Siméon-Denis Poisson
Mathematics in the service of science

Exhibition in the mathematics and computer science research library
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Cover Illustration:

Portrait of Siméon-Denis Poisson by E. Marcellot, 1804

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SIMÉON-DENIS POISSON
(1781-1840)

It is not too difficult to remember the important dates in Siméon-Denis Poisson's life. He was seventeen in 1798 when he placed first on the entrance examination for the École Polytechnique, which the Revolution had created four years earlier. His subsequent career as a "teacher-scholar" spanned the years 1800-1840. His first publications appeared in the *Journal de l'École polytechnique* in 1801, and he died in 1840. Assistant Professor at the École Polytechnique in 1802, he was named Professor in 1806, and then, in 1809, became a professor at the newly created Faculty of Sciences of the Université de Paris. He was elected to the Académie des Sciences in 1812, and he published during his 40 year career hundreds of essays, extracts of essays, notes, reports, and a dozen books, two of which were soon translated into German and one of them also into English. He played a dominant role in the science of his age, as well as in the administration of public education in France at all levels. Salomon Bochner summarized in 1966 his opinion on Poisson in the following way: "He worked most successfully in virtually all parts of mathematics and mathematical physics. He was probably the greatest French mathematician of the 19th century."

Did Poisson invent the Fourier series? Did Fourier invent the Poisson distribution? Was it Poinsot or Poisson who made progress on the study of the motion of solid bodies? Did Cauchy or Poisson develop integration in complex analysis? Should we attribute the theory of elasticity to Navier, to Cauchy, or to Poisson? Does Poisson or Fresnel deserve the credit for having established the theory of diffraction? Doubtless it is Fresnel. But experts agree that Poisson's equation in electromagnetism was indeed discovered by Poisson. We can verify this in this exhibition by looking at page 463 of his *Mémoire sur la théorie du magnétisme en mouvement* of 1823, where he wrote: "$\Delta V = 0$, $= - 2\kappa\pi$, $= - 4\kappa\pi$, selon que le point M sera situé en dehors, à la surface ou en dedans du volume que l'on considère" (depending on whether point M is located outside, on the surface of, or inside the volume in question). Controversy and disputes over precedence were not the invention of Newton, nor of Leibniz; they persist into our days, and their intensity did not diminish in the 19th century. Poisson was involved in many acrimonious disputes and later accused of having no ideas but "celles des autres" (other people's) – incorrectly, as the present exhibition attempts to demonstrate.

This exhibition, organized by Brigitte Laude, director of the Mathematics and Computer Science Research Library at the Université Pierre et Marie Curie in Paris, with the support of librarians at this university and at the Université Paris-Diderot, as well as that of

numerous librarians and archivists, was designed to show original copies of some of Poisson's publications, chosen from his enormous production. We have sought to display all of the books published by Poisson, most of which would have constituted chapters in a comprehensive *Traité de physique mathématique* (Treatise on Mathematical Physics), a project which he undertook in the 1830's but never completed, as well as several essays representative of the numerous areas in which he had worked. We have preferred to present pages where he demonstrates a result, sometimes buried in a jungle of calculations, which traditionally bears his name. Also gathered in this exhibition are documents from the archives of the life of Citizen Poisson, who became an influential member of the Académie under the Empire, and a baron under the Restoration.

The books exhibited here also illustrate Poisson's scientific influence, the judgments contemporaries made concerning his role in science, and some of the domains of mathematics and physics where his work has been further developed, making his name familiar to all researchers. In particular, his work has been influential in the development of potential theory, as well as in probability and statistics, where "Poisson's law" and the "Poisson processes" play considerable roles, and his work in celestial mechanics has led to a general theory of "Poisson structures," with applications to algebra, geometry, and mechanics, classical and quantum.

The development of Poisson's work from the results he originally established to the form in which we know them now is sometimes difficult to trace, but returning to sources is always an enriching experience. The curators of this exhibition hope that many visitors will have this experience, and that this presentation will play a role in the "rehabilitation" of Poisson as a great mathematician and mathematical physicist.

Yvette Kosmann-Schwarzbach

Paris, 18 March 2014

LIST OF EXHIBITED DOCUMENTS

Poisson counted 11 separately published works in the list of publications that he drew up shortly before his death. This list served to establish the *Catalogue des ouvrages et mémoires scientifiques de Siméon-Denis Poisson* (*Catalogue of works and scientific essays of Siméon-Denis Poisson*) (see no. 11) which was published by Bachelier in 1851, and which would also be published as an appendix to the notice on Poisson written by François Arago that appeared in his Complete Works (see no.32).

Several miscellanies of Poisson's essays have also been created by collectors. Exhibited here are three of the seven volumes of the collection from the library of the physicist Émile Verdet (1824-1866), preserved at the Mathematics and Computer Science library of the École Normale Supérieure. A collection in four volumes, originally in the library of the académicien Jacques Binet (1786-1856), who succeeded Poisson as Professor of Mechanics at the École Polytechnique in 1815, was recently put up for sale. The holdings of the library of the École Polytechnique include several essays of Poisson, published between 1808 and 1834, in bound editions.

SIMÉON-DENIS POISSON'S SEPARATELY PUBLISHED WORKS

1. *Cours de mécanique de la seconde division, comprenant la statique et les premiers principes de la dynamique*, par M. Poisson. École polytechnique, 1809.

***Cours de mécanique de la première division, comprenant la suite de la dynamique, l'hydrostatique et l'hydrodynamique*, par M. Poisson. École polytechnique, 1809.**

[*Course in Mechanics for the second "division", consisting of statics and first principles of dynamics, by M. Poisson*. École Polytechnique, 1809.]

[*Course in Mechanics for the first "division", consisting of the remaining topics in dynamics, hydrostatics, and hydrodynamics, by M. Poisson*. École Polytechnique, 1809.]

Bibliothèque centrale de l'École polytechnique - Centre de Ressources Historiques. Cote Poisson 1809

This textbook derives from the mechanics course that Poisson taught at the École Polytechnique.

Presented here are copies of the title pages of the two volumes of the 1809 textbook.

According to Poisson's "Liste de mes écrits imprimés" (List of my published works), his "Leçons de mécanique" (Lessons in Mechanics), in one volume in 4^{o}, were published at an unspecified date, probably before 1809, but no trace of them has been found at École Polytechnique.

2. *Théorie de la figure de la Terre, tirée des principes de l'hydrostatique*, par Clairaut, de l'Académie des Sciences, et de la Société royale de Londres. Seconde édition. Paris : Courcier, 1808.

[*Theory of the Shape of the Earth, Drawn from the Principles of Hydrostatics*, by Clairaut, of the Academy of Sciences and of the Royal Society of London. Second edition. Paris: Courcier, 1808.]

Bibliothèque de Mathématiques et Informatique de l'École normale supérieure. Cote SMR 41 440

In 1808, Poisson prepared this second edition of Clairaut's treatise, the first edition of which dates from 1743. Poisson inserted a two page preface, unsigned. It figures in Poisson's list as a part of his works.

3. *Traité de mécanique*, par S. D. Poisson, professeur à l'École polytechnique et à la Faculté des Sciences de Paris, et membre-adjoint du Bureau des Longitudes. 2 volumes. Paris : Chez Mme Veuve Courcier, 1811.

[*Treatise of Mechanics*, by S. D. Poisson, Professor at the École Polytechnique and at the Faculté des Sciences de Paris, and Adjunct Member of the Bureau des Longitudes. 2 volumes. Paris: Chez Mme Veuve Courcier, 1811.]

Private collection

This *Traité de mécanique* followed the preliminary *Cours de mécanique* of 1809, which was distributed to the students at the École Polytechnique (see no. 1). This textbook was intensively used until the publication of the second, revised edition in 1833 (see no. 6). In it, Poisson presents statics, followed by dynamics, and finally hydrostatics and hydrodynamics, with "les équations générales du mouvement des fluides" (the general equations of the motion of fluids). Each of the two volumes consists of 500 pages and contains several engraved fold-out plates. Poisson was also named Professor of Rational Mechanics in the Faculté des Sciences de Paris in 1809 and gave his first lecture there on April 29, 1811.He was renowned for the clarity of his teaching.

The copy on display was a prize awarded in 1830 to the student, Chevreul, in the class of "mathématiques spéciales" in the Collège Royal Henri IV. Arago (see no.32) wrote that Poisson, in his role as member, later treasurer of the Council of the University, "avait présidé mainte fois à la distribution des prix du collège Henri IV" (had presided many times

over the distribution of prizes at the collège Henri IV), so one can imagine that this young student received this book from Poisson's own hands.

Nicolai Mikheevitch Arkhangelskii, who held the chair of Theoretical and Applied Mechanics at the University of Kharkov from 1813 to1837, translated the Statics portion of this textbook into Russian. This translation was published by his university in 1816.

4. *Formules relatives aux effets du tir d'un canon sur les différentes parties de son affût et règles pour calculer la grandeur et la durée du recul*, par S. D. Poisson. Paris : Imprimerie de Guiraudet, 1826.

[*Formulæ Concerning the Effects of Firing a Cannon on the Different Parts of its Mount and Rules to Calculate the Size and Duration of the Recoil*, by S. D. Poisson. Paris: Imprimerie de Guiraudet, 1826.]

Bibliothèque centrale de l'École polytechnique - Centre de Ressources Historiques. Cote K 4 B 40 A

This 76 page technical study was intended for artillery officers.

A second edition was published, "conforme à la première, imprimée par ordre de M. le Ministre de la Guerre" (identical to the first, printed by order of the Minister of War), with a slightly different title, *Formules relatives aux effets du tir sur les différentes parties de l'affût,* par S.-D. Poisson. Paris : Bachelier, 1838. (Formulæ concerning the effects of firing on the different parts of the mount, by S.-D. Poisson. Paris: Bachelier, 1838). The title page of this second edition is preceded by the statement: "Cet opuscule manquant dans le commerce, on en a fait une réimpression à laquelle on a joint deux Notes d'un ancien professeur à l'École de Metz." (Since this brochure is no longer available for purchase, it has been reprinted, with two additional notes by a former professor at the School at Metz). These notes were from Guillaume Piobert (1793-1871), a professor at the École Polytechnique and an artillery officer, who would be elected to the Academy of Sciences in 1840 and promoted to the rank of general in 1852.

A copy of the title page of the first edition is displayed.

5. *Nouvelle théorie de l'action capillaire*, par S. D. Poisson. Paris : Bachelier, 1831.

[*New Theory of Capillary Action*, by S. D. Poisson. Paris: Bachelier, 1831.]

Bibliothèque de l'Institut Henri Poincaré. Cote PB 858 9 b

The title page is preceded by a page that bears, in large type: *Traité de physique mathématique* (*Treatise of Mathematical Physics*), which alludes to the great project that Poisson was never able to complete.

This treatise consists of six chapters followed by a chapter of "Notes et additions" (Notes and additions) which concern, among other subjects: the nature of molecular forces, fluid equilibrium equations, and the comparison of the results of the author's analysis with those of Gay-Lussac's experiments. Poisson positions himself as the successor to Clairaut, whose *Théorie de la figure de la Terre* he had edited (see no. 2), to Laplace, author of a theory of capillary action developed and published between 1806 and 1807, and to Thomas Young, who had studied this question since 1805 in England. However, Poisson aises objections to their theories and to the theory that Gauss had just published in1830,which did not take into account "la dilatation du liquide près de sa surface libre et la condensation qui peut être produite par l'attraction du tube" (the expansion of the liquid near its free surface and the contraction that may be produced by the attraction of the tube). He presents a new explanation for capillarity, emphasizing that: "Lors même que la véritable cause des phénomènes est connue, il n'y a que l'analyse mathématique qui puisse découvrir leur liaison réciproque, et les déduire les uns des autres" (Even though the true cause of phenomena may be known, only mathematical analysis can discover their reciprocal relations, and derive one from the others). In the second paragraph of the "Notes et additions," Poisson discusses the mathematical question of the "conversion des sommes en integrals" (conversion of sums into integrals), returning to some of the themes of his *Mémoire sur le calcul numérique des intégrales définies* of 1823, where he had laid out the basis of the computation of definite integrals by approximation (see no. 24).

6. *Traité de mécanique*, par S. D. Poisson, Membre de l'Institut, du Bureau des Longitudes et de l'Université de France […]. Seconde édition, considérablement augmentée. 2 volumes. Paris : Bachelier, 1833.

[*Treatise of Mechanics*, by S. D. Poisson, Member of the Institut, of the Bureau des Longitudes, and of the Université de France […]. Second edition, considerably augmented, 2 volumes. Paris: Bachelier, 1833].

Bibliothèque Mathématiques Informatique Recherche. Cote 84 POI 33/34

Since the edition of 1811, Poisson had completed a great deal of research using mathematical analysis to study physical phenomena (electricity, magnetism, capillarity, elasticity, optics, heat, motion of fluids). In the preface to the second edition, he announced: "Sa destination principale est de servir d'introduction à un *Traité de physique mathématique*, dont la *Nouvelle théorie de l'Action capillaire*, que j'ai publiée il y a un an, est déjà une partie ; les autres parties se composeront des différens [*sic*] Mémoires que j'ai écrits, soit sur l'équilibre et le mouvement des corps élastiques et des fluides, soit sur les fluides impondérables, et que je me propose de réunir et de rendre aussi complets qu'il me sera donné de le faire." (Its principal function is to serve as an introduction to a *Traité de physique mathématique*, of which the *Nouvelle théorie de l'Action capillaire*, which I published a year ago, is already a part. The other parts will be composed of the different essays that I have written, either on the equilibrium and motion of elastic bodies and of

fluids, or on weightless fluids, and which I intend to reunite and complete to the extent that I shall be able to). Poisson died seven years later without having completed his project, but he published the *Théorie mathématique de la chaleur* in 1835 (see no. 7), in which he again asserted that he intended to include it in his grand *Traité*.

This textbook, adapted to the needs of the students at the École Polytechnique, is a new version of the 1811 edition, which Poisson updated to take into account numerous developments over the past twenty years. It is possible to affirm that the modern form of the theory of dynamics of rigid bodies is that which Poisson gave here.

What is to-day called the Fourier inversion formula,which Poisson first used in 1816 in the *Mémoire sur la théorie des ondes* (see no. 18),appears here on p. 653 of the first volume.

The second volume, which “se vend aussi à Londres, chez Ballière” (is also available in London, at the publisher Ballière), concerns dynamics. Poisson follows the method of Lagrange to establish the general equations for the motion of a system of bodies subject to constraints. He wrote: “C’est Lagrange qui a ainsi étendu à tous les problèmes de la Mécanique la méthode de la variation des constantes arbitraires […]. Il restait à trouver les formules inverses qui donnent directement, dans le cas général, les différentielles des inconnues en fonctions linéaires des forces […]. C’est ce qui a été fait dans les mémoires que j’ai insérés, sur ce sujet, dans le 15^{e} cahier du *Journal de l’École polytechnique*, et dans le tome 1er [de la nouvelle série] des *Mémoires de l’Académie des Sciences* […]. Les deux questions principales de l’Astronomie, savoir, la détermination du mouvement des corps célestes, considérés comme des points matériels isolés, et la détermination du mouvement de ces corps autour de leurs centres de gravité respectifs, se trouvent ramenés aux mêmes formules et dépendre de la même analyse” (It was Lagrange who extended the method of the variation of arbitrary constants to all problems in Mechanics […]. It remained only to find the inverse formulæ which give directly, in the general case, the differentials of the unknowns as linear functions of the forces […]. It is what has been done in the essays that I inserted on this subject, in the 15th cahier [volume 8] of the *Journal de l’École Polytechnique*, and in the first volume [of the new series] of the *Mémoires de l’Académie des Sciences* […]. The two principal questions of Astronomy – that is, the determination of the motion of celestial bodies, considered as isolated material points, and the determination of the motion of these bodies around their respective centers of gravity – both are reduced to the same formulæ and depend upon the same analysis, p. 399-400). Poisson makes reference here to his essays of 1809, the second of which contained the direct determination of the parentheses, today called “Poisson brackets” (see nos. 14 and 15).

Book dedicated to M. Dinet (Charles Louis Dinet, 1775-1856, Adjunct Professor of Astronomy at the Faculté des Sciences de Paris, Examiner at the École Polytechnique, known in the history of mathematics for having expressed an unfavorable opinion on the application for admission of Évariste Galois).

This work was translated into German by Moritz A. Stern under the title, Lehrbuch der Mechanik (Berlin: Reimer, 1835-1836). An English translation, accompanied by explanatory notes, was completed by H. H. Harte and published in London by Longman and Co. in 1842, under the title, A Treatise of Mechanics.

7. *Théorie mathématique de la chaleur*, par S.-D. Poisson, membre de l'Institut et du Bureau des longitudes de France. Paris : Bachelier, 1835.

[*Mathematical Theory of Heat*, by S.-D. Poisson, Member of the Institut and of the Bureau des longitudes of France. Paris: Bachelier, 1835.]

Bibliothèque Mathématiques Informatique Recherche. Cote 85 POI 35

This 524-page treatise is followed by three notes and a fold-out plate of engraved figures. On the second page of his preface, Poisson cited Fourier and Laplace. He wrote : “En donnant [à cet ouvrage] le titre de *Théorie mathématique de la chaleur*, j’ai voulu indiquer qu’il s’agira de déduire, par un calcul rigoureux, toutes les conséquences d’une hypothèse générale sur la communication de la chaleur, fondée sur l’expérience et l’analogie” (In giving [this work] the title *Théorie mathématique de la chaleur*, I wanted to indicate that its aim is to deduce, by rigorous calculation, all the consequences of a general hypothesis on the propagation of heat, based on experiment and analogy). This treatise was presented, like the *Nouvelle théorie de l’action capillaire* in 1831 (see no. 5) and the *Traité de mécanique* in 1833 (see no. 6) as part of his future grand Treatise of Mathematical Physics.

This treatise contains the heat equation (formula 8, p. 92) for variable conductivity, as a function of temperature, which Poisson had succeeded in deriving in1823 (see no. 13). Fourier’s “heat equation” then appears as the particular case of this general equation when the conductivity is constant. On page 98, we read, for the first time, the word “conductibilité” (conductibility).

8. *Théorie mathématique de la chaleur ; mémoire et notes formant un supplément à l'ouvrage publié sous ce titre*, par S.-D. Poisson, membre de l'Institut et du Bureau des longitudes de France. Paris : Bachelier, 1837.

[*Mathematical Theory of Heat. Essay and Notes Forming a Supplement to the Work Published under this Title*, by S.-D. Poisson, Member of the Institut and of the Bureau des Longitudes de France. Paris: Bachelier, 1837.]

Bibliothèque Mathématiques Informatique Recherche. Cote 85 POI 37

This small 72-page volume is a supplement to the *Théorie mathématique de la chaleur* (see no. 7). It consists of the “Mémoire sur les températures de la partie solide du globe, de l’atmosphère et du lieu de l’espace où la Terre se trouve actuellement” (Essay on the

temperatures of the solid part of the globe, the atmosphere, and the place in space where the Earth is currently located), read at the Académie des Sciences on January 30, 1837, plus four "Notes relatives au mémoire précédent" (Notes concerning the preceding essay) and one page of "Remarques sur la température désignée par *h* à la page 4 du mémoire" (Remarks on the temperature denoted by *h* on page 4 of the essay).

Poisson refers to Gay-Lussac's aerostatic experiment and to other experimental results that are consistent with his analysis.

The "Mémoire sur les températures de la partie solide du globe" figures separately on Poisson's list with the remark: "avec des notes qui ne sont pas dans le compte rendu [de l'Académie des Sciences]" (with notes that are not in the report [of the Académie des Sciences session]).

9. *Recherches sur la probabilité des jugements en matière criminelle et en matière civile, précédées des règles générales du calcul des probabilités*, par S. D. Poisson. Paris : Bachelier, 1837.

[*Research into the Probability of Judgments in Criminal Matters and in Civil Matters, Preceded by General Rules for Calculating Probabilities*, by S. D. Poisson. Paris: Bachelier, 1837.]

Bibliothèque de Mathématiques et Informatique de l'École normale supérieure. Cote SMR Oe 326

This treatise continues 18th century work on the applications of probability to the reliability of witness testimony and follows several of Poisson's earlier studies on probability and statistics: on the game of trente et quarante in 1820 (see no. 21), on the proportion of births of girls and boys in 1830 (see no. 25), and, in the *Comptes rendus de l'Académie des Sciences* in 1836, three notes on the law of large numbers.

Poisson introduced his work with an appreciation of the role of the calculus of probability: "Il est devenu une des principales branches des mathématiques, soit par le nombre et l'utilité de ses applications, soit par le genre d'analyse auquel il a donné naissance" (It has become one of the principal branches of mathematics, either by the number and usefulness of its applications, or by the type of analysis to which it has given birth) and emphasized the importance of the law of large numbers, "cette loi étant par ailleurs la base de toutes les applications du calcul des probabilités" (this law being moreover the base of all applications of the calculus of probability).

The "Poisson distribution," which had already appeared in his essay of 1830 (see no.25), appears here on page 206.

In the list of his works, Poisson specified: "Il a été tiré des exemplaires à part de l'introduction, différente du préambule inséré dans le n° 20 des Comptes rendus [de

l'Académie des Sciences] de 1835" (Separate copies were printed of the introduction, differing from the preface published in no. 20 of the Comptes rendus [de l'Académie des Sciences] for 1835).

The copy exhibited is bound with the "Mémoire sur le mouvement d'un corps solide" (Essay on the motion of a solid body), published in 1838 in the Mémoires de l'Académie des Sciences, of which an extract had appeared in 1834.

Christian Heinrich Schnuse published a German translation under the title, Lehrbuch der Wahrscheinlichkeitsrechnung und deren wichtigsten Anwendungen (Brunswick, G. C. E. Meyer, 1841).

The book by V. A. Buniakovsky, Основания математической теории вероятностей *(Elements of a Mathematical Theory of Probability), published in Saint Petersburg in 1846, was strongly influenced by Poissson's Recherches.*

An article by Stephen M. Stigler, which appeared in Probability and Statistics Letters in 1982, gives an English translation of pages 189-190 and 205-207 of this book.

In 2013, Oscar B. Sheynin published an English translation, Researches into the Probabilities of Judgements in Criminal and Civil Cases*. Berlin: NG-Verlag, and a translation into Russian*, *И*сследования о вероятности приговоров в уголовных и гражданских делах*. Berlin: NG-Verlag.*

10. *Recherches sur le mouvement des projectiles dans l'air, en ayant égard à leur figure et leur rotation, et à l'influence du mouvement diurne de la Terre*, par S. D. Poisson. Paris : Bachelier, 1839.

[*Research into the Motion of Projectiles in Air, Taking into Account their Shape and their Rotation, and the Influence of the Diurnal Motion of the Earth*, by S. D. Poisson. Paris: Bachelier, 1839.]

Bibliothèque de l'Observatoire de Paris. Cote 1473

The verso of the false title page indicates "Ces *Recherches* se composent de plusieurs Mémoires lus par l'Auteur à l'Académie des Sciences et insérés dans les XXVI^{e} et XXVII^{e} cahiers du *Journal de l'École Polytechnique*" (This *Research* is composed of several Essays read by the Author at the Académie des Sciences and published in the 26th and 27th cahiers of the *Journal de l'École Polytechnique*). This book contains:

"Mémoire sur le mouvement des projectiles dans l'air, en ayant égard à la rotation de la Terre" (Essay on the motion of projectiles in air, taking into account the rotation of the Earth), read on November 14, 1837,

"Mémoire sur le mouvement des projectiles dans l'air, en ayant égard à leur rotation" (Essay on the motion of projectiles in air, taking into account their rotation), read on March 5, 1838,

"Suite du mémoire précédent" [dans lequel on considère l'influence de la non-homogénéité des projectiles sur leur double mouvement de rotation et de translation] (Continuation of the preceding essay [in which we consider the influence of the non-homogeneity of projectiles on their double rotational and translational motion]),

"Addition au § III du mémoire précédent" (Addition to § III of the preceding Essay).

Poisson establishes equations for the translational and rotational motions of a projectile, taking into account air resistance and the effect of the rotation of the Earth, as well as, in the Continuation of the second essay, the possible non-homogeneity of the projectiles. In various cases, he compares the numerical approximations obtained from the equations to the experimental results of several scholars. The theory is applied to the firing of bullets and artillery projectiles. Like elsewhere in his mathematical physics work, Poisson highlights the role of analysis in the solution of technical questions, saying, on the subject of the deviations observed in the motion of artillery projectiles, that "[leurs] effets ne pourraient être déterminés sans le secours de l'analyse" ([their] effects could not be determined without the help of analysis).

11. *Catalogue des ouvrages et mémoires scientifiques de Siméon-Denis Poisson*. Paris : Bachelier, 1851.

[*Catalogue of the Works and Scientific Essays of Siméon-Denis Poisson*. Paris: Bachelier, 1851.]

Bibliothèque de Mathématiqueset Informatique de l'Écolenormale supérieure. Cote SMR Oe 329/1

The title page is followed by the note: "Cette Liste des Travaux scientifiques de Siméon-Denis Poisson rédigée par lui-même, et trouvée dans ses papiers après sa mort, a été jointe à la collection de ses Ouvrages, offerte à la ville de Pithiviers le jour de l'inauguration de la Statue qu'elle lui a fait élever" (This List of the scientific Works of Siméon-Denis Poisson written by himself, and found among his papers after his death, was added to the collection of his Works, presented to the city of Pithiviers on the day of the inauguration of the Statue that they had erected).

The autograph manuscript of this list is currently located in the Bibliothèque de l'Institut in the papers of the astronomer Philippe Gustave le Doulcet, comte de Pontécoulant (1795-1874), in a sub-folder that also contains the invitation letter to this inauguration on June 15, 1851, signed by the mayor of Pithiviers, [Théodore] Defiennes.

SOME OF POISSON'S ESSAYS AND ARTICLES

Poisson wrote several hundred essays and articles, notes, and reports, including the extracts that were often published before or after the long articles. Among the articles that are presented here, besides his first and last publications, are the essays on celestial mechanics, where one finds the "Poisson brackets," on analysis, where one finds the "Poisson kernel," on electromagnetism, where one finds the "Poisson equation," and on elasticity, where one finds "Poisson's ratio." Poisson's polemics with his contemporaries are also recalled.

12. « Mémoire sur l'élimination dans les équations algébriques », *Journal de l'École polytechnique*, 11^{e} cahier, 4 (1801- 1802), p. 199-203.

["Essay on elimination in algebraic equations," *Journal de l'École polytechnique,* 11th cahier, 4 (1801-1802), p. 199-203.]

Bibliothèque Mathématiques Informatique Recherche. Cote J 85

This volume of the *Journal de l'École polytechnique*containsthe "Application d'algèbre à la géométrie" (Application of algebra to geometry) byGaspard Monge and Jean Nicolas Pierre Hachette, who were professors at the École Polytechnique, followed by an "Addition au mémoire précédent" (Addition to the preceding Essay), signed by Hachette and Poisson. This "Addition," containing a proof of the classification of quadrics, is Poisson's first publication and his only co-authored article.

One also finds in this volume another of Poisson's publications, "Mémoire sur la pluralité des intégrales dans le calcul des différences" (Essay on the plurality of integrals in the calculus of differences), read at the Institut on the 16th of Frimaire in the year 9 (of the French revolutionary calendar, i.e., December 8, 1800), where he generalizes one of Laplace's remarks on the solutions of first-order difference equations (see no. 84).

Finally, the "Mémoire sur l'élimination" (Essay on elimination), written by Poisson in 1799 or 1800, while he was still a student at the École Polytechnique, contains a new, simplified proof of Bézout's theorem on the degree of the resultant attached to two algebraic curves.

In the "Annonces et notices d'ouvrages" (Announcements and notices of publications) at the end of this volume, one notice signed "H. C." refers to the publication of "*Disquisitiones arithmeticæ*, par M. Gauss, ouvrage publié à Leipsick en 1801" (*Disquisitiones arithmeticæ* by M. Gauss, published in Leipzig in 1801).

13. « Mémoire sur la propagation de la chaleur dans les corps solides », par M. Fourier [Poisson]. In *Œuvres de Fourier*, tome II, Paris : Gauthier-Villars, 1890, p. 215-221.
["Essay on the propagation of heat in solid bodies," by M. Fourier [Poisson]. In *Œuvres de Fourier,* volume II, Paris: Gauthier-Villars, 1890, p. 215-221.]

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A note from the editor of the *Œuvres de Fourier*, Gaston Darboux, indicates: "Cet Article […] n'est pas de Fourier. Signé de l'initiale P, il a été rédigé par Poisson qui était un rédacteur du *Bulletin des Sciences* pour la partie mathématique. À raison de l'intérêt historique qu'il présente comme étant le premier écrit où l'on ait fait connaître la théorie de Fourier, nous avons cru devoir le reproduire intégralement" (This Article […] is not by Fourier. Signed with the initial "P," it was written by Poisson who was an editor of the mathematical portion of the *Bulletin des Sciences*. Because of the historic interest that it presents as the first publication that made Fourier's theory known, we believed that we should reproduce it in its entirety).

This text, which dates from 1808 and was first published in the *Bulletin de la Société philomatique* (*Bulletin des Sciences*), is Poisson's report on the manuscript on the theory of heat which Fourier had submitted to the Académie in 1807, without being honored with a report. Poisson summarizes Fourier's analysis, in which he derives the heat equation and solves it in a particular case, by expanding the sought-after solution into a trigonometric series. Fourier's text, revised, would be published much later, in 1821. From 1814 to 1825, Poisson published many essays on "Fourier series", and the theory of heat. A virulent debate over precedence broke out in 1815 between the two scholars, during which Fourier wrote a letter to Laplace, blaming both Poisson and Jean-Baptiste Biot: "[Ils] […] reconnaissent qu'ils n'ont pu donner jusqu'ici aucun résultat différent des miens […] mais ils disent qu'ils ont une autre manière de les exposer et que cette manière est excellente et la *véritable*. […] Mais ce n'est pas reculer les limites des sciences que de présenter sous une forme que l'on dit être différente des résultats que l'on n'a pas trouvés soi-même" ([They] […] recognize that they could not obtain up to now any results different from mine […] but they say that they have another method for formulating them, and that this method is excellent and the *true* one.[…] But it does not extend the limits of science to only present results that one has not found oneself under a form that one says is different).

Poisson established the heat equation in the more general case of variable conductivity in his "Mémoire sur la distribution de la chaleur dans les corps solides" (Essay on the distribution of heat in solid bodies), published in the *Journal de l'École polytechnique* in 1823, and included it in his 1835 "Théorie mathématique de la chaleur" (see no. 7 and no. 42).

14. « Mémoire sur les inégalités séculaires des moyens mouvements des planètes », *Journal de l'École polytechnique*, 15^{e} cahier, 8 (1809), p. 1-56.

["Essay on the secular inequalities in the average motions of planets," *Journal de l'École polytechnique*, 15th cahier, 8 (1809), p. 1-56.]

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Poisson derived here an expression for the variation of one of the elements describing the orbit of a planet in terms of the partial derivatives of the perturbing function with respect to the coordinates. With this essay, read at the Académie des Sciences on June 20, 1808, Poisson earned a place in the history of celestial mechanics, as he inspired important works by Lagrange and Laplace, read at the Bureau des Longitudes as early as August 17, 1808 (see no. 33).

15. « Mémoire sur la variation des constantes arbitraires dans les questions de mécanique », *Journal de l'École polytechnique*, 15^{e} cahier, 8 (1809), p. 266-344.

["Essay on the variation of arbitrary constants in questions of mechanics," *Journal de l'École polytechnque,* 15th cahier, 8 (1809), p. 266-344.]

Bibliothèque Mathématiques Informatique Recherche. Cote J 85

In this essay, read at the Académie des Sciences on October 16, 1809, Poisson obtains directly the expressions of what would later be called "Poisson brackets" of the arbitrary constants that intervene in the integration of perturbed planetary motion, which Lagrange had derived six months earlier by inverting his parentheses. Lagrange later wrote in his "Second mémoire sur la théorie de la variation des constantes arbitraires dans les problèmes de mécanique" (Second essay on the theory of variation of arbitrary constants in problems of mechanics) in1810: "Heureusement une considération très simple, que je vais exposer et qui m'avait échappé, facilite et simplifie extrêmement cette application" (Fortunately, a very simple consideration that I will present, and which had escaped me, facilitates and extremely simplifies this application). It was Jacobi who would discover the importance of the theorem concerning first integrals of the motion proved by Poisson in this essay (see no. 36).Jacobi would also prove the identity that bears his name. Poisson brackets are today fundamental tools in mathematics, mechanics, and theoretical physics.

In his Report of 1857 (see no. 33), Cayley would recognize the importance of this paper of Poisson: "as well for its own sake as historically, the memoir is a very important one."

This volume of the *Journal de l'École polytechnique* contains, besides Poisson's two famous essays on celestial mechanics (nos. 14 and 15), his "Mémoire sur le mouvement de rotation de la Terre" (Essay on the rotational motion of the Earth) and a short article on pendulums.

16. « Mémoire sur la distribution de l'électricité à la surface des corps conducteurs », *Mémoires de la classe des Sciences mathématiques et physiques de l'Institut Impérial de France*, 12 (1811), 1812, première partie, p. 1-92.

["Essay on the distribution of electricity on the surface of conducting bodies," *Mémoires de la classe des Sciences mathématiques et physiques de l'Institut Impérial de France*, 12 (1811), 1812, first part, p. 1-92.]

Bibliothèque de Mathématiques et Informatique de l'École normale supérieure. Cote SMR Oe 329/3

In the same bound volume of the Verdet collection is also Poisson's "Second mémoire sur la distribution de l'électricité à la surface des corps conducteurs" (Second essay on the distribution of electricity on the surface of conducting bodies), read at the Institut on September 6, 1813, and published in the same periodical.

These essays are Poisson's first important contributions to the theory of electromagnetism. In them, he takes up the problem of the distribution of electrical charges by applying analytical techniques, such as series expansions.The notion of potential theory had already been presented by Clairaut, by Euler, by Lagrange in 1777 in the study of the motion of several bodies interacting under the effect of gravitation, and then by Laplace, and it appeared here in electromagnetism.

Regarding this 1812 essay, Whittaker wrote in 1910 in *A History of the Theories of Æther and Electricity: "*Electrostatical theory was, however, suddenly advanced to quite a mature state of development by Siméon-Denis Poisson, in a memoir which was read to the French academy in 1812 […]. The rapidity with which in a single memoir Poisson passed from the barest elements of the subject to such recondite problems as those just mentioned may well excite admiration" (see no. 41, p. 60 and 62).

In 1939, the historian of science Mario Gliozzi, analyzing "Il contributo del Poisson all'electrologia" (Poisson's contribution to electricity), considered the 1813 publication a "notevolessima Memoria" (most remarkable Essay).

17. « Mémoire sur les intégrales définies », *Journal de l'École polytechnique*, 16^{e} cahier, 9 (1813), p. 215-246.

["Essay on definite integrals," *Journal de l'École polytechnique*, 16th cahier, 9 (1813), p. 215-246.]

Bibliothèque Mathématiques Informatique Recherche. Cote J 85

Poisson carries out calculations of certain definite integrals by showing that the corresponding indefinite integral is a function that satisfies a differential equation that can

be integrated. He re-derives formulæ expressing some integrals in terms of integrals that are today called “Eulerian integrals” (p. 219) and remarks that Euler “les a trouvées par une sorte d’induction fondée sur le passage des quantités réelles aux imaginaires ; inductions qu’on peut bien employer comme un moyen de découverte, mais dont les résultats ont besoin d’être confirmés par des méthodes directes et rigoureuses” ([Euler] derived them by a kind of induction founded on the passage from real quantities to imaginary ones; inductions that one could well employ as a method of discovery, but whose results need to be confirmed by direct and rigorous methods). The use of complex numbers in analysis still needed to be justified.

The “Suite du Mémoire sur les intégrales définies, imprimé dans le volume précédens [*sic*] de ce Journal” (Continuation of the essay on definite integrals, printed in the preceding volume of this journal) can be found in volume 10 (1815), and the “Suite du Mémoire sur les intégrales définies inséré dans les deux précédens [*sic*] volumes de ce Journal” (Continuation of the essay on definite integrals published in the two preceding volumes of this Journal) in volume 11 (1820). Poisson published yet another continuation in 1823 (see no. 22).

In the second Continuation of this article, Poisson considers the integration of functions “qui passent par l’infini entre des limites d’intégration” (which become infinite between the limits of integration), then the relationship between a definite integral, expressed in terms of a primitive function, and the summation of differentials, “lorsque les valeurs intermédiaires seront imaginaires” (when the intermediate values are imaginary). He applies the method of calculating integrals that figured in his “Mémoire sur la distribution de l’électricité” (see no. 16).

This volume also contains the “Mémoire sur un cas particulier du mouvement de rotation des corps pesans [*sic*]” (Essay on a particular case of the rotational motion of heavy bodies), which describes the rotational motion of a solid body revolving around a fixed point on its axis, distinct from its center of gravity.

18. « Mémoire sur la théorie des ondes », *Mémoires de l’Académie des Sciences,* 1 (1816), 1818, p. 71-186.

[“Essay on wave theory,” *Mémoires de l’Académie des Sciences,* 1 (1816), 1818, p. 71-186.]

Bibliothèque Mathématiques Informatique Recherche. Cote HC

Poisson had been elected to the Académie des Sciences in the physics section in 1812. (As early as 1803, he had been presented as a “subject” (i.e., candidate) for the geometry section, alongside Biot, Parseval and Labey. It was Biot, seven years his senior, who had been elected.) This essay, which Poisson read at the Académie des Sciences in October

and December 1815, is a solution to the “problème des ondes à la surface d’un liquide de profondeur indéfinie" (problem of waves on the surface of a liquid of indefinite depth), which had been proposed in 1813, as a question for the mathematics prize of the Institut for 1816, by a committee that included Poisson. The prize was awarded to Cauchy, by a committee of which Poisson was a member, for his essay, read at the Académie des Sciences in July 1815, and finally published in 1827. The two scientists had provided similar solutions, using Fourier transforms and series expansions (see no. 51). Poisson would publish many notes and essays on the motion of fluids and, in 1818, he would synthesize his research on the integration of partial differential equations and their application to the study of elastic fluids.

In the same volume of the *Mémoires de l’Académie des Sciences*, besides several reports by Poisson, one also finds the “Mémoire sur la variation des constantes arbitraires, dans les questions de mécanique” (Essay on the variation of arbitrary constants in questions of mechanics), which bears the same title as the one that he had published in 1809 (see no. 15) and which develops the theory introduced in his previous essay with new applications to celestial mechanics: variation of the principal axes and planetary motion, using Lagrange’s parentheses (p.10), as well as “Poisson brackets” (p. 13).

19. « Mémoire sur la manière d'exprimer les fonctions par des séries de quantités périodiques, et sur l'usage de cette transformation dans la résolution de différens [sic] **problèmes », *Journal de l’École polytechnique*, 18^{e} cahier, 11 (1820), p. 417-489.**

[“Essay on the manner of expressing functions by series of periodic quantities and on the use of this transformation in the solution of various problems”, *Journal de l’École polytechnique,* 18th cahier, 11 (1820), p. 417-489]

Bibliothèque Mathématiques Informatique Recherche. Cote J 85

In this long essay, Poisson introduces the evaluation of a “fonction finie” (finite function) with the help of integration by way of what would later be called a “noyau de Poisson” (Poisson kernel, p. 422). He gives numerous applications for it, including the “mouvement d’une corde vibrante composée de deux parties de matières différentes” (motion of a vibrating string composed of two parts of different material) and the “mouvement d’un corps pesant suspendu à l’extrémité d’un fil extensible” (motion of a heavy body suspended from an elastic wire).

20. « Extrait d’un mémoire sur la propagation du mouvement dans les fluides élastiques », par M. Poisson, lu à l’Académie des Sciences le 24 mars 1823, in *Œuvres complètes* d’Augustin Fresnel, Tome 2. Paris : Imprimerie Impériale, 1868. Réimpression, Bordeaux : Éditions Bergeret, [ca 1995], p. 192-205.

["Extract of an essay on the propagation of motion in elastic fluids," by M. Poisson, read at the Académie des Sciences on March 24, 1823, in *Œuvres complètes* d'Augustin Fresnel, Volume 2. Paris: Imprimerie Impériale, 1868. Reprinted, Bordeaux: Éditions Bergeret, [ca 1995], p. 192-205.]

Bibliothèque Chimie Physique Recherche. Cote 530.08 FRE 02 Tome 2

Poisson proposes in this essay the idea of a fluid "qui aurait, en différents sens, des degrés différents d'élasticité" (which might have, in different directions, different degrees of elasticity, p. 196).One finds what was later called the "rapport de Poisson" (Poisson's ratio) in his 1829 essay, "Sur l'équilibre et le mouvement des corps élastiques" (On the equilibrium and motion of elastic bodies), published in volume 8 of the *Mémoires de l'Académie des Sciences.*

This volume of the works of Fresnel reprints the documents of his acrimonious 1823 controversy with Poisson on the nature of light, one of several polemics that marred Poisson's relationships with his contemporaries, in particular Fourier, Sophie Germain, Poinsot and Navier. Despite this controversy, Fresnel cites Poisson very favorably in his "Mémoire sur la réflexion de la lumière" (Essay on the reflection of light), presented to the Académie in 1819, but published thirty years later in the *Mémoires de l'Académie des Sciences*, 20 (1849), where he writes: "M. Poisson a démontré [un résultat de M. Young], d'une manière plus rigoureuse, par une analyse savante dans un beau mémoire sur le mouvement des fluides élastiques" (M. Poisson has proved [a result of M. Young], in a more rigorous manner, by a learned analysis in a beautiful essay on the motion of elastic fluids, p. 200). Fresnel may be referring to Poisson's 1817 essay, "Sur le mouvement des fluides élastiques dans des tuyaux cylindriques, et sur la théorie des instruments à vent" (On the motion of elastic fluids in cylindrical pipes, and on the theory of wind instruments), published in the *Mémoires de l'Académie des Sciences* in 1819.

21. « Mémoire sur l'avantage du banquier au jeu de trente et quarante », *Annales de Mathématiques pures et appliquées de Gergonne*, 16 (1825-1826), p. 173-208.

["Essay on the house advantage in the game of trente et quarante," *Annales de Mathématiques pures et appliquées de Gergonne*, 16 (1825-1826), p. 173-208.]

Bibliothèque Mathématiques Informatique Recherche. Cote A 555

This essay first appeared in the *Bulletin de la Société philomatique de Paris* and in the *Annales de chimie et de physique* in 1820.

Poisson had been interested in the theory of probability that Laplace had developed since 1810. In this article, published under the heading "Analise [*sic*] appliquée" (Applied analysis), he begins by evaluating the probability of drawing without replacement by means of the method of generating functions.

22. « Suite du mémoire sur les intégrales définies et sur la sommation des séries », *Journal de l'École polytechnique*, 19e cahier, 12 (1823), p. 404-509.

["Continuation of the essay on definite integrals and the summation of series," *Journal de l'École polytechnique*, 19th cahier, 12 (1823), p. 404-509.]

Bibliothèque Mathématiques Informatique Recherche. Cote J 85

This essay follows those of 1813, 1815 and 1820 (see no. 17). Here, Poisson treats the question of the summation of series of sines and cosines, today called "Fourier series". He wrote: "il ne sera pas inutile de les réunir toutes sous un même point de vue et de déduire ces valeurs d'une méthode uniforme" (it will be advantageous to bring all of them together under the same point of view and to derive these values by a uniform method).

This volume of the *Journal de l'École polytechnique* contains four other essays by Poisson on the distribution of heat (see no. 7) and on the integration of linear partial differential equations.

23. « Mémoire sur la théorie du magnétisme en mouvement », *Mémoires de l'Académie des Sciences*, 6 (1823), 1827, p. 441-570.

["Essay on the theory of magnetism in motion," *Mémoires de l'Académie des Sciences*, 6 (1823), 1827, p. 441-570.]

Bibliothèque Mathématiques Informatique Recherche. Cote HC

This essay, read at the Académie des Sciences in 1826, follows important essays on electricity from 1812 and 1813 (see no. 16) and the "Mémoire sur la théorie du magnétisme" (Essay on the theory of magnetism) of 1824, which appeared in 1826 in the *Mémoires de l'Académie des Sciences*. It was very influential, particularly in England (see no. 35) and in Germany. An extract was published in 1827 in the *Zeitschrift für Physik.*

It contains the equations that are satisfied by the electrostatic potential on the surface of a charged body, as well as in its interior and in its exterior (p. 463).

Besides essays by Laplace, Legendre, Navier and Cauchy, and two "éloges" (eulogies), one by Fourier and the other by Cuvier, this volume of the *Mémoires de l'Académie des Sciences* contains another of Poisson's essays, on numerical calculation (see no. 24).

24. « Mémoire sur le calcul numérique des intégrales définies », *Mémoires de l'Académie des Sciences*, 6 (1823), 1827, p. 571-602.

["Essay on the numerical calculation of definite integrals," *Mémoires de l'Académie des Sciences*, 6 (1823), 1827, p. 571-602.]

Bibliothèque de Mathématiques et Informatique de l'École normale supérieure. Cote SMR Oe329/4

This essay discusses the calculation by approximation of integrals and sums of convergent series, the results of which are applied, in particular, in the *Nouvelle théorie de l'action capillaire* (see no. 5).

25. « Mémoire sur la proportion des naissances des filles et des garçons », *Mémoires de l'Académie des Sciences*, 9 (1830), p. 239-308.

["Essay on the proportion of births of girls and boys," *Mémoires de l'Académie des Sciences*, 9 (1830), p. 239-308.]

Bibliothèque Mathématiques Informatique Recherche. Cote HC

In this essay, Poisson establishes, among other results, what is now known as the "Poisson distribution" for the probability that an event, for which the probability is very small, would occur in a very large number of trials (p. 262). Poisson later published three notes on the law of large numbers in volume 2 (1836) of the *Comptes rendus de l'Académie des Sciences*: "Note sur la loi des grands nombres" (Note on the law of large numbers), "Note sur le calcul des probabilités" (Note on the calculation of probability), et "Formules relatives aux probabilités qui dépendent de très grands nombres" (Formulæ concerning probabilities depending on very large numbers), where he introduced "la loi des grands nombres dans toute sa généralité" (the law of large numbers in all its generality), shortly before writing his *Recherches sur la probabilité des jugements* (see no. 9).

This volume of the *Mémoires de l'Académie des Sciences* also contains an important essay by Poisson, "Sur l'équilibre des fluides" (On the equilibrium of fluids) and a "Note sur les racines des équations transcendantes" (Note on the roots of transcendental equations).

26. « Mémoire sur l'équilibre et le mouvement des corps cristallisés », *Mémoires de l'Académie des Sciences,* 18 (1842), p. 3-152.

["Essay on the equilibrium and the motion of crystallized bodies," *Mémoires de l'Académie des Sciences,* 18 (1842), p. 3-152.]

Bibliothèque Mathématiques Informatique Recherche. Cote HC

This essay by Poisson, which he had read at the Académie des Sciences on October 28, 1839, a few months before his death, was published posthumously. In it, Poisson announces “un autre Mémoire où se trouveront les lois des petites vibrations des fluides” (another Essay which will contain the laws of small vibrations of fluids) and their application “à la théorie des ondes lumineuses” (to the theory of light waves). This essay is followed by a text by the editors explaining its incomplete character, which ends with the description of a scene worthy of a painting by Greuze and with a laudatory and emphatic wish: “Cherchant avec peine le mot pour exprimer son idée, il a répété plusieurs fois : c’était un *filet* de lumière. Puissent ces paroles, religieusement conservées par les amis de M. Poisson, les dernières paroles de science qui soient sorties de sa bouche, mettre les savants sur la trace de sa pensée, et inspirer un achèvement de son œuvre digne du commencement” (Searching with pain for the word to express his idea, he repeated several times: it is a *ray* of light. May these words, religiously preserved by M. Poisson’s friends, the last words of science that left his mouth, put scholars on the trace of his thought, and inspire a completion of his work worthy of its beginning).

27. « Mémoire sur les apparences des corps lumineux en repos ou en mouvement », *Mémoires de l’Académie des Sciences*, 19 (1845), p. 311-357.

[“Essay on the appearance of luminous bodies at rest or in motion,” *Mémoires de l’Académie des Sciences*, 19 (1845), p. 311-357.]

Bibliothèque Mathématiques Informatique Recherche. Cote HC

Published five years after Poisson’s death, “ce mémoire a été trouvé dans les papiers de Monsieur Poisson, et adressé à l’Académie par son fils aîné, Charles Poisson, officier d’artillerie” (this essay was found in the papers of Monsieur Poisson, and addressed to the Académie by his eldest son, Charles Poisson, artillery officer). It contains neither introduction nor conclusion. It may be the application to the case of light of the theory of the propagation of vibrations in fluids that he had announced in his last essay, which appeared in the *Mémoires de l’Académie* after his death (see no. 26).

19TH CENTURY APPRECIATIONS OF POISSON'S WORK

28. *Œuvres complètes. Tome 11, Écrits de jeunesse et pièces diverses* / A. A. Cournot ; Bernard Bru et Thierry Martin, éds. Paris : J. Vrin, 2010.

[Complete works. Volume 11, Early works and diverse pieces / A. A. Cournot; Bernard Bru and Thierry Martin, eds. Paris: J. Vrin, 2010]

Bibliothèque de l'Institut Henri Poincaré. Cote 328 19 B XI

Volume 11 of Antoine Augustin Cournot's *Œuvres* contains an interesting "Coup d'œil sur la marche actuelle des sciences mathématiques" (A glance at current advances in the mathematical sciences) published in 1829, when Poisson was alive. One reads on p. 473, v.1: "La démonstration du principe du plan invariable, qui paraît compliquée dans la *Mécanique céleste* [de Lagrange], devient d'une simplicité extrême dans le *Traité de mécanique* de M. Poisson" (The demonstration of the principle of the invariable plane, which appears complicated in [Lagrange's] *Mécanique céleste*, becomes extremely simple in M. Poisson's *Traité de mécanique*) and, later, Cournot speaks of the "beau théorème [de Poisson] sur la variabilité des dimensions du système solaire" ([Poisson's] beautiful theorem on the variability of dimensions in the solar system). He also writes in his "Souvenirs" (Memories): "L'analyse de M. Poisson vise plus à la clarté qu'à l'élégance ; personne n'a montré plus d'abondance, de souplesse, de ressource dans les hauts calculs ; il aborde, dans sa fécondité, toutes les questions et de préférence celles qui ont des applications à la philosophie naturelle" (M. Poisson's analysis aims more for clarity than for elegance; no one has shown more abundance, versatility, ability in advanced calculations; he attacks, in his fecundity, all the questions and prefers those with applications to natural philosophy, p. 958-959, v. 2).

Notes by Bernard Bru and Thierry Martin in the edition of this volume of Cournot's *Œuvres* furnish a very rich documentation and try to rehabilitate Poisson in comparison with his 19th century detractors.

29. Discours de M. Cousin, Ministre de l'Instruction publique, prononcé aux funérailles de M. Poisson le 30 avril 1840. Institut de France, Académie des Sciences. Paris : Imprimerie de Didot frères, [1840].

[Address of M. Cousin, Minister of Public Education, given at the funeral of M. Poisson on April 30, 1840. Institut de France, Académie des Sciences. Paris: Imprimerie de Didot frères, [1840].]

Archives de l'Académie des Sciences – Institut de France. Dossier Poisson

Poisson's funeral was held at the church of Saint-Étienne-du-Mont on April 30, 1840. In his address at the Père-Lachaise cemetery, Victor Cousin called Poisson the "premier géomètre de l'Europe" (leading geometer of Europe). During the first half of the 19th century, "géomètre" (geometer) was still the general term used to refer to a mathematician.

Cousin also declared that Poisson's participation in the activities of the Faculté des Sciences was "pour l'Université un engagement sacré de ne jamais laisser dépérir ou s'affaiblir dans ses écoles l'étude des mathématiques" (for the University a sacred commitment to never let perish or weaken the study of mathematics in its schools).

30. Discours de M. Arago, secrétaire perpétuel, prononcé aux funérailles de M. Poisson le 30 avril 1840. Institut de France, Académie des Sciences, Paris : Imprimerie de Didot frères, [1840].

[Address of M. Arago, secrétaire perpétuel, given at the funeral of M. Poisson on April 30, 1840. Institut de France, Académie des Sciences, Paris: Imprimerie de Didot frères, [1840].]

Archives de l'Académie des Sciences – Institut de France. Dossier Poisson

François Arago, who had been the general secretary of the Académie des Sciences for mathematical sciences since 1830, first declared, speaking of Poisson: "Le génie ne meurt pas" (Genius does not die) and, later, "l'invention brille à chaque pas dans les immenses travaux de Poisson sur les questions les plus subtiles" (ingenuity shines at each stage in Poisson's immense works on the most subtle questions).

31. « Lettres à un Américain sur l'état des sciences en France, III, M. Poisson », [Guillaume Libri], *Revue des deux mondes*, 4^{e} série, 23 (1840), p. 410-437.

["Letters to an American on the state of science in France, III, M. Poisson," [Guillaume Libri], *Revue des deux mondes*, 4th series, 23 (1840), p. 410-437.]

Archives de l'Académie des Sciences – Institut de France. Dossier Poisson

In this unsigned article, the count Libri-Carrucci della Sommaia, himself a member of the Académie des Sciences, mourns "la perte grande et prématurée [de l']une des plus éclatantes lumières" (the great and premature loss [of] one of the brightest stars) of the Institut and the University, and declares that the sciences "n'avaient nulle part de plus ardent promoteur ni de plus digne représentant" (never had a more ardent promoter nor a worthier representative). Libri, accused of stealing rare books from libraries, had to flee to London in 1848 and lost his membership in the Académie.

The exhibited pages are copies of an extract of the periodical.

32. *Œuvres complètes de François Arago publiées d'après son ordre sous la direction de M. J.-A. Barral. Notices biographiques, Tome deuxième*. Paris : Gide et J. Baudry ; Leipzig : T. O. Weigel, 1854.

[*Complete Works of François Arago published according to his instructions under the direction of M. J.-A. Barral. Biographical notices, second volume.* Paris: Gide and J. Baudry; Leipzig: T. O. Weigel, 1854.]

Bibliothèque Mathématique Informatique de l'École normale supérieure. Cote SMR Oe 10/2

At the end of 1850, Arago read a biography of Poisson at a public session of the Académie des Sciences. This notice was published one year after Arago's death. It is followed by the "Catalogue des travaux laissés par Poisson, rédigé par lui-même" and by an appendix, "Discours prononcé aux funérailles de Poisson le jeudi 30 avril 1840" (Address delivered at Poisson's funeral on Thursday, April 30, 1840), which had been published separately as brochures (see nos. 11 and 30).

This detailed notice gives a great deal of information about Poisson's life, character, career, and work. Arago tries to avoid writing a panegyric, but he attributes to Poisson these "trois qualités : le génie, l'amour du travail et l'érudition mathématique" (three qualities: genius, love of work, and mathematical erudition), and he awards the highest praises: "illustre géomètre" (illustrious geometer), "une des plus grandes illustrations de notre pays et de notre siècle" (one of the brightest lights of our country and of our century).

33. « Report on the recent progress of theoretical dynamics», Arthur Cayley, *Report of the British Association for the Advancement of Science,* 1857, p. 1-57. In *The Collected Mathematical Papers of Arthur Cayley*. Volume 3. Cambridge: At the University Press, 1890, p. 156-204. [Reproduction in *fac-simile*, New York: Johnson, 1963].

Bibliothèque Mathématiques Informatique Recherche. Cote 02.5 CAY 3

In this magisterial text, followed by a bibliography, Cayley gives an account of the work on dynamics and celestial mechanics since Lagrange and Laplace. When he analyzes thei rpublications and those of Poisson from the years 1808-1810, he first observes the influence of Poisson's 1809 essay on both Laplace and Lagrange, and he writes, presaging future developments, "The theory of Poisson gives rise to developments which seem to have nothing corresponding to them in the theory of Lagrange." Cayley highlights the importance of the change of variables, as introduced by Poisson, which allows one to write the equations of dynamics in the so-called "Hamiltonian" form, such as they would be written by Cauchy, and, later, by Hamilton.

34. *Histoire des sciences mathématiques et physiques* / par Maximilien Marie. Volume 11. Paris : Gauthier-Villars, 1887.

[History of the mathematical and physical sciences / by Maximilien Marie. Volume 11. Paris: Gauthier-Villars, 1887]

Bibliothèque Mathématiques Informatique Recherche. Cote 01.1 MAR 11

Maximilien Marie, author of the famous *Histoire des sciences mathématiques* (History of the mathematical sciences) in 12 volumes, ventures a judgment entirely negative on Poisson: “Pour laisser un nom, il faudrait laisser des idées, et Poisson n’avait que celles des autres. Bien plus, quand il avait à choisir entre deux idées contraires, celle à laquelle il ferait l’honneur d’y appliquer son analyse, il se trompait généralement” (To leave a name for posterity, it is necessary to leave ideas, and Poisson only had those belonging to others. Even more, when he had to choose between two contrary ideas, the one to which he gave the honor of applying his analysis was generally incorrect) and concludes: “Les analystes ne voient [dans la science] qu’un jeu d’esprit sans autre intérêt que celui de la difficulté vaincue” (Analysts see [in science] nothing more than an intellectual game with no other interest than vanquishing difficulties).

POISSON'S INFLUENCE AND POSTERITY IN THE 19TH CENTURY

35. *An Essay on the Application of Mathematical Analysis to the Theories of Electricity and Magnetism* / George Green. Göteborg: Wezäta-Melins Aktiebolag, 1958. [Reproduction in *fac-simile* of the Nottingham edition: T. Wheelhouse, 1828].

Bibliothèque de l'Institut Henri Poincaré. Cote 488 87 a

In 1828, in the preface to his *Essay*, George Green (1793-1841) wrote: "Little appears to have been effected in the mathematical theory of electricity […] when M. Poisson presented to the French Institut two memoirs of singular elegance, relative to the distribution of electricity on the surfaces of conducting spheres, previously electrified and put in presence of each other." Green refers here to Poisson's essays on the distribution of electricity published in 1812 and 1813 (see no. 16). He emphasizes that Poisson's essays were founded on the notion of potential. Later, he cites Poisson's essays on magnetism published in 1826 and 1827 (see no. 23).

This essay first had a limited distribution but was published 20 years later in the *Journal de Crelle*, in three parts, between 1850 and 1854. The first part is preceded by an introduction, which explains the publishing history of the *Essay*, and also by a short biography of Green. It was printed in the *Mathematical Papers of the Late George Green*, published in 1871, and reprinted in 1903 and 1970.

36. « Lettre adressée à M. le Président de l'Académie des Sciences », C.-G.-J. Jacobi, *Journal de mathématiques pures et appliquées,* 5, 1840, p. 350-355.

["Letter addressed to the President of the Académie des Sciences," C.-G.-J. Jacobi, *Journal de mathématiques pures et appliquées,* 5, 1840, p. 350-355.]

Bibliothèque Mathématiques Informatique Recherche. Cote J 90

This letter first appeared in the *Comptes rendus de l'Académie des Sciences*, 11, 1840, p. 529-530. Jacobi writes: "Le théorème dont je parle me semble être le plus important de la mécanique et de cette partie du calcul intégral qui s'attache à l'intégration d'un système d'équations différentielles ordinaires. […] Ce théorème vraiment prodigieux, et jusqu'ici sans exemple, est resté en même temps découvert et caché" (The theorem about which I am writing appears to me to be the most important in mechanics and in that part of integral calculus concerned with the integration of a system of ordinary differential equations. […] This truly prodigious theorem, until now without an example, remained both discovered and hidden). Jacobi was referring to Poisson's essay of 1809 on the variation of constants (see no. 15).

When Liouville reprinted Jacobi's Letter in his *Journal*, he added a long "Note de l'Éditeur" (Editor's note).

Poisson brackets play an essential role in the theory of integration of partial differential equations, developed by Jacobi at the end of the 1830s.

37. « Développements sur un chapitre de la mécanique de Poisson », Joseph Liouville, *Journal de mathématiques pures et appliquées,* 3, 1858, p. 1-25.

["Developments on a chapter of Poisson's mechanics," Joseph Liouville, *Journal de mathématiques pures et appliquées,* 3, 1858, p. 1-25.]

Bibliothèque Mathématiques Informatique Recherche. Cote J 90

Liouville generalizes a result proved by Poisson "pour le seul cas d'un système de forme invariable" (only for the case of a system of invariable form), and he indicates: "Je n'aurai pour ainsi dire qu'à commenter un chapitre de sa *Mécanique*" (I need only to comment, so to speak, on a chapter of his *Mécanique*).

38. *Sur l'intégration des équations aux dérivées partielles du premier ordre* / V. G. Imschenetsky. Paris : Gauthier-Villars ; Greifswald : C. A. Koch, 1869.

[*On the Integration of First Order Partial Differential Equations* / V. G. Imschenetsky. Paris: Gauthier-Villars ; Greifswald: C. A. Koch, 1869.]

Bibliothèque de l'Institut Henri Poincaré. Cote 595 5

This book is a link in the chain of transmission that goes from Poisson (1809) and Jacobi (1840) to Sophus Lie in his studies in the 1870s leading to the creation of the theory of Lie groups and to pre-modern treatises on partial differential equations, such as the second edition of Forsyth's *A Treatise on Differential Equations* (1914).

Imschenetsky presents Jacobi's theory of integration of systems of partial differential equations, "explique la liaison qui existe entre le théorème de Poisson relatif aux intégrales de ces équations et le théorème fondamental de la méthode de Jacobi" (explains the link that exists between Poisson's theorem concerning the [first] integrals of these equations and the fundamental theorem of Jacobi's method) and makes repeated use of Poisson brackets, without naming them.

This book is bound with the *Étude sur les méthodes d'intégration des équations aux dérivées partielles du second ordre d'une fonction de deux variables indépendantes* (Study of the Methods of Integration of Second Order Partial Differential Equations Satisfied by a Function of Two Independent Variables), published in 1871.

In a nearly contemporary work, the Belgian mathematician Joseph Graindorge introduced "la notation de Poisson" (Poisson's notation) and later, in 1889,he also employed "les notations nouvelles introduites par Poisson" (the new notations introduced by Poisson) for this bracket.

39. *Geometrie der Berührungstransformationen. Erster Band* / dargestellt von Sophus Lie und Georg Scheffers. Leipzig : B. G. Teubner, 1896.

[*Geometry of Contact Transformations*. First Volume. / Edited by Sophus Lie and Georg Scheffers. Leipzig: B. G. Teubner, 1896.]

Bibliothèque Mathématiques Informatique Recherche. Cote 60 LIE 1-96

Lie writes that new independent sciences have formed, such as mathematical physics, "in den Händen von Laplace, Ampère, Fourier, Fresnel, Green, Gauss, Cauchy, Poisson und Lejeune-Dirichlet" (in the hands of Laplace, Ampère, Fourier, Fresnel, Green, Gauss, Cauchy, Poisson and Lejeune-Dirichlet).

In Sophus Lie's work, from 1874 on, we find brackets of functions, *i.e.*, "Poisson brackets", which he called "expressions," and the commutator brackets that we call "Lie brackets", but that he called "Poisson brackets".

40. *Les méthodes nouvelles de la mécanique céleste* / Henri Poincaré. Tome 3. Paris : Gauthier-Villars, 1899.

[*New Methods of Celestial Mechanics* / Henri Poincaré. Volume 3. Paris: Gauthier-Villars, 1899.]

Bibliothèque Mathématiques Informatique Recherche. Cote 99 POI 87-3

Poincaré titled his chapter 26 "Stabilité à la Poisson" (Stability à la Poisson). Indeed, Poisson had concluded in his "Mémoire sur les inégalités séculaires des moyens mouvements des planètes" in 1809 (see no. 14) that "la stabilité du système solaire est assurée […] en ayant même égard aux carrés des forces perturbatrices" (The stability of the solar system is assured […] even when one takes into account the squares of the perturbing forces) and he had tried without success, in a note in the *Comptes rendus de l'Académie des Sciences* in 1837, to push the analysis to third order (which was done by Spiru Haret in 1878). But Poincaré does not cite any of Poisson's works in his book.

POISSON IN THE 20TH AND 21ST CENTURIES

41. *A History of the Theories of Æther and Electricity* / Edmund Taylor Whittaker. New York: Harper, 1960. First edition, 1910.

Bibliothèque Mathématiques Informatique Recherche. Cote 01.1 WHI 60

Whittaker describes “Poisson’s mathematical theory of electrostatics” and concludes: “His success is, no doubt, partly explained by the high state of development to which analysis had been advanced by the great mathematicians of the eighteenth century; but […] Poisson’s investigation must be accounted a splendid memorial of his genius”. Later, he examines “Poisson’s theory of magnetic induction,” rejecting his physical interpretation but noting that the formulæ derived by Poisson are valid (see no. 23).

42. *Étude sur l’évolution d’un problème de physique : la propagation thermique dans les solides* / Gaston Bachelard. Paris : J. Vrin, 1927. 2e édition, 1973.

[*Study on the Evolution of a Problem in Physics: the propagation of heat in solid bodies* / Gaston Bachelard. Paris: J. Vrin, 1927. Second edition, 1973.]

Bibliothèque Chimie Physique Recherche. Cote 501.53 BAC

This study, the first edition of which was published in 1927, contains a highly laudatory historical and scientific analysis of Poisson’s mathematical theory of heat (see nos. 7 and 13). In the preface to the second edition, André Lichnerowicz wrote, speaking of Poisson and of Gabriel Lamé (1795-1870): “C’est sans doute avec [eux] que la physique mathématique va prendre conscience de la large nécessité de ses ambitions et des moyens de les assumer” (It is without a doubt thanks to them that mathematical physics became aware of the necessity of its ambitious program and of the ways of taking it on). He judges that Poisson carried out rigorous calculations, and that “son approche se veut beaucoup plus universelle et unitaire que celle de Fourier et se garde jusqu’au bout d’hypothèses simplificatrices” (His approach is much more universal and unifying than that of Fourier and refrains at each step from making any simplifying hypotheses).

43. *The Principles of Quantum Mechanics* / P. A. M. Dirac. Oxford: Clarendon Press, 1930.

Bibliothèque Chimie Physique Recherche. Cote 530.12 DIR

In paragraph 32 (p. 94), Dirac observes: “The equations of motion, and also all important equations of general classical dynamics, can be written in a form in which they involve

partial differential coefficients only through Poisson Bracket expressions." He then establishes a list of properties of Poisson brackets: they are bilinear, they are skew-symmetric, and they satisfy the Leibniz rule and the Jacobi identity. Thereafter, he takes a daring step and asserts that these brackets have an analogue in quantum theory, and then gives the general formula for this "quantum Poisson bracket" in terms of Planck's constant. In 1930, quantum theory was thus founded by Dirac on the notion of the Poisson bracket.

44. *Histoire de la mécanique* / René Dugas. Neuchâtel : Éditions du Griffon ; Paris : Dunod, 1950.

[*History of Mechanics* / René Dugas. Neuchâtel: Éditions du Griffon ; Paris: Dunod, 1950.]

Bibliothèque Mathématiques Informatique Recherche. Cote 01.1 DUG 50

In the chapter that Dugas devotes to Poisson, he includes the theorem that Poisson had proved in his second essay on celestial mechanics in 1809 and that was rediscovered by Jacobi in 1840 (see no. 36). He then describes the determination of the "Lagrange-Poisson brackets", which Poisson had derived in this essay (see no.15).

English translation by J. R. Maddox, A History of Mechanics. Neuchâtel: Éditions du Griffon, 1955.

45. « Esame storico-critico del contributo di d'Alembert, Eulero, Poisson, Poncelet ed altri al concetto dell'asse istantaneo di rotazione nei moti rigidi con un punto fisso », Pascal Dupont, *Atti dell'Accademia delle Scienze di Torino. I. Classe di Scienze fisiche, matematiche e naturali*, 98 (1963-1964).

["Historical-critical examination of the contribution of d'Alembert, Euler, Poisson, Poncelet and others to the concept of an instantaneous axis of rotation in rigid motions with a fixed point," Pascal Dupont, *Atti dell'Accademia delle Scienze di Torino. I. Classe di Scienze fisiche, matematiche e naturali*, 98 (1963-1964).]

Coimbra University Library

Pascal Dupont, a historian of mechanics, attributes the notion of an instantaneous axis of rotation to d'Alembert and observes that Poisson gave a name to this concept in the first edition of his *Traité de mécanique*, in volume 2, page 125 (see no. 3). He also emphasizes Poisson's role in the separation of mechanics from kinematics, "encore serrée entre la statique et la dynamique" (still caught between statics and dynamics), "qui se révéla si heureuse" (that turned out to be so beneficial).

A photocopy of the article is exhibited.

46. *The Role of Mathematics in the Rise of Science* / Salomon Bochner. Princeton NJ: Princeton University Press, 1966.

Bibliothèque Mathématiques Informatique Recherche. Cote 02.1 BOC 66 a

For Bochner, Poisson is a great mathematician who nevertheless lacked firmness in his conceptualization, and the study of whom suffers due to the lack of an edition of his complete works.

47. *The Society of Arcueil. A View of French Science at the Time of Napoleon I* / Maurice Crosland. Cambridge, MA: Harvard University Press, 1967.

Bibliothèque Chimie Physique Recherche. Cote 509.3 CRO

In July 1807, Poisson became a member of the Society of Arcueil, where he met Berthollet, Laplace, von Humboldt, Biot and Gay-Lussac. This Society, which met in Laplace's house in Arcueil, near Paris, had an important role in the evaluation and dissemination of science under the Empire.

48. *Siméon-Denis Poisson et la science de son temps* / Michel Métivier, Pierre Costabel et Pierre Dugac, éd. Palaiseau : École polytechnique, 1981.

[*Siméon-Denis Poisson and the Science of his Time* / Michel Métivier, Pierre Costabel and Pierre Dugac, eds. Palaiseau: École Polytechnique, 1981.]

Bibliothèque Mathématiques Informatique Recherche. Cote 01.8 POI 81

A collection of articles on Poisson by specialists in the history of science, written in French or in English, published in 1981 on the occasion of the bicentennial of his birth. All the texts have been re-edited in *Siméon-Denis Poisson. Les mathématiques au service de la science* (see no. 57).

The idea of Métivier, Costabel, Dugac and Coumet was to organize a "Colloque Poisson" (Conference on Poisson), but it did not take place. An exhibition of archival documents concerning Poisson was organized in 1982 by the library of the École Polytechnique.

49. « Présentation du volume : Siméon-Denis Poisson et la science de son temps », Michel Métivier, *Cahiers du Séminaire d'histoire des mathématiques*, 4 (1984), p. 89-92.

["Presentation of the book: Siméon-Denis Poisson and the science of his time," Michel Métivier, *Cahiers du Séminaire d'histoire des mathématiques*, 4 (1984), p. 89-92.]

Bibliothèque Mathématiques Informatique Recherche. Cote C 129

In a talk at the École Polytechnique on April 20, 1982, that was later published, Métivier summarized the book on Poisson published in 1981 (see no. 48), its origin and significance. He analyzed the diverse contributions in the book and showed how this work "contribue de façon passionnante à éclairer un moment particulièrement important de la pensée scientifique" (is a fascinating contribution to the elucidation of a particularly important moment in scientific thought).

50. *The History of Statistics. The Measurement of Uncertainty before 1900* / Stephen M. Stigler. Cambridge, MA: Harvard University Press, 1986.

Bibliothèque Mathématique Informatique Recherche. Cote 01.1 STI 86

Stigler gives a summary of the contributions of 19th century scholars to statistics, and, in particular, he describes the role played by Poisson through the publication of his notes in the *Comptes rendus de l'Académie des Sciences* in 1836, and then of his book, *Recherches sur la probabilité des jugements*, in 1837 (see no. 9).

51. *The History of Modern Mathematics* / David A. Rowe and John McCleary, eds. Volume 2. Boston, MA: Academic Press, 1989.

Bibliothèque Mathématique Informatique Recherche. Cote 01.1 HIS 2-88

This book contains a detailed analysis by Amy Dahan-Dalmedico, "La propagation des ondes en eau profonde et ses développements mathématiques (Poisson, Cauchy, 1815-1825)" (The propagation of waves in deep water and its mathematical developments (Poisson, Cauchy, 1815-1825)), of Poisson's essays on wave theory published in 1818 and 1820 (see no.18) and of those published by Cauchy in the same period.

52. *The Uses of Experiment. Studies in the Natural Sciences* / David Gooding, Trevor Pinch, Simon Schaffer, eds. Cambridge: Cambridge University Press, 1989.

Bibliothèque Chimie Physique Recherche. Cote 504.12 USE

In his article, "Fresnel, Poisson and the white spot: the role of successful predictions in theory acceptance," John Worrall examines the roles of Fresnel and Poisson in the development of the theory of light, and he tells the story of "Poisson's spot."

53. *A History of Inverse Probability. From Thomas Bayes to Karl Pearson* / Andrew I. Dale. New-York: Springer, 1991. Second edition, 1999.

Bibliothèque Mathématique Informatique Recherche. Cote 01.1 DAL 99

In Chapter 8, Dale devotes seven pages to a study of Poisson's essay "Sur la proportion des naissances des filles et des garçons," published in 1830 (see no. 25), then reports in detail upon the mathematical contents of his 1837 book, *Recherches sur la probabilité des jugements* (see no.9).

54. *Les sciences dans l'enseignement secondaire français. Tome I, 1789-1914 : textes officiels* / réunis et présentés par Bruno Belhoste. [Paris] : Institut national de recherche pédagogique, Economica, 1994.

[*Science in French Secondary Education. Volume I, 1789-1914: Official Texts*, collected and presented by Bruno Belhoste. [Paris]: Institut national de recherche pédagogique, Economica, 1994.]

Bibliothèque Chimie Physique Recherche, Cote 507.2 BEL

From 1820 until his death, Poisson played a large part in the organization of education in France, in his role as member and then, after 1822, as treasurer of the Conseil royal de l'instruction publique (Royal Council of Public Education). He was the "master" of mathematics in France and wielded considerable influence. With his authority, he battled to maintain the teaching of mathematics for all students, including those primarily studying humanities. As president of the jury of the competitive examination of "agrégation" for the selection of teachers, he strove to maintain a unified examination for both mathematics and physics.

Poisson's devotion to teaching was well known. In a short autograph letter, dated November 27, 1812, and preserved at the Institut de France in the papers of Ludovic Halévy, Poisson wrote that he was extremely sorry to have to decline an invitation "car nous avons ce jour-là des examens à la faculté des sciences" (because examinations are scheduled for that day at the Faculté des Sciences).

55. *L'édification au XIX^{e} siècle d'une science du phénomène lumineux* / André Chappert. Paris : J. Vrin, 2004.

[*The 19th Century Creation of a Science of Light* / André Chappert. Paris: J. Vrin, 2004.]

Bibliothèque Physique Enseignement. Cote 509.535 CHA

Chappert describes the very important contribution of Fresnel to the theory of reflection and refraction of light, examines Poisson's publications on optics, and retraces the episodes of the 1823 controversy between Poisson and Fresnel.

56. *Cinq siècles de mathématiques en France* / Marcel Berger. Paris : Association pour la diffusion de la pensée française, 2005.

[*Five Centuries of Mathematics in France* / Marcel Berger. Paris: Association pour la diffusion de la pensée française, 2005.]

Bibliothèque Mathématiques Informatique Recherche. Cote 01.1 BER 05

Berger brings attention to Poisson's contributions to potential theory, to harmonic analysis, and to probability theory, as well as to the theory of partial differential equations.

57. *Siméon-Denis Poisson. Les mathématiques au service de la science* / Yvette Kosmann-Schwarzbach, éd. Palaiseau : Éditions de l'École polytechnique, 2013.

[*Siméon-Denis Poisson. Mathematics in the Service of Science* / Yvette Kosmann-Schwarzbach, ed. Palaiseau: Éditions de l'École polytechnique, 2013.]

Bibliothèque Mathématiques Informatique Recherche. Cote 01.7 POI 13

The diverse aspects of Poisson's contributions to mathematics and to physics are examined, as well as the history of their development. This book reproduces all the articles that were published in 1981 in the book *Siméon-Denis Poisson et la science de son temps*, and includes new chapters on the history of mechanics, on the development of symplectic and Poisson geometry, and on gauge theory.

POISSON TODAY

Presented are:

- Four representative works of the vast literature on potential theory and harmonic analysis, where one regurlarly finds the “Poisson kernel” and the “Poisson formula”,
- Four works on probability and statistics, selected from among the hundreds that cite Poisson’s work, whether as the “Poisson distribution” (or “Poisson’s law”) or the “Poisson processes,”
- Works bearing Poisson’s name in their titles, which give an idea of the development of theories originally founded on the notion of Poisson brackets, in geometry, algebra, classical mechanics, quantum mechanics, field theory, etc.

Many other domains where Poisson’s name appears systematically are not represented, such as elasticity, with “Poisson’s ratio,” optics, with “Poisson’s spot,” and electromagnetism, with the “Poisson equation.”

POTENTIAL THEORY

58. *Functions of One Complex Variable* / John B. Conway. New York: Springer-Verlag, 1973. Second edition in two volumes, 1978 and 1995.

Bibliothèque Mathématiques Informatique Recherche. Cote 42 CON 73

59. *Potential Theory* / John Wermer. Berlin, Heidelberg, New York: Springer, 1974.

Bibliothèque Mathématiques Informatique Recherche. Cote 45.2 WER 74

60. *Classical Potential Theory* / David H. Armitage and Stephen J. Gardiner. London: Springer, 2001.

Bibliothèque Mathématiques Informatique Recherche. Cote 45.2 ARM 01

61. *Potential Theory* / Lester L. Helms. New York, London: Springer, 2009.

Bibliothèque Mathématiques Informatique Recherche. Cote 45.2 HEL 09

PROBABILITY AND STATISTICS

62. *Handbook of the Poisson Distribution* / Frank A. Haight. New York, London, Sydney: J. Wiley, 1967.

Bibliothèque de l'Institut Henri Poincaré. Cote 513 48 a

63. *Mixed Poisson Processes* / Jan Grandell. London: Chapman and Hall, 1997.

Bibliothèque Mathématiques Informatique Recherche. Cote 72 GRA 97

64. *Statistical Inference for Spatial Poisson Processes* / Yuri A. Kutoyants. New York: Springer, 1998.

Bibliothèque Mathématiques Informatique Recherche. Cote 72 KUT 98

65. *Non-Life Insurance Mathematics. An Introduction with the Poisson Process* / Thomas Mikosch. Berlin: Springer, 2009.

Bibliothèque Mathématiques Informatique Recherche. Cote 75.7 MIK 09

POISSON GEOMETRY, POISSON STRUCTURES, QUANTIZATION

Poisson geometry, at the confluence of the Hamiltonian formulation of dynamics in terms of Poisson brackets and the geometry of symplectic manifolds, was created in the middle of the 1970s, and has been at the origin of numerous important developments.

66. « Les variétés de Poisson et leurs algèbres de Lie associées », André Lichnerowicz, *Journal of Differential Geometry*, 12 (1977), p. 253-300.

["Poisson manifolds and their associated Lie algebras," André Lichnerowicz, *Journal of Differential Geometry*, 12 (1977), p. 253-300.]

Bibliothèque Mathématiques Informatique Recherche. Cote J 320

In this article, resulting from a collaboration with Moshé Flato and Daniel Sternheimer, André Lichnerowicz defined Poisson manifolds and what is now called Poisson-Lichnerowicz cohomology.

67. *Symplectic Geometry and Analytical Mechanics* / Paulette Libermann and Charles-Michel Marle. Dordrecht: D. Reidel, 1987.

Bibliothèque Mathématiques Informatique Recherche. Cote 67 LIB 87 A

The original French version of this work was published in 4 volumes under the title *Géométrie symplectique. Bases théoriques de la mécanique* (Symplectic Geometry: Theoretical Foundations of Mechanics) in the Publications Mathématiques of the Université Paris VII, 1980-1987.It was one of the first works in book form that dealt with Poisson geometry.

68. *Poisson Algebras and Poisson Manifolds* / K.H. Bhaskara and K. Viswanath. Harlow : Longman Scientific & Technical, 1988.

Bibliothèque Mathématiques Informatique Recherche. Cote 57.5 BHA 88

69. *Nonlinear Poisson Brackets. Geometry and Quantization* / M. V. Karasev and V. P. Maslov. Providence, RI: American Mathematical Society, 1993.

Bibliothèque Mathématiques Informatique Recherche. Cote 67 KAR 93

70. *Lectures on the Geometry of Poisson Manifolds* / Izu Vaisman. Basel: Birkhäuser, 1994.

Bibliothèque Mathématiques Informatique Recherche. Cote 57.5 VAI 94 A

71. *Quantization, Coherent States, and Poisson Structures* / A. Strasburger, S. Twareque Ali, J.-P. Antoine, J.-P. Gazeau, A. Odzijewicz, eds. Warsaw: Polish Scientific Publishers PWN, 1998.

Bibliothèque Mathématiques Informatique Recherche. Cote 82 WGMP 95

This volume consists of reports from the 14th "Workshop on Geometric Methods in Physics," which was held in Białowieza, Poland, July 9-15, 1995.

72. *Lectures on Symplectic and Poisson Geometry* / Izu Vaisman. [Coimbra, Portugal]: Departamento de Matemática da Universidade de Coimbra, 2000.

Bibliothèque Mathématiques Informatique Recherche. Cote 67 VAI 99

These lectures from the "Summer School on Differential Geometry," which was held at Coimbra in September 1999, were published from notes taken by Fani Petalidou.

73. *Quantization, Poisson Brackets and Beyond* / Theodore Voronov, ed. Providence, RI: American Mathematical Society, 2002.

Bibliothèque Mathématiques Informatique Recherche. Cote 67 QUA 01-2

This volume consists of reports from the conference organized by the London Mathematical Society, “Quantization, deformations, and new homological and categorical methods in mathematical physics,” July 6-13, 2001, in Manchester (University of Manchester Institute of Science and Technology).

74. “Deformation quantization of Poisson manifolds,” Maxim Kontsevich, *Letters in Mathematical Physics*, 66 (2003), p. 157-216.

Bibliothèque Mathématiques Informatique Recherche. Cote L 385

In this article of capital importance, deposited on the pre-publication archive arxiv.org in September 1997 and finally published in 2003, Kontsevich shows that any finite-dimensional Poisson manifold can be quantized, in the sense of quantization by deformation.

75. *Poisson Geometry, Deformation Quantisation and Group Representations* / Simone Gutt, John Rawnsley and Daniel Sternheimer, eds. Cambridge: Cambridge University Press, 2005.

Bibliothèque Mathématiques Informatique Recherche. Cote 67 POI 03 b

76. *Poisson Structures and their Normal Forms* / Jean-Paul Dufour and Nguyen Tien Zung. Basel: Birkhäuser, 2005.

Bibliothèque Mathématiques Informatique Recherche. Cote 67 DUF 05

77. *The Breadth of Symplectic and Poisson Geometry. Festschrift in Honor of Alan Weinstein* / Jerrold E. Marsden and Tudor S. Ratiu, eds. Boston: Birkhäuser, 2005.

Bibliothèque Mathématiques Informatique Recherche. Cote 67 BRE 05

78. *Poisson Geometry in Mathematics and Physics* / Giuseppe Dito, Jiang-Hua Lu, Yoshiaki Maeda, Alan Weinstein, eds. Providence, RI: American Mathematical Society, 2008.

Bibliothèque Mathématiques Informatique Recherche. Cote 67 POI 06

79. *Cluster Algebras and Poisson Geometry* / Michael Gekhtman, Michael Shapiro and Alek Vainshtein. Providence, RI: American Mathematical Society, 2010.

Bibliothèque Mathématiques Informatique Recherche. Cote 16.5 GEK 10

80. *Poisson Structures* / Camille Laurent-Gengoux, Anne Pichereau and Pol Vanhaecke. Heidelberg: Springer, 2013.

Bibliothèque Mathématiques Informatique Recherche. Cote 17 LAU 13

INTERNATIONAL CONFERENCES ON POISSON GEOMETRY

The first international conference on Poisson geometry was held at the Banach Center in Warsaw from 3 to 15 August, 1998, in memory of Stanisław Zakrzewski, who had organized the meeting but died suddenly, while visiting the Institut des Hautes Études Scientifiques (IHÉS) in Bures-sur-Yvette, three months before the planned event. The next meeting was in 2000 and, since then, an "International Conference on Poisson Geometry" was held every two years.

PG1. *Poisson Geometry, Stanisław Zakrzewski, in memoriam* / Janusz Grabowski and Paweł Urbański, eds. Warsaw: Banach Center Publications, 2000.

Bibliothèque Mathématiques Informatique Recherche (Paris 7 Sophie Germain). Cote 67 ZAK 00

Proceedings of the first international meeting on Poisson geometry (Banach Center, Warsaw 1998).

No proccedings of the second and third meetings, "Poisson 2000," held at the Centre International de Rencontres Mathématiques (CIRM) in Marseille-Luminy in July 2000, and "Poisson Geometry," held at the Instituto Superior Técnico (IST) in Lisbon in July 2002, were published.

PG2. *Special issue devoted to papers originated from the 4th conference on Poisson Geometry* / Carine Molitor-Braun, Norbert Poncin and Martin Schlichenmaier, eds. Luxembourg: Publications de l'Université du Luxembourg, XVI, 2005.

Bibliothèque de l'Institut Henri Poincaré. Cote K 275 3 XVI

Proceedings of the fourth Conference on Poisson Geometry (University of Luxembourg).

The proceedings of the "International Conference on Poisson Geometry in Mathematics and Physics" that was held at the National Olympics Memorial Youth Center, Tokyo, in 2006 were published by the American Mathematical Society in 2008 (see no. 78).

PG3. *Special Volume on Poisson Geometry* / Anton Alekseev, Alberto S. Cattaneo, Yvette Kosmann-Schwarzbach, Tudor S. Ratiu, eds*. Letters in Mathematical Physics*, 90 (2009).

Bibliothèque Mathématiques Informatique Recherche. Cote L 385

This special issue contains papers by the speakers at the "International Conference on Poisson Geometry in Mathematics and Physics" that was held at the Bernoulli Center of the École Polytechnique Fédérale in Lausanne (EPFL) in July 2008.

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PG4. *Special Issue, Volume 42, No. 4* / Henrique Bursztyn, Rui Loja Fernandes, Jiang-Hua Lu and Alan Weinstein, eds. *Bulletin of the Brazilian Mathematical Society* (2011).

Bibliothèque Mathématiques Informatique Recherche. Cote B 764

This special issue contains papers by the speakers at the "International Conference on Poisson Geometry in Mathematics and Physics" that was held at the Instituto Nacional de Matemática Pura e Aplicada (IMPA) in Rio de Janeiro in July 2010.

AUDIOVISUAL DOCUMENT

81. *Science à partir d'une feuille de papier*. Conférence à la Bibliothèque nationale de France, 8 février 2012.

[*Science from a piece of paper*. Lecture at the Bibliothèque nationale de France, February 8, 2012].

A public lecture delivered by Tadashi Tokieda, director of studies at Trinity Hall, University of Cambridge, about Poisson's text: "Mémoire sur l'équilibre et le mouvement des corps élastiques" (Essay on the equilibrium and the motion of elastic bodies), published in the *Mémoires de l'Académie des Sciences de l'Institut de France*, 8 (1829), p. 357-570.

http://www.bnf.fr/fr/evenements_et_culture/anx_conferences_2012/a.c_120208_tokieda.html

On the same subject, see also:

"Poisson's ratio over two centuries: challenging hypotheses," G. Neville Greaves, *Notes and Records: the Royal Society journal of the history of science*, 67 (2013), p. 37-58. DOI: 10.1098/rsnr.2012.0021

ARCHIVAL DOCUMENTS

The documents displayed are copies.

82. Acte de baptême de Siméon-Denis Poisson (1781).

[Baptismal certificate of Siméon-Denis Poisson (1781).]

Municipal archives of Pithiviers. Baptismal register.

"Acte de baptême du 22 juin 1781 de Simeon Denys fils de Simeon Poisson et Aimée Marie Francheterre, né le 21 juin 1781, ondoyé le même jour" (Baptismal certificate, dated June 22, 1781, of Simeon Denys son of Simeon Poisson and Aimée Marie Francheterre, born June 21, 1781, ondoyé on the same day).

"Ondoyer un enfant" means to baptise a newborn without the ceremonies of the Church. It was practiced when a newborn was in danger of death, or if the baptism should have been deferred for propriety's sake, as in the case of princes.

83. Liste générale des Candidats […] admis à l'École polytechnique en l'an 7 (1798).

[General list of Candidates […] admitted to the École Polytechnique in the year 7 (1798)]

Archives of the École polytechnique

"Liste générale des Candidats qui d'après leur examen et la discussion du Jury ont été jugés suffisamment instruits pour être admis à l'École Polytechnique en l'an 7. Lesdits candidats classés dans cette liste suivant le degré de leur instruction" (General list of the Candidates who, according to their examinations and the discussion of the Jury, have been judged sufficiently educated to be admitted to the École Polytechnique in the year 7. The aforesaid candidates ranked in this list according to the degree of their proficiency).

Poisson was ranked first.

84. Rapport sur un Mémoire du Cit^{en} Poisson, 6 nivôse an 9 (27 décembre 1800).

[Report on an essay by Cit^{en} Poisson, 6 Nivôse, year 9 (December 27, 1800).]

Archives of the Académie des Sciences – Institut de France

This four page long "Rapport sur un Mémoire du Cit^{en} Poisson relatif au nombre d'intégrales complettes [*sic*] dont les équations aux différences finies sont susceptibles" (Report on an

essay by Cit[en] Poisson relating to the number of complete integrals of which equations of finite differences are susceptible) is signed by Lacroix and Legendre. When he presented this essay to the Institut national (which had replaced the Académie des Sciences in 1795) on December 8, 1800, Poisson, at the age of 19, was still a student at the École Polytechnique. The reporters wrote in conclusion: “Il en résulte au moins que la théorie établie par ce jeune géomètre est exacte, et quand même elle ne serait pas susceptible d’applications utiles dans les problèmes qui conduisent à ce genre d’équations, on doit toujours regarder comme contribuant au progrès de la science, l’éclaircissement d’un problème d’analyse qui jusqu’à présent était resté dans une grande obscurité” (It follows at least that the theory established by this young geometer is correct, and eventhough it would not be susceptible to useful applications in the problems that lead to this type of equations, one must always regard the clarification of a problem of analysis which until the present remained in great obscurity as contributing to the progress of science) and recommended the inclusion of the “young geometer’s” essay in the *Recueil des savants étrangers*. This essay was published in the *Journal de l’École polytechnique* (see no. 12).

85. Extrait du registre de contrôle des élèves de l’École polytechnique (1801).

[Extract from the register of students at the École Polytechnique (1801).]

Archives of the École polytechnique

Card delivered to C[en] Poisson, Siméon Denis, on Nivôse 1, year 10 (December 22, 1801).

86. Document attestant le grade de sergent d’artillerie du c. Poisson, élève de l’École polytechnique, 9 nivôse an 10 (30 décembre 1801).

[Document attesting to the rank of artillery sergeant for c. Poisson, student at the École Polytechnique, 9 Nivôse, year 10 (December 30, 1801).]

Archives of the École polytechnique

“Vu à l’État-Major de la Place de Paris. Signé, l’adjoint de place Le Vallois” (At the Head-quarters of the Paris military district. Signed, adjutant Le Vallois).

87. Confirmation de la nomination de Poisson en qualité de suppléant de Fourier, 11 brumaire an 11 (2 novembre 1802).

[Confirmation of the nomination of Poisson to replace Fourier, 11 Brumaire, year 11 (November 2, 1802).]

Archives of the École polytechnique

“Au Directeur de l’École Polytechnique

Je vous préviens, Citoyen, que le Ministre de l’Intérieur a confirmé le choix que le Conseil de l’École Polytechnique a fait du Cit^en^ Poisson, pour remplir, en qualité de suppléant, par intérim, du Cit^en^ Fourrier [*sic*], les fonctions d’instituteur d’analyse à ladite École.
Je ne doute pas que le zèle et le talent du Cit^en^ Poisson ne justifient votre choix et la confiance du Gouvernement.

Je vous salue,

Fourcroy.”

To the Director of the École Polytechnique,

I write to inform you, Citizen, that the Minister of the Interior has confirmed the choice that the Council of the École Polytechnique has made of Cit^en^ Poisson, to take over temporarily the duties of Cit^en^ Fourrier [*sic*], as instructor of analysis at the said École.
I do not doubt that Cit^en^ Poisson’s zeal and talent justify your choice and the confidence of the Government.

Sincerely,

Fourcroy.

The chemist Antoine-François de Fourcroy (1755-1809) had been a member of the First Class of the Institut national since 1795, and was Professor at the École Polytechnique. He would be named Director General of Public Education in 1802.

88. Portrait de Siméon-Denis Poisson par E. Marcellot, 1804.

[Portrait of Siméon-Denis Poisson by E. Marcellot, 1804.]

Archives of the École polytechnique

In 1804, Poisson was Assistant Professor at the École Polytechnique. He would become Professor two years later.

89. Lettre d’envoi du décret de l’Empereur qui nomme Poisson Instituteur d’analyse à l’École polytechnique, 17 mars 1806.

[Covering letter for the decree of the Emperor [Napoleon] naming Poisson as Instructor of analysis at the École Polytechnique, March 17, 1806.]

Archives of the École polytechnique

“A Monsieur Poisson

J’ai l’honneur de vous adresser, Mr, l’ampliation du décret de S[a] M[ajesté] qui vous nomme Instituteur d’Analyse à l’École Polytechnique. Je me félicite d’avoir à vous transmettre ce témoignage de distinction donné par le Gouvernement à un ancien élève de l’École, il remplit à la fois le vœu de l’École et le mien, et est la juste récompense de vos talents et de votre zèle.” Signé, J. L. d. v. S.

To Monsieur Poisson,

I have the honor of conveying to you, Sir, the copy of His Majesty’s decree that names you Instructor of Analysis at the École Polytechnique. It is my pleasant duty to forward to you this testimony of distinction bestowed by the Government upon a former student of the École, it fulfills at once the École’s wishes and mine, and is the just reward for your talents and zeal. Signed, J.L. d. v. S.

Poisson was named full professor as the replacement for Fourier, who had become Prefect of the Department of Isère in 1802, and for whom he had been deputy since that date.

90. Lettre autographe signée de Poisson, datée du 31 mars 1812.

[Autograph letter signed by Poisson, dated March 31, 1812.]

Archives of the École polytechnique

Poisson asks the governor of the École Polytechnique, in the name of the committee of the *Journal de l’École polytechnique*, to send volumes 8 and 9 of the *Journal* to Gauss. Poisson refers to Gauss as the “géomètre le plus distingué de l’Allemagne” (the most distinguished mathematician in Germany). Volume 8 (1809) contained four of Poisson’s articles (see nos. 14 and15) and volume 9 (1813) contained two of them (see no.17).

91. Rapport de Poisson et Ampère, signé de Poisson, sur un mémoire de Pouillet sur le phénomène des anneaux colorés, 22 janvier 1816.

[Report of Poisson and Ampère, signed by Poisson, on an essay by Pouillet on the phenomenon of colored rings, January 22, 1816.]

Archives of the Académie des Sciences – Institut de France

This report is an autograph manuscript. It is now Poisson’s turn (see no. 84), to judge the essay of a young physicist – who is 26 years old – and to recommend the publication of his work. Claude Pouillet went on to become a professor at the École Polytechnique in 1830 and 1831, then at the Sorbonne, and was elected to the Académie des Sciences in the

general physics section in 1837. Poisson himself published an article titled “Sur le phénomène des anneaux colorés” (On the phenomenon of colored rings) in 1823.

92. Inauguration de la statue de Poisson le 15 juin 1851.

[Inauguration of the statue of Poisson, June 15, 1851.]

Municipal Archives of Pithiviers

The town of Pithiviers wished to honor Poisson, a native of that city, by erecting his statue. The *Courrier du Loiret* of June 8, 1851, reportsthat the sum collected by public subscription organized by the city has reached 11,731 francs. The inauguration was organized on June 15, 1851, and a poem composed for the occasion: “Hommage à la statue de Siméon Denis Poisson” (Homage to the statue of Siméon-Denis Poisson).

93. Statue de Poisson à Pithiviers.

[Statue of Poisson at Pithiviers.]

Municipal Archives of Pithiviers. Carte postale. Cote 3Fi149

The sculptor Auguste Deligand represented Poisson as a Peer of France, his left hand holding a closed book. The statue was installed in Place du Martroi, and then moved in 1864 to the Place du Grand Cloître, later becoming Place Denis Poisson.

94. Déboulonnage de la statue de Poisson, 19 février 1942.

[Dismantling of the statue of Poisson, February 19, 1942.]

During the Second World War, the statue of Poisson, like many others, was dismantled by the Germans to be melted and used to manufacture arms.

Municipal Archives of Pithiviers. Photographie. Fonds Bernard Valéry

95. « Bas-relief de la statue du mathématicien Poisson ».

[Bas-relief of the statue of the mathematician Poisson.]

Municipal Archives of Pithiviers. Carte postale. Cote 3Fi156

Two bronze bas-reliefs decorated the north and south faces of the pedestal of the statue of Poisson. They were saved from being melted down and deposited in the municipal museum in Pithiviers.

THANKS

The library thanks for their friendly cooperation:

The archival service of the Académie des Sciences,
The archival service of the École Polytechnique,
The archival service of the City of Pithiviers,
The mathematics and computer science library of the École Normale Supérieure,
The library of the Institut Henri Poincaré,
The library of the Observatoire de Paris,
And the libraries of the Universities Pierre et Marie Curie and Paris-Diderot,

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