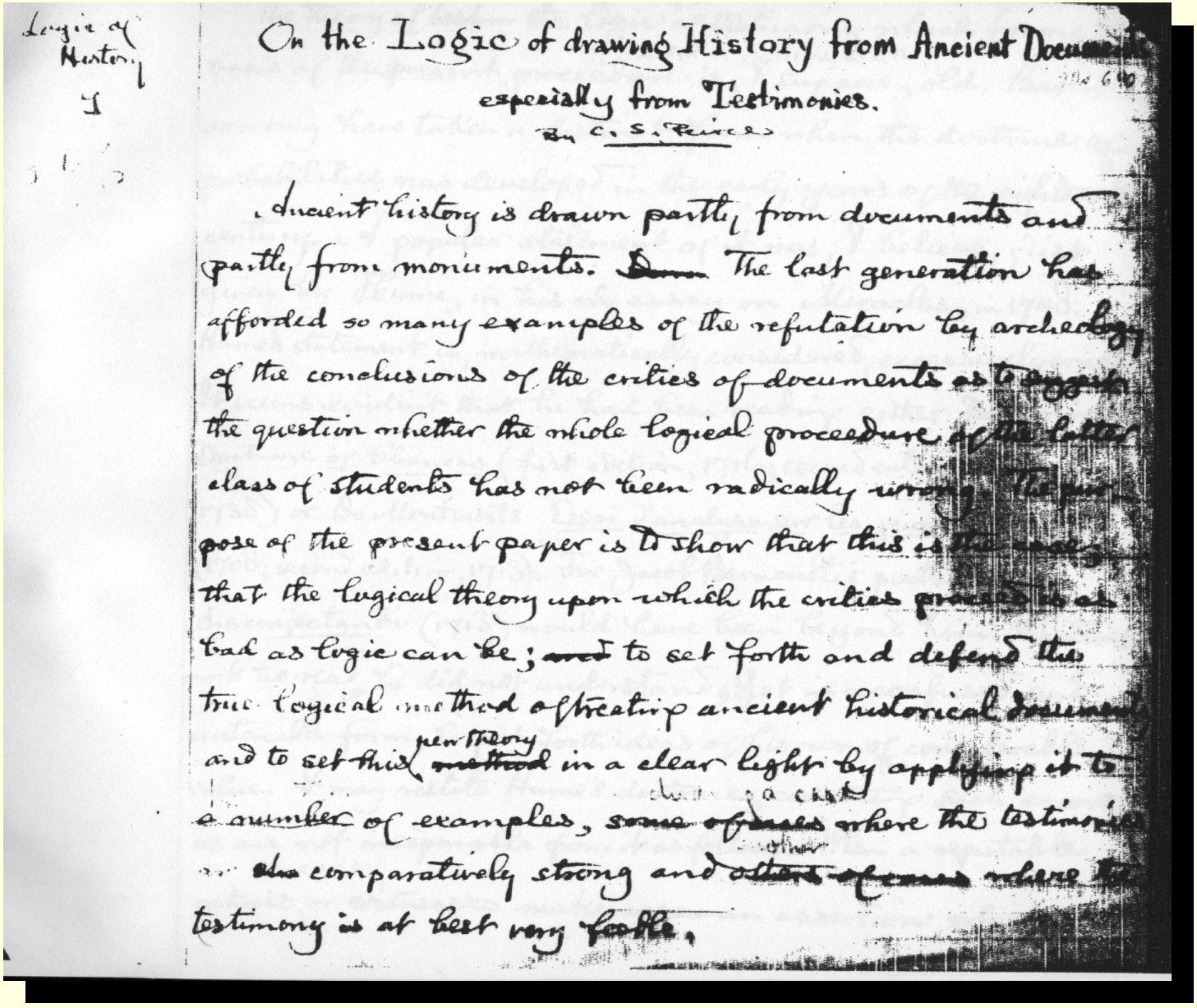


Materials for an Impressionist List of 300 Great Men

Item 2 *MS 470: Fall 1883–Fall 1884*

First Rank	*Provisionally Admitted*	*Doubtful*	*Provisionally Excluded*
1 Alexander	4 .Thomas à Becket	265 .Abel (math.)	
2 ?Archimedes	5 .Abelard	Aesop	
3 Aristotle	6 Aeschylus	?d'Alembert X	
	292 ?Agassiz (Exclude?)	16 !Apelles X	
	7 Alcibiades	17 Sir R. Arkwright X	
	?-Alfieri	284 Augustus	
	8 .Alfred the Great		
	9 .St. Thomas Aquinas		
	10 .Jeanne d'Arc		
	?-J. van Artevelde		
	11 Ph. v. Artevelde		
	12 .Athanasius		
	13 Attila		
	14 .St. Augustine		
	15 Marcus Aurelius		
18 Beethoven	19 .Sebastian Bach	279 von Baer	Baxter
	20 Francis Bacon	Chevalier Bayard	278 Bentley
	21 .Roger Bacon	Berzelius	St. Bernard
	22 Barneveldt	Boccaccio	Bp. Berkeley
	23 Jeremy Bentham	Botticelli	St. Ch. Borromeo
	24 Jacob Bernoulli	Giordano Bruno	Buffon
	25 John Bernoulli	von Buch	35 Bossuet X
	26 Bhas-cara *(algebraist)*	282 Burke	36 Balzac X
	27 .Bismarck	34 !Burns X	37 Bruce X
	28 .Bolívar		
	291 ?Boole		
	29 Boyle		
	30 Tycho Brahe		
	31 Robert Browning		
	32 !Buddha		
	33 .Byron		

APORTES EN HISTORIA



Logic of History I

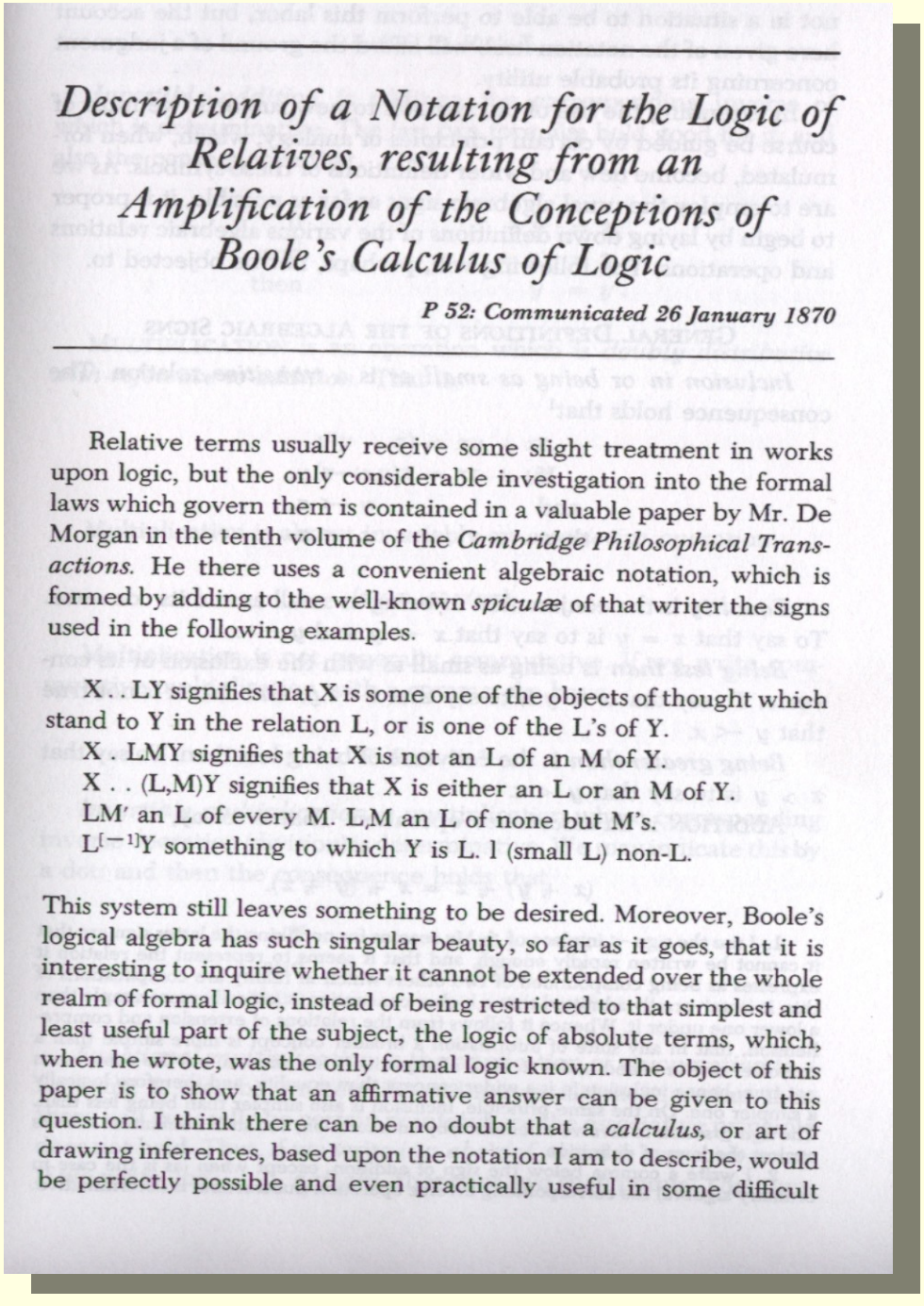
On the Logic of drawing History from Ancient Documents, especially from Testimonies.

By C. S. Peirce

Ancient history is drawn partly from documents and partly from monuments. The last generation has afforded so many examples of the refutation by archeology of the conclusions of the critics of documents as to engage the question whether the whole logical procedure of the latter class of students has not been radically wrong. The purpose of the present paper is to show that this is not so, that the logical theory upon which the critics proceed is as bad as logic can be; and to set forth and defend the true logical method of treating ancient historical documents, and to set this new theory in a clear light by applying it to a number of examples, some of cases where the testimony is comparatively strong and others of cases where the testimony is at best very feeble.

APORTES EN LÓGICA

Lógica de relativos



Description of a Notation for the Logic of Relatives, resulting from an Amplification of the Conceptions of Boole's Calculus of Logic

P 52: Communicated 26 January 1870

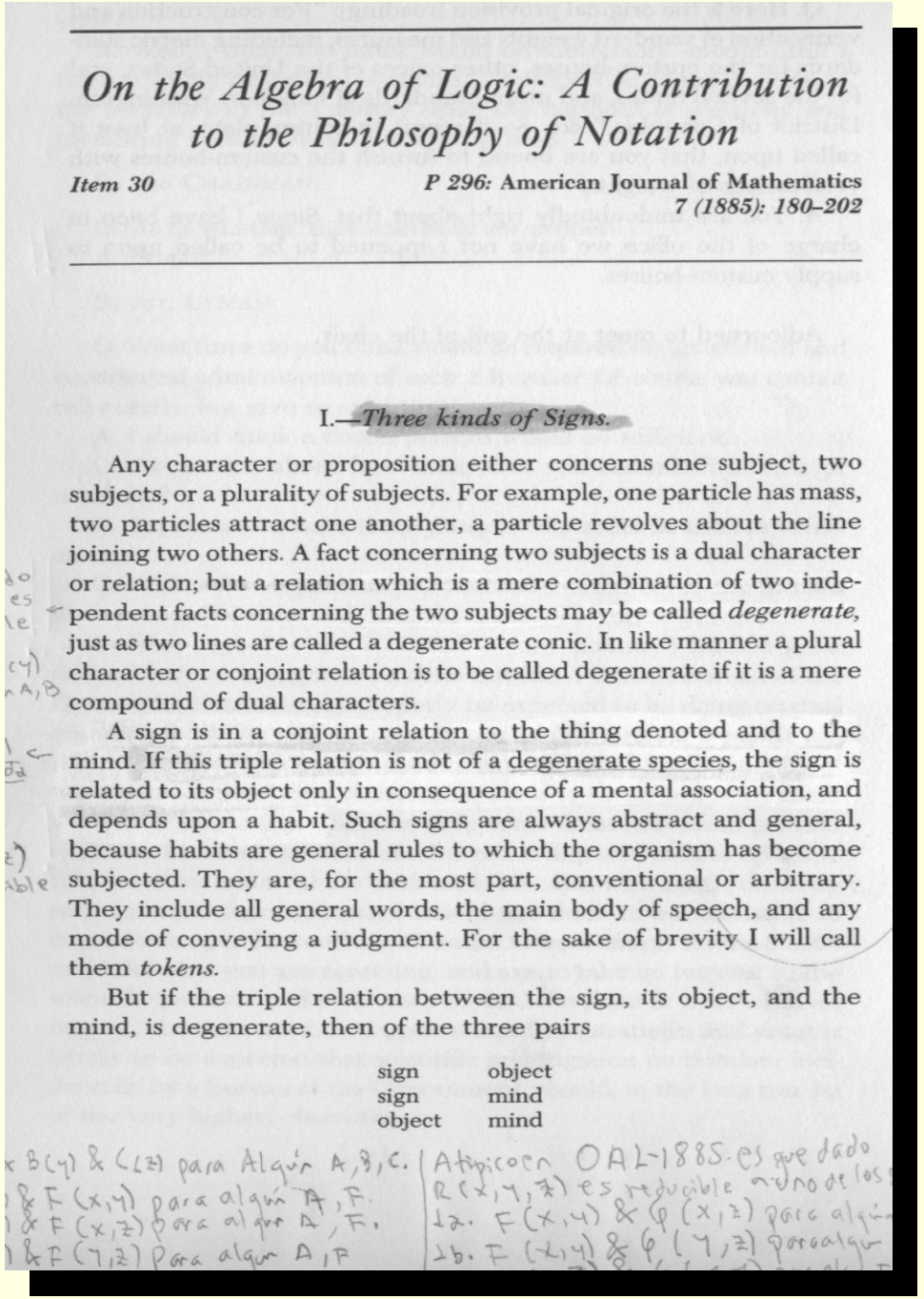
Relative terms usually receive some slight treatment in works upon logic, but the only considerable investigation into the formal laws which govern them is contained in a valuable paper by Mr. De Morgan in the tenth volume of the *Cambridge Philosophical Transactions*. He there uses a convenient algebraic notation, which is formed by adding to the well-known *spiculæ* of that writer the signs used in the following examples.

X . . LY signifies that X is some one of the objects of thought which stand to Y in the relation L, or is one of the L's of Y.
X . LMY signifies that X is not an L of an M of Y.
X . . (L,M)Y signifies that X is either an L or an M of Y.
LM′ an L of every M. L,M an L of none but M's.
$L^{[-1]}$Y something to which Y is L. l (small L) non-L.

This system still leaves something to be desired. Moreover, Boole's logical algebra has such singular beauty, so far as it goes, that it is interesting to inquire whether it cannot be extended over the whole realm of formal logic, instead of being restricted to that simplest and least useful part of the subject, the logic of absolute terms, which, when he wrote, was the only formal logic known. The object of this paper is to show that an affirmative answer can be given to this question. I think there can be no doubt that a *calculus*, or art of drawing inferences, based upon the notation I am to describe, would be perfectly possible and even practically useful in some difficult

APORTES EN LÓGICA

- Cálculo proposicional clásico
- Lógica clásica de primer orden
- Lógica clásica de segundo orden



On the Algebra of Logic: A Contribution to the Philosophy of Notation

Item 30 — *P 296:* American Journal of Mathematics *7 (1885): 180–202*

I.—*Three kinds of Signs.*

Any character or proposition either concerns one subject, two subjects, or a plurality of subjects. For example, one particle has mass, two particles attract one another, a particle revolves about the line joining two others. A fact concerning two subjects is a dual character or relation; but a relation which is a mere combination of two independent facts concerning the two subjects may be called *degenerate*, just as two lines are called a degenerate conic. In like manner a plural character or conjoint relation is to be called degenerate if it is a mere compound of dual characters.

A sign is in a conjoint relation to the thing denoted and to the mind. If this triple relation is not of a degenerate species, the sign is related to its object only in consequence of a mental association, and depends upon a habit. Such signs are always abstract and general, because habits are general rules to which the organism has become subjected. They are, for the most part, conventional or arbitrary. They include all general words, the main body of speech, and any mode of conveying a judgment. For the sake of brevity I will call them *tokens*.

But if the triple relation between the sign, its object, and the mind, is degenerate, then of the three pairs

sign	object
sign	mind
object	mind

APORTES EN LÓGICA
Notación icónica

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
F	F	F	F	T	T	T	T	F	F	F	F	T	T	T	T
F	F	F	T	F	T	F	F	T	T	F	T	F	T	T	T
F	F	T	F	F	F	T	F	T	F	T	T	T	F	T	T
F	T	F	F	F	F	F	T	F	T	T	T	T	T	F	T

(a)

(b)

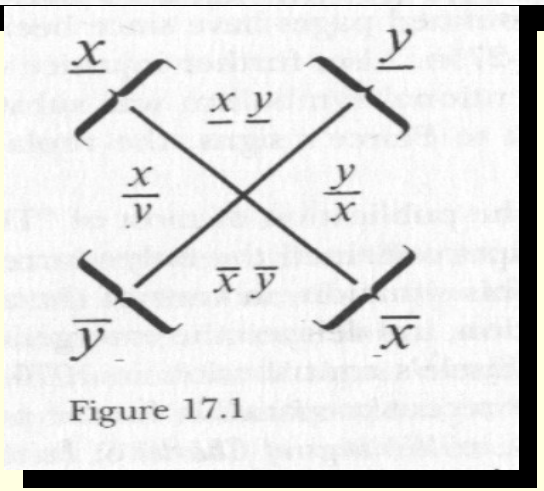
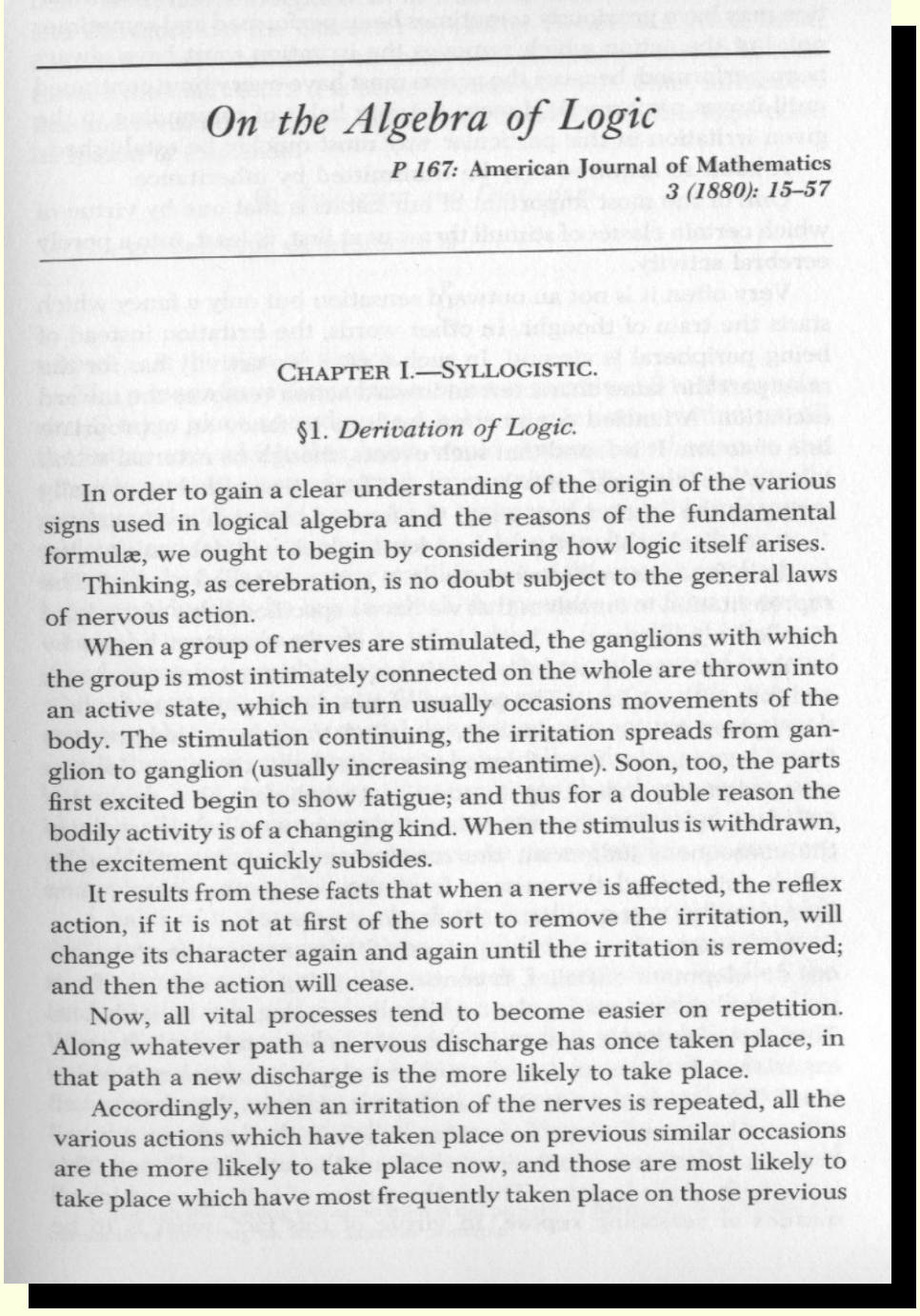


Figure 17.1

APORTES EN LÓGICA

Definición de conjunción y disyunción lógicas.

Funtor de Peirce



On the Algebra of Logic

P 167: American Journal of Mathematics
3 (1880): 15–57

CHAPTER I.—SYLLOGISTIC.

§1. *Derivation of Logic.*

In order to gain a clear understanding of the origin of the various signs used in logical algebra and the reasons of the fundamental formulæ, we ought to begin by considering how logic itself arises.

Thinking, as cerebration, is no doubt subject to the general laws of nervous action.

When a group of nerves are stimulated, the ganglions with which the group is most intimately connected on the whole are thrown into an active state, which in turn usually occasions movements of the body. The stimulation continuing, the irritation spreads from ganglion to ganglion (usually increasing meantime). Soon, too, the parts first excited begin to show fatigue; and thus for a double reason the bodily activity is of a changing kind. When the stimulus is withdrawn, the excitement quickly subsides.

It results from these facts that when a nerve is affected, the reflex action, if it is not at first of the sort to remove the irritation, will change its character again and again until the irritation is removed; and then the action will cease.

Now, all vital processes tend to become easier on repetition. Along whatever path a nervous discharge has once taken place, in that path a new discharge is the more likely to take place.

Accordingly, when an irritation of the nerves is repeated, all the various actions which have taken place on previous similar occasions are the more likely to take place now, and those are most likely to take place which have most frequently taken place on those previous

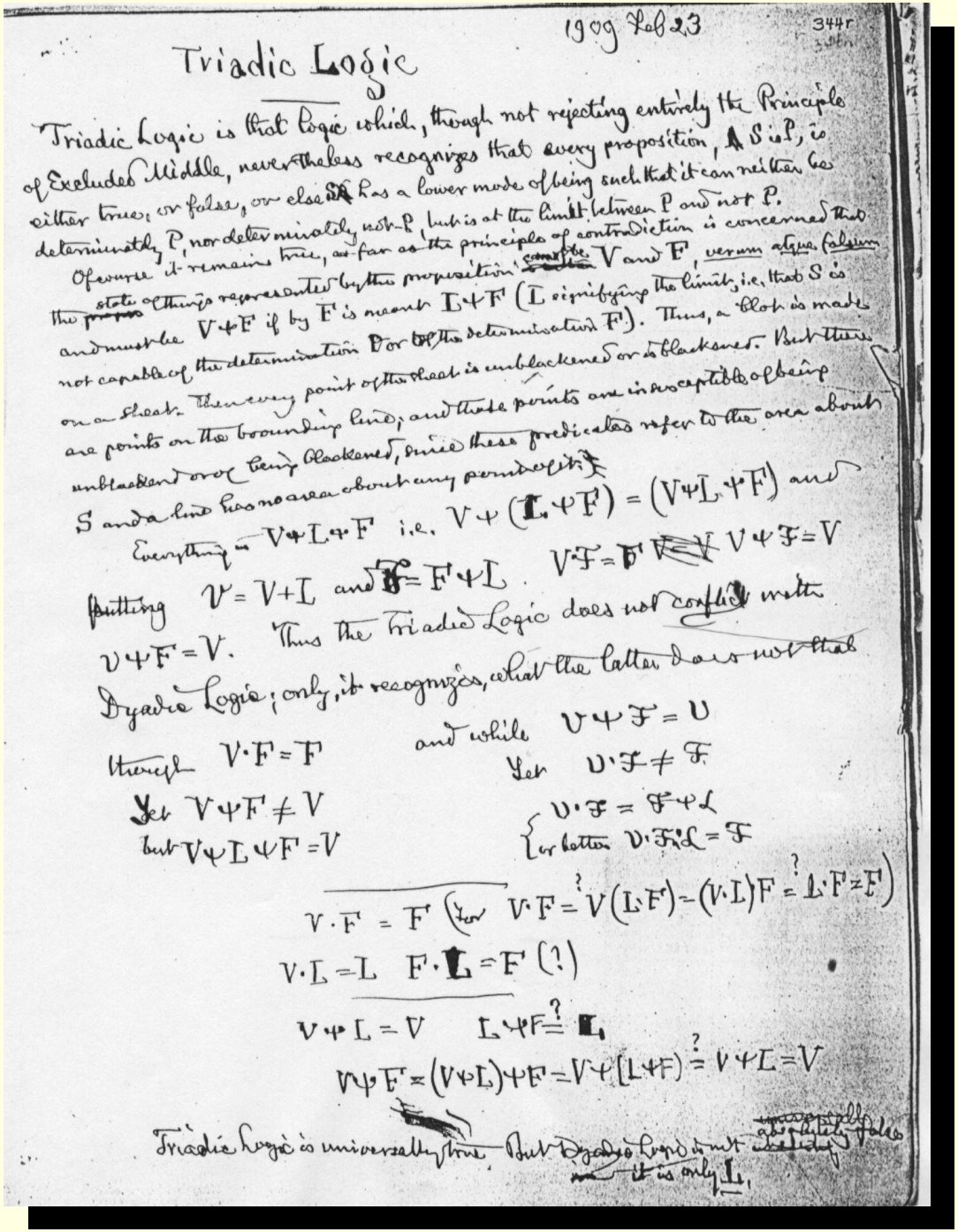
APORTES EN LÓGICA

Lógicas alternativas

(1909)

Negación intuicionista

(1880)

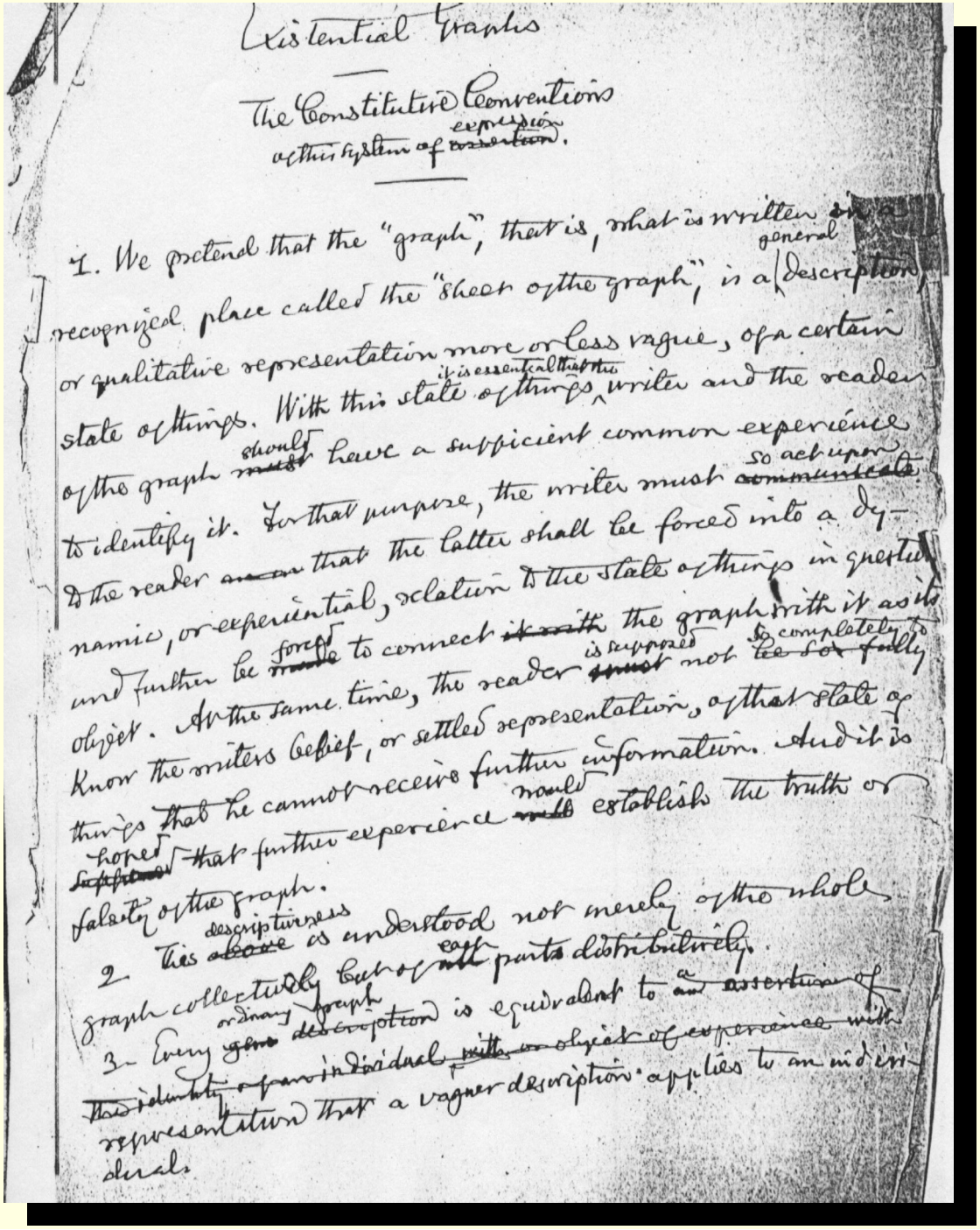


APORTES EN LÓGICA

Gráficos existenciales

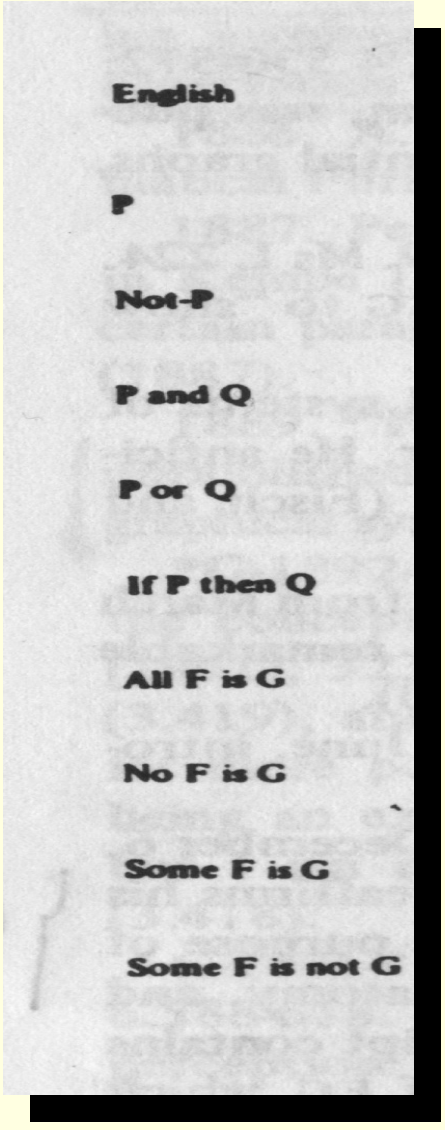
α, β, γ

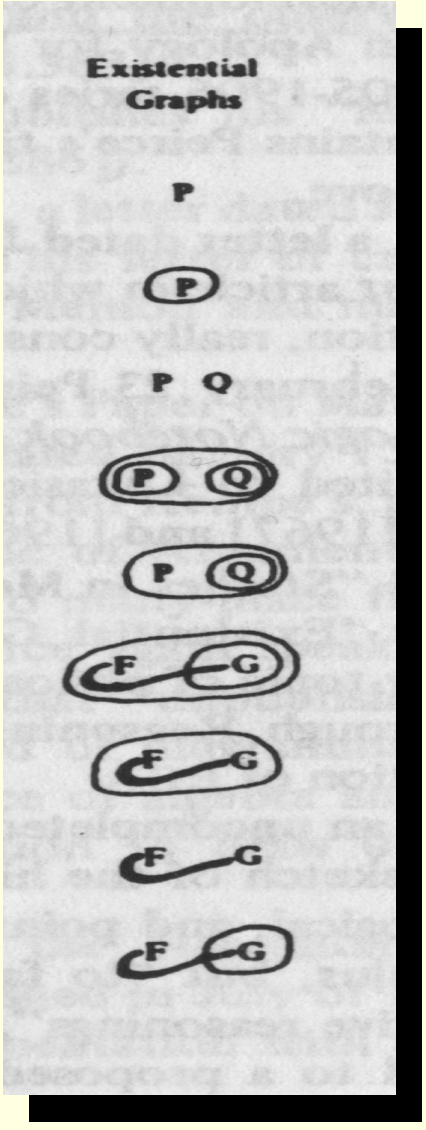
(Primera axiomatización de la lógica clásica)

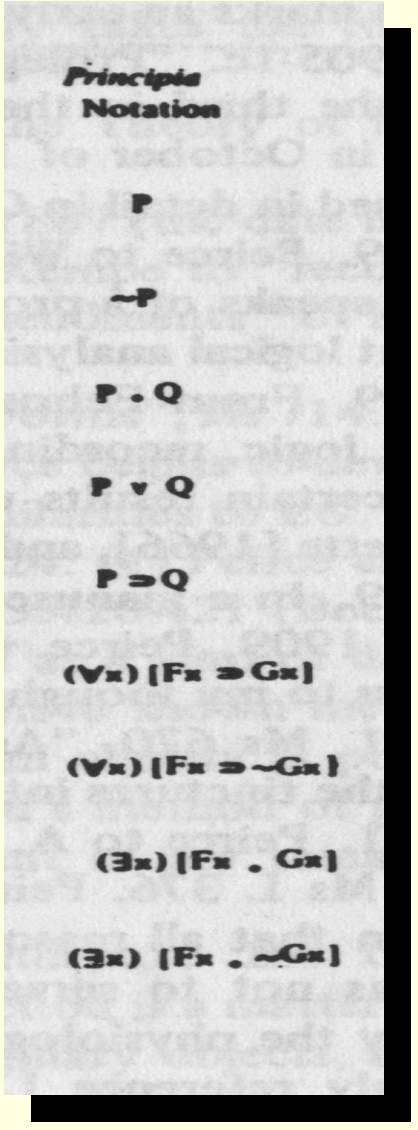


APORTES EN LÓGICA

Gráficos existenciales

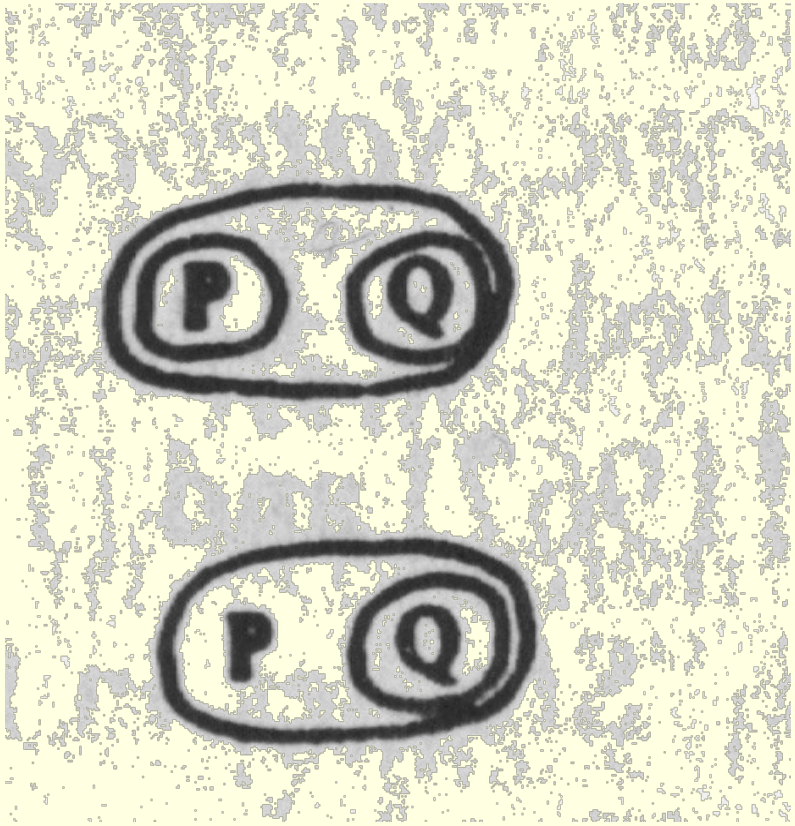






APORTES EN LÓGICA

Gráficos existenciales



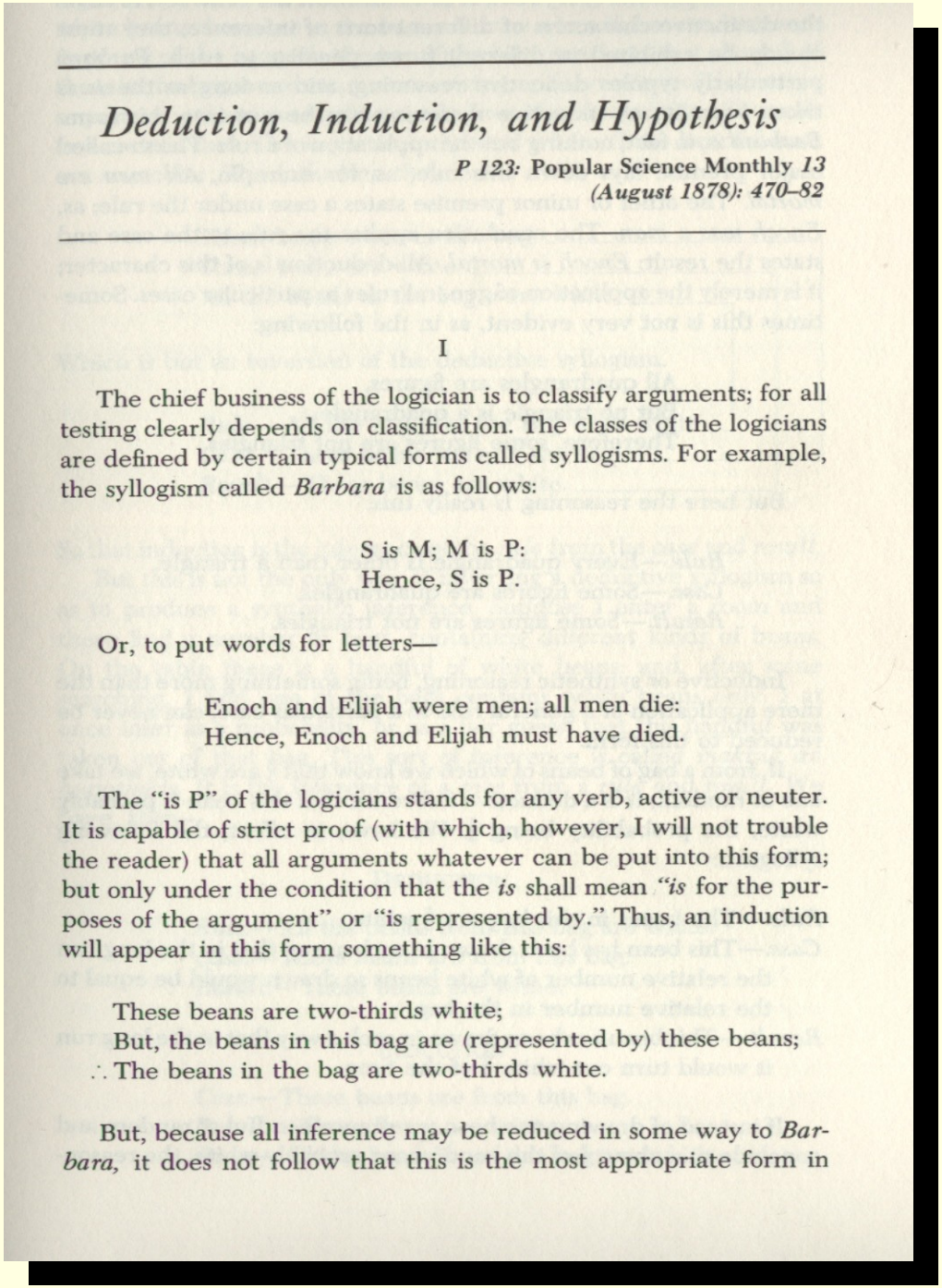
$$p \vee q \equiv \neg(\neg p \wedge \neg q)$$

$$\neg(p \wedge \neg q) \equiv \neg p \vee q$$

APORTES EN LÓGICA

Lógica de la abducción

(Único tipo de inferencia que permite introducir ideas nuevas, considerada por algunos el principal problema de la epistemología contemporánea)



Deduction, Induction, and Hypothesis

P 123: **Popular Science Monthly** *13 (August 1878): 470–82*

I

The chief business of the logician is to classify arguments; for all testing clearly depends on classification. The classes of the logicians are defined by certain typical forms called syllogisms. For example, the syllogism called *Barbara* is as follows:

S is M; M is P:
Hence, S is P.

Or, to put words for letters—

Enoch and Elijah were men; all men die:
Hence, Enoch and Elijah must have died.

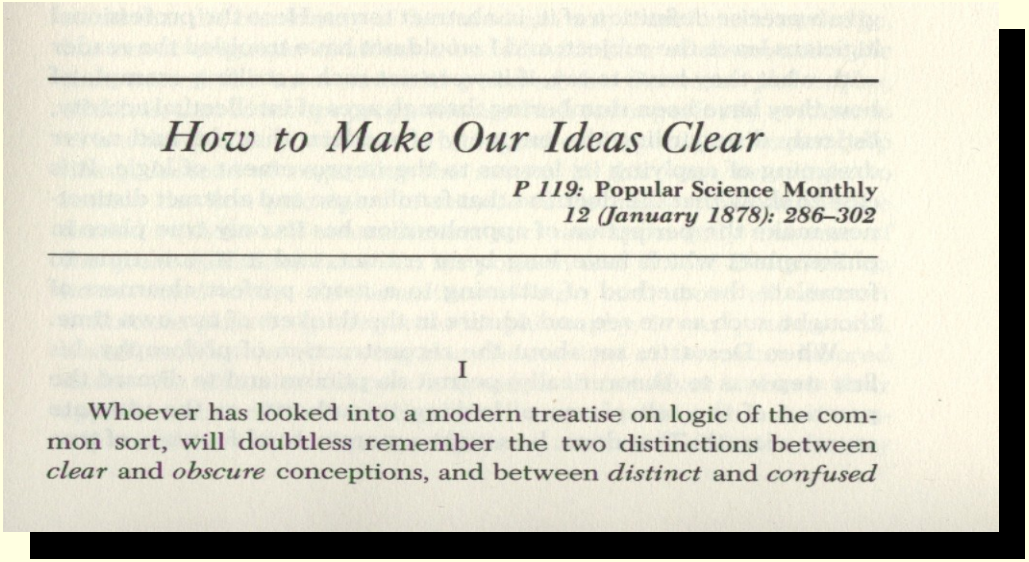
The "is P" of the logicians stands for any verb, active or neuter. It is capable of strict proof (with which, however, I will not trouble the reader) that all arguments whatever can be put into this form; but only under the condition that the *is* shall mean *"is* for the purposes of the argument" or "is represented by." Thus, an induction will appear in this form something like this:

These beans are two-thirds white;
But, the beans in this bag are (represented by) these beans;
∴ The beans in the bag are two-thirds white.

But, because all inference may be reduced in some way to *Barbara,* it does not follow that this is the most appropriate form in

APORTES EN FILOSOFÍA

Pragmatismo

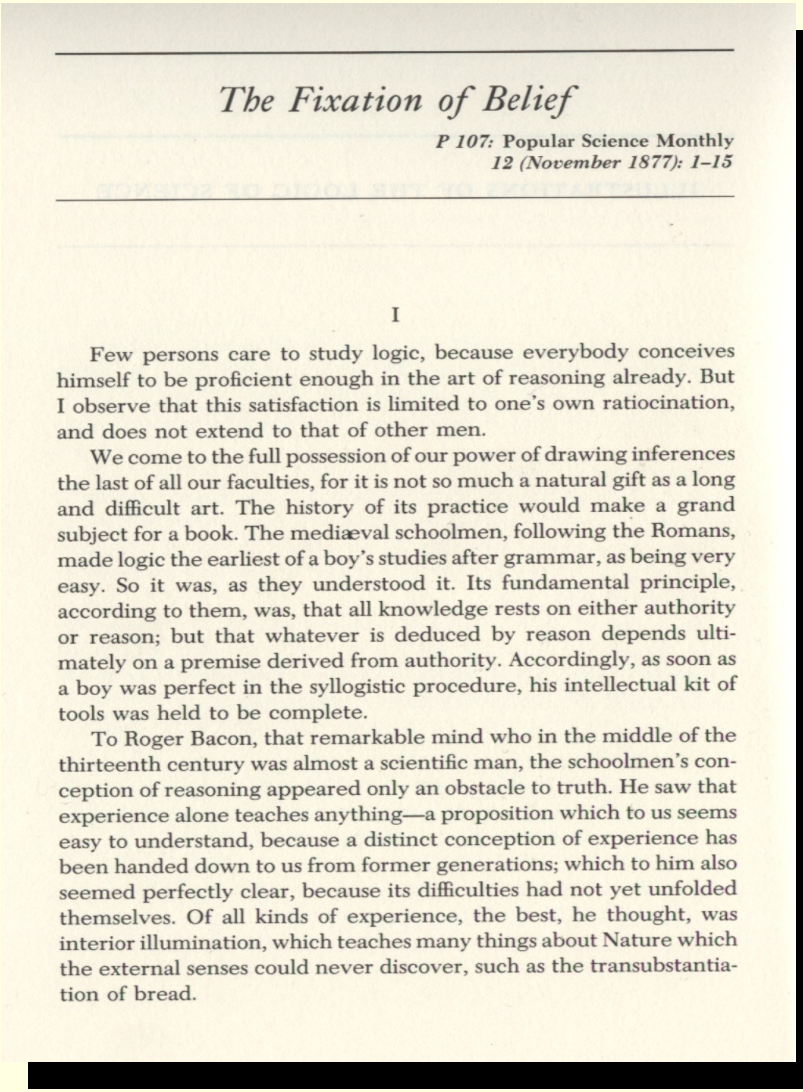


How to Make Our Ideas Clear

P 119: **Popular Science Monthly**
12 (January 1878): 286–302

I

Whoever has looked into a modern treatise on logic of the common sort, will doubtless remember the two distinctions between *clear* and *obscure* conceptions, and between *distinct* and *confused*



The Fixation of Belief

P 107: **Popular Science Monthly**
12 (November 1877): 1–15

I

Few persons care to study logic, because everybody conceives himself to be proficient enough in the art of reasoning already. But I observe that this satisfaction is limited to one's own ratiocination, and does not extend to that of other men.

We come to the full possession of our power of drawing inferences the last of all our faculties, for it is not so much a natural gift as a long and difficult art. The history of its practice would make a grand subject for a book. The mediæval schoolmen, following the Romans, made logic the earliest of a boy's studies after grammar, as being very easy. So it was, as they understood it. Its fundamental principle, according to them, was, that all knowledge rests on either authority or reason; but that whatever is deduced by reason depends ultimately on a premise derived from authority. Accordingly, as soon as a boy was perfect in the syllogistic procedure, his intellectual kit of tools was held to be complete.

To Roger Bacon, that remarkable mind who in the middle of the thirteenth century was almost a scientific man, the schoolmen's conception of reasoning appeared only an obstacle to truth. He saw that experience alone teaches anything—a proposition which to us seems easy to understand, because a distinct conception of experience has been handed down to us from former generations; which to him also seemed perfectly clear, because its difficulties had not yet unfolded themselves. Of all kinds of experience, the best, he thought, was interior illumination, which teaches many things about Nature which the external senses could never discover, such as the transubstantiation of bread.

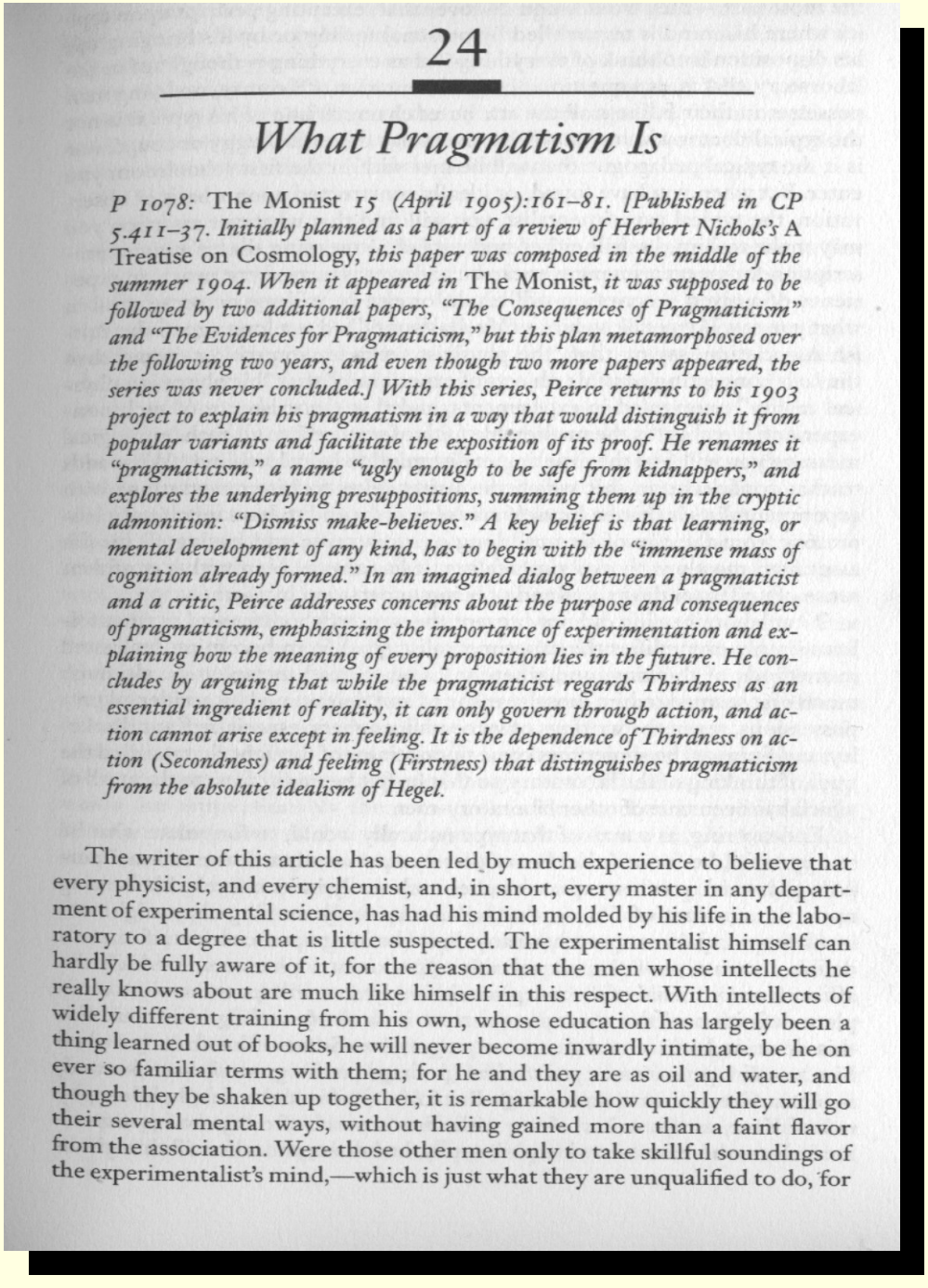
APORTES EN FILOSOFÍA

Máxima pragmática

"Consideremos qué efectos, que puedan tener concebiblemente repercusiones prácticas, concebimos que tiene el objeto de nuestra concepción. Entonces, nuestra concepción de esos efectos es, pues, el todo de nuestra concepción del objeto" (CP, 5.402; W3: 266; EP1: 132, 1878a).

APORTES EN FILOSOFÍA

Pragmatismo



24

What Pragmatism Is

P 1078: The Monist *15 (April 1905):161–81. [Published in CP 5.411–37. Initially planned as a part of a review of Herbert Nichols's* A Treatise on Cosmology, *this paper was composed in the middle of the summer 1904. When it appeared in* The Monist, *it was supposed to be followed by two additional papers, "The Consequences of Pragmaticism" and "The Evidences for Pragmaticism," but this plan metamorphosed over the following two years, and even though two more papers appeared, the series was never concluded.] With this series, Peirce returns to his 1903 project to explain his pragmatism in a way that would distinguish it from popular variants and facilitate the exposition of its proof. He renames it "pragmaticism," a name "ugly enough to be safe from kidnappers," and explores the underlying presuppositions, summing them up in the cryptic admonition: "Dismiss make-believes." A key belief is that learning, or mental development of any kind, has to begin with the "immense mass of cognition already formed." In an imagined dialog between a pragmaticist and a critic, Peirce addresses concerns about the purpose and consequences of pragmaticism, emphasizing the importance of experimentation and explaining how the meaning of every proposition lies in the future. He concludes by arguing that while the pragmaticist regards Thirdness as an essential ingredient of reality, it can only govern through action, and action cannot arise except in feeling. It is the dependence of Thirdness on action (Secondness) and feeling (Firstness) that distinguishes pragmaticism from the absolute idealism of Hegel.*

The writer of this article has been led by much experience to believe that every physicist, and every chemist, and, in short, every master in any department of experimental science, has had his mind molded by his life in the laboratory to a degree that is little suspected. The experimentalist himself can hardly be fully aware of it, for the reason that the men whose intellects he really knows about are much like himself in this respect. With intellects of widely different training from his own, whose education has largely been a thing learned out of books, he will never become inwardly intimate, be he on ever so familiar terms with them; for he and they are as oil and water, and though they be shaken up together, it is remarkable how quickly they will go their several mental ways, without having gained more than a faint flavor from the association. Were those other men only to take skillful soundings of the experimentalist's mind,—which is just what they are unqualified to do, for

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On a New List of Categories

P 32: Presented 14 May 1867

§1. This paper is based upon the theory already established, that the function of conceptions is to reduce the manifold of sensuous impressions to unity, and that the validity of a conception consists in the impossibility of reducing the content of consciousness to unity without the introduction of it.

§2. This theory gives rise to a conception of gradation among those conceptions which are universal. For one such conception may unite the manifold of sense and yet another may be required to unite the conception and the manifold to which it is applied; and so on.

§3. That universal conception which is nearest to sense is that of *the present, in general.* This is a conception, because it is universal. But as the act of *attention* has no connotation at all, but is the pure denotative power of the mind, that is to say, the power which directs the mind to an object, in contradistinction to the power of thinking any predicate of that object,—so the conception of *what is present in general,* which is nothing but the general recognition of what is contained in attention, has no connotation, and therefore no proper unity. This conception of the present in general, or IT in general, is rendered in philosophical language by the word "substance" in one of its meanings. Before any comparison or discrimination can be made between what is present, what is present must have been recognized as such, as *it,* and subsequently the metaphysical parts which are recognized by abstraction are attributed to this *it,* but the *it* cannot itself be made a predicate. This *it* is thus neither predicated of a subject, nor in a subject, and accordingly is identical with the conception of substance.

§4. The unity to which the understanding reduces impressions is the unity of a proposition. This unity consists in the connection of the predicate with the subject; and, therefore, that which is implied in the copula, or the conception of *being,* is that which completes the

One, Two, Three: Fundamental Categories of Thought and of Nature

Item 35 ***MS 546: Summer–Fall 1885***

Kant, the king of modern thought, it was who first remarked the frequency in logical analytics of *trichotomies* or three-fold distinctions. It really is so; I have tried hard and long to persuade myself that it is only fanciful, but the facts will not countenance that way of disposing of the phenomenon. Take any ordinary syllogism:

All men are mortal,
Elijah was a man;
Therefore, Elijah was mortal.

There are here three propositions, namely, two premises and a conclusion; there are also three terms, *man, mortal,* and *Elijah.* If we transpose one of the premises with the conclusion, denying both, we obtain what are called the indirect figures of syllogism; for example

All men are mortal,
But Elijah was not mortal;
Therefore, Elijah was not a man.

Elijah was not mortal,
But Elijah was a man;
Therefore, some men are not mortal.

Thus, there are three figures of ordinary syllogism. It is true there are other modes of inference which do not come under any of these heads; but that does not annul the fact that we have here a trichotomy. Indeed, if we examine by itself what is by some logicians called

APORTES EN FILOSOFÍA

CLASIFICACIÓN DE LAS CIENCIAS

I. LAS CIENCIAS FORMALES (HEURÉTICAS)

I.1. Matemáticas

- I.1.1 Colecciones finitas
- I.1.2 Colecciones infinitas
- I.1.3 Continuo

I.2. Filosofía

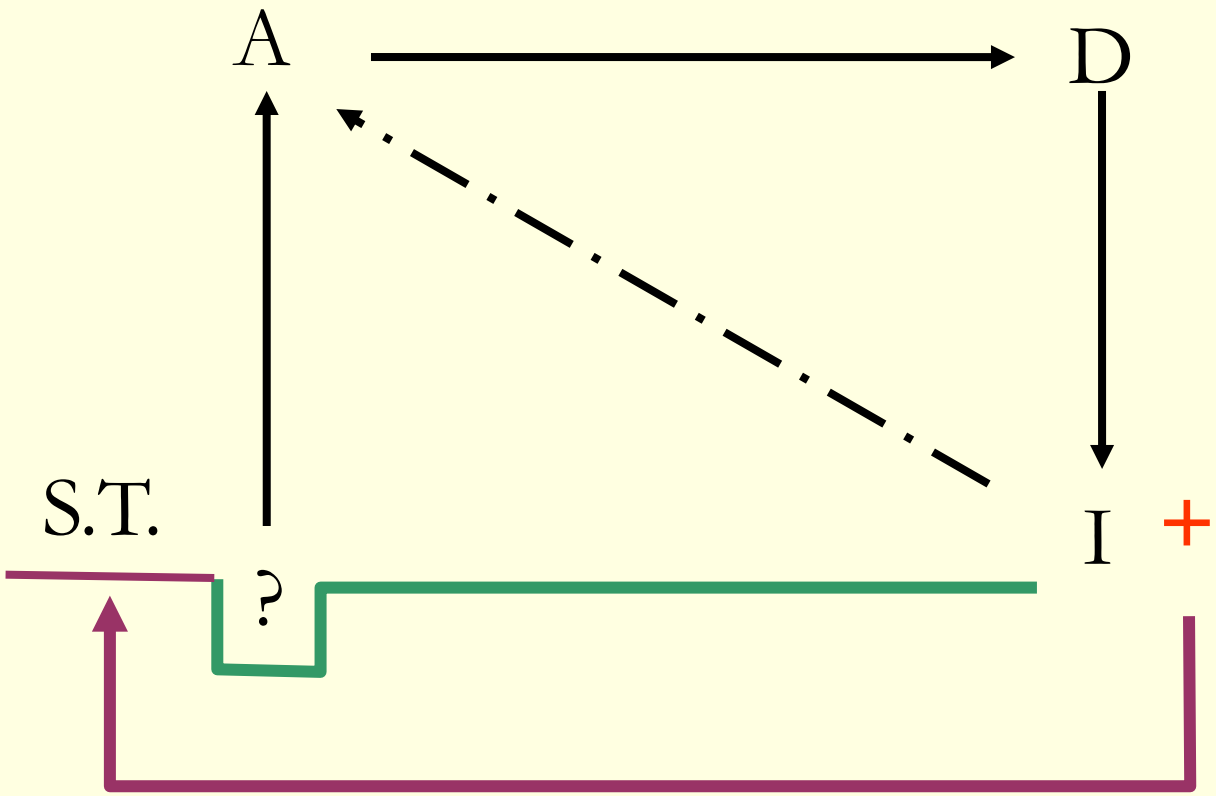
- I.2.1 Fenomenología (Faneroscopía)
- I.2.2 Ciencias normativas
  - I.2.2.1. Estética
  - I.2.2.2. Ética
  - I.2.2.3 **Semeiótica** (Lógica)
    - I.2.2.3.1. Gramática semiótica
    - I.2.2.3.2. Lógica crítica
    - I.2.2.3.3. Retórica universal
- I.2.3 Metafísica
  - I.2.3.1. Ontología
  - I.2.3.2. Metafísica física
  - I.2.3.3. Metafísica religiosa

I.3. Ciencias especiales

FÍSICAS PSÍQUICAS (SOCIALES)

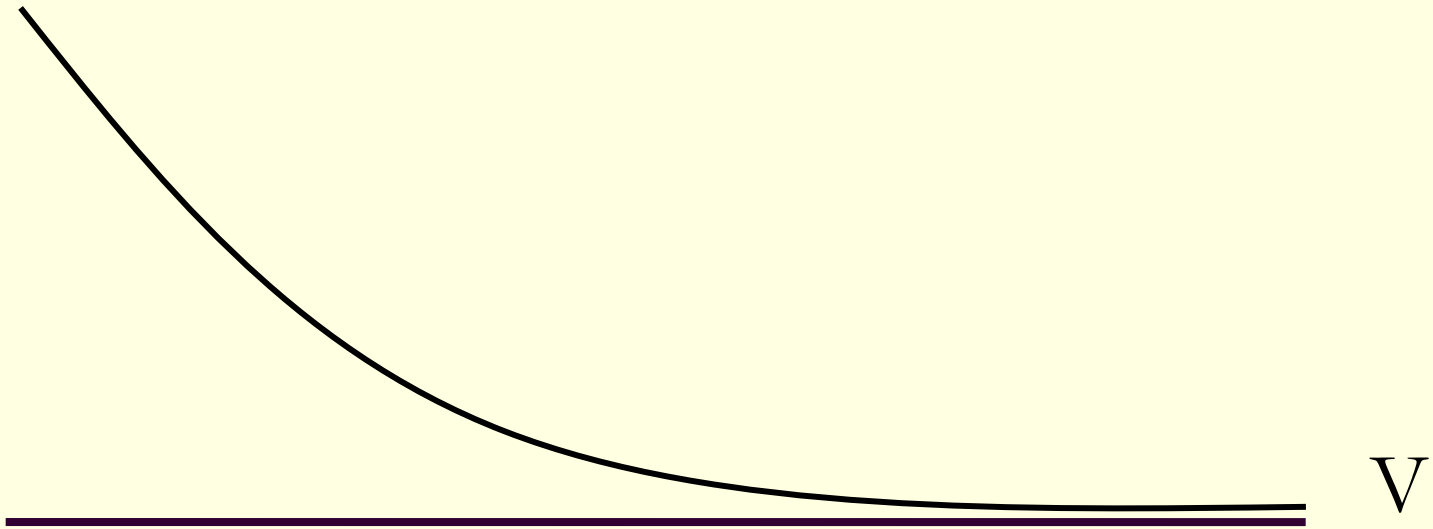
APORTES EN FILOSOFÍA

La lógica crítica como teoría del método científico

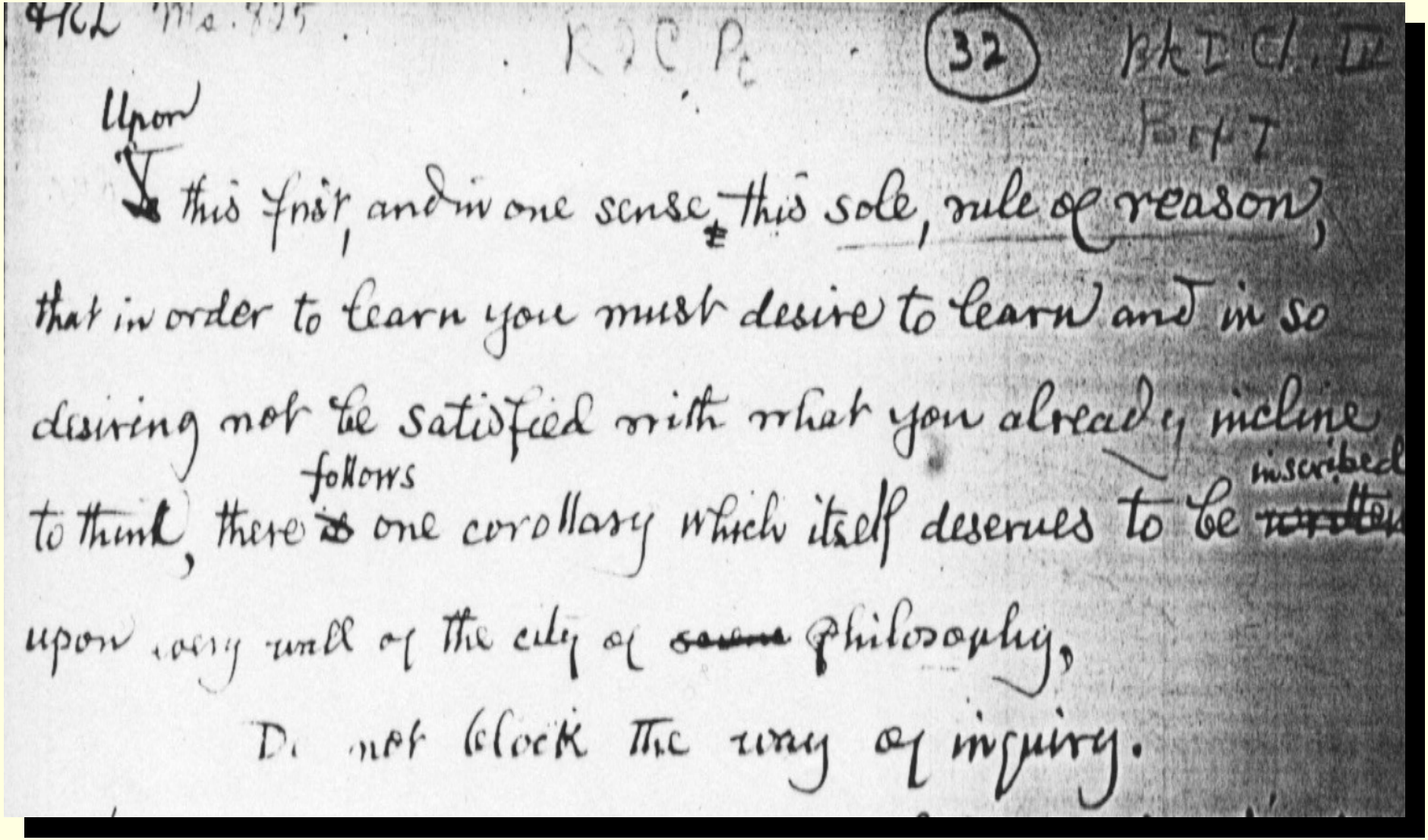


APORTES EN FILOSOFÍA

Teoría del método científico:
Noción normativa de verdad



LA PRIMERA REGLA DE LA RAZÓN



LA PRIMERA REGLA DE LA RAZÓN

De esta primera y, en un sentido, única regla de la razón —es decir, que para aprender debes desear aprender y, deseándolo así, no estar satisfecho con lo que ya estás inclinado a pensar— se sigue un corolario que en sí mismo es digno de ser inscrito en cada pared de la ciudad de la filosofía:

No bloquees el camino de la investigación.

MS 825, 1898

Charles S. Peirce



1839 - 1914