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## Dossier Pierre Duhem

### Duhem in Pre-War Italian Philosophy: The Reasons of an Absence

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#### Abstract:

The article illustrates the presence of Duhem's thought in Italian philosophical culture until the Great War. This presence was very scarce, so we must speak of an absence. One can identify the causes of this absence with the fact that all the great Italian philosophical currents, in different ways, have had little interest or been manifestly opposed to the tensions that came from abroad after the great discussion about the crisis of mechanicism in which Duhem was an important protagonist.

#### Keywords:

Pierre Duhem; Ernst Mach; Italian Philosophy; History of Science

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In the years when Duhem was reflecting on the philosophical value of science, the philosophy of science was not attracting much attention in Italy. At the turn of the twentieth century, the idealist school of Benedetto Croce and Giovanni Gentile was taking centre stage on the Italian philosophical scene. Both Croce and Gentile were very critical of the importance of philosophy in science, albeit for different reasons.

In his "Logica come scienza del concetto puro" [Logic as the science of pure concept] published in 1909, Benedetto Croce maintains that scientific knowledge only has an instrumental, practical value, and that it is composed of pseudo-concepts. This critique became famous, but it was not anything new in Croce's intellectual path. What he did in 1909 was simply reiterating and developing a belief he had already acquired years – about a decade – earlier, while he was reflecting on historical and literary themes, unaware of the contemporaneous debate on exact sciences. He learned about the thought of Mach, Avenarius and Poincaré (but not Duhem) only when his critique of science had turned into a deeply rooted conviction. "About the time" he began to study Hegel, in 1905, Croce also read "the new gnosiologists of science and the blundering pragmatists, obtaining a proof of his critiques of aesthetic doctrines" (Croce 1945, 401). It is irrelevant whether Croce read Mach a few months before or after writing his Logic, because the discourse on sciences presented in this text does not owe anything to Mach or other epistemologists. It belongs solely to Croce in structure, style and arguments. Wherever traces of other thinkers may be found, they are always such generic and widespread theses that it is impossible to establish whether Croce was referring to Mach or Papini.

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Nevertheless, some of those generic and widespread theses are the point of arrival of Croce's deprecating discourse on the cognitive power of science. It is true that Croce draws those conclusions by following his personal path – a path that is theoretically flawed, as it overlooks the arguments of the more advanced epistemology and neglects the practice of science – but his conclusions are not personal at all.

Croce's so often quoted opinions on science mirrored analogous judgements that were widespread among the numerous European and American varieties of Bergsonism, Conventionalism, more or less mystical Pragmatism, Fictionism, Empirio-criticism, but also – by then – of Italian Positivism.

Around 1905 also Italian Positivism – despite the roughness and narrow-mindedness of many of its representatives – had become aware of the ongoing discussion about the crisis of the mechanical philosophy in Europe, the “failure of science”, the rebirth of Idealism, Contingentism and so on. For instance, in “Della conoscenza del fatto naturale e umano” [Of the knowledge of the natural and human fact], already in 1896, the positivist Giuseppe Tarozzi presented an idea of science that was perfectly in line with the movement of the “destruction of reason” that was permeating European culture; a concept that was particularly akin to Bergson's ideas. Another example is Giovanni Marchesini's “La crisi del Positivismo e il problema filosofico” (1899) [The crisis of Positivism and the philosophical problem], a book whose main goal is to counter the thesis that attributes a symbolic value to scientific concepts, although admitting that it was Positivism that contributed to the emergence of Scepticism. This statement clearly contrasts with the ideas of Fouillé, one of the main French representatives of the idealistic revolt against scientific Naturalism. Another text worth mentioning is “Sopra la teoria della scienza” [On the theory of science] (1903), an early work by Annibale Pastore, another opponent of Neidealism. Pastore presented a similar analogical-fictionist conception of Modelism, perceived as the main scientific method, which mirrored, widened and specified the ideas of one of Pastore's masters, physicist Antonio Garbasso, a feisty adversary of Croce.

As a matter of fact, Croce's discourse on science relegated it to the realm of “usefulness” and simply reiterated an opinion that was widely shared or at least known by many Italian scholars. Quite opportunistically, Croce came to the same conclusions on the troubles of nineteenth-century science as many other European scholars, but the details of such conclusions were foreign to his personality. Particularly, the absence of Duhem's name in Croce's writings is a sign of his superficial relationship with epistemological works.

Gentile was even less interested in epistemology than Croce. In his famous controversy with mathematician Federigo Enriques, Gentile refrained from an epistemological discussion, shifting his focus from the “critique of science” to Enriques' “scientific philosophy”, identified as the “Naturalism” that is typical of all science-based philosophies. Even in his systematic works Gentile traced the critique of sciences back to the critique of a vaguely outlined single type of philosophy, which, in his view, encompassed all the science-based philosophical varieties.

Unlike Croce, Gentile could not criticize sciences and separate them from philosophy by attributing them a mere practical value, as in his philosophy a clear distinction between theory and praxis is impossible: like philosophy, science has a cognitive value, too. The difference between science and philosophy lies in the lack of universality of the object in science. In fact, every science is particular and refers to a limited object. Hence its need to presume the object of its investigation and to see reality as nature, made of elements that can be studied separately. So, Dogmatism and Naturalism are the two distinctive characters of every science, and Gentile finds them after a very generic analysis that has no relation whatsoever with epistemological critique. On the contrary, the immediate conclusion that Gentile draws from his investigation appears to be in contrast with what was emerging in epistemology at the time. As epistemological critique was often labelled as an allied of “idealistic reaction” at the beginning of the century, Gentile established a strong and steady relation between science and Materialism. He speaks of a “logically necessary tendency of science in all times towards the mechanical philosophy and Materialism” (Gentile 1924, 198) and maintains that “science as philosophy has always stood up against philosophy, which, overcoming the mechanical philosophy, Empiricism and Dogmatism, has tried to turn into a universal idea of the world in its metaphysical reality”. He also theorises the incompatibility between being a scientist and being an idealist: “Scientists, because of the very spirit of science – which is not and does not want to be philosophy –, have always supported one philosophy: the most naïve and weak of its forms” (Gentile 1924, 199).

As a matter of fact, Gentile's thesis about the theoretical separation between science and Idealism only made sense within his system and, as such, it was built around a logical pattern that was completely extraneous to scientific dynamicity, even though it mirrored exactly the image of science as outlined by

positivist Scientism. During the nineteenth century, the bond between science and Materialism had been very strong (but not exclusive), but Gentile's vision turns a historically framed idea of science – that of the age of Positivism – into an absolute and unhistorical idea.

By theorising a clear-cut contrast between science and Idealism, Gentile contributed much more than Croce to the separation of Italian philosophy from science at the beginning of the twentieth century. In Croce's view, science differed from philosophy, but for Gentile it was an enemy to be defeated for the triumph of Idealism – hence the crusade-like spirit of his works.

Gentile was certainly aware of the existence in Europe of interpretative tendencies – very often within science itself –, which prefigured the divorce between science and Materialism already in the nineteenth century. However, these tendencies could be perceived as philosophical critiques coming from the outside and not created by internal developments of the scientific thought, as these developments were invariably materialistic. Epistemologist could be easily ignored: in the many pages of Gentile's works there is no mention of Mach, Poincaré and Duhem.

Croce's and Gentile's critiques only developed within the framework of superficial and instrumental relationships with the major epistemologists of the time, or even without any familiarity with their works, and one gets the same impression by reading the works of the main targets of the critique of Idealism – the positivists.

Italian Positivism had dealt with psychology, anthropology, sociology, law, but mathematized natural sciences had never been among its interests. In the books by Tarozzi, Marchesini and Troilo one can find long discussions about the nature of science, but they only deal with the concept of science or experience, hypothesis, law, symbol, etc., in very generic terms, without any reference to physics, and the authors seem not to have a real knowledge of the epistemologists who were turning physics into one of the most important motifs of philosophical analysis. Therefore these works appear backward and narrow-minded.

In order to find references to the questions of physics or to authors such as Mach or Duhem, we must turn our attention to less elaborated works, such as articles or reviews. Of course, this proves the weak impact of these themes on the overall development of Positivism. Mach is the name that is most often quoted, although very limitedly, on positivist journals. But it is a reduced, simplified and criticised version of Mach.

In 1900 Enrico Morselli, in his review of Karl Pearson's "The grammar of science" on *Rivista di Filosofia e Pedagogia* paints both Pearson and Mach as mediocre scientific popularisers: "Pearson's work is essentially an educational text, [which is echoed in Europe by] the books of Prof. Mach, who excels in his most difficult and useful work of popularising knowledge" (Morselli 1900, 83).

In 1903 Giovanni Cesca published in the same journal one of the few Italian articles dedicated to Mach (and to his "follower" Ostwald), in which Mach is presented not as a scholar who has drawn certain philosophical conclusions through a precise reflection on his work as a scientist, but, on the contrary, as a scientist who – like all scientists – is invariably confined in the narrow realm of Empiricism and Materialism and, when he comes to suffer these limitations and starts philosophising, falls naively and hastily for "those doctrines opposing Positivism and the mechanical philosophy" (Cesca 1903, 248). Cesca's critique to Mach proceeds along lines that are completely unrelated to Mach's arguments, ignoring the reasons of epistemology and articulating a totally non-analytical discourse: Cesca only counters Mach's idea by postulating a series of philosophical necessities that make philosophy independent and superior to physics. In Cesca's view, Mach has developed an "extreme Idealism", a "doctrine of absolute Phenomenalism or Idealism" (Cesca 1903, 249). Mach's mistake is not having recognised that science does not only have a hypothetical and economic part, but also a positive part, which is based on the data coming from the experience of all mankind. One must admit an object in juxtaposition with a subject, something outside us that serves as the basis for our sensations. Like science, philosophy does not settle for a "quantitative conception of physical phenomena". It aspires to reaching the qualitative causal explanation (Cesca 1903, 249). With this goal it relies on "empirical metaphysics explaining the causes, the laws of the becoming of facts, which reduce them to their ultimate constitutional elements and show the essential and peculiar qualities of each one of them" (Cesca 1903, 265).

It is clear that such an approach, interested as it is in the "causes" and "essential qualities" of phenomena, could only have a few points of contact with an anti-metaphysical author such as Mach. The differences from Duhem were just as radical, if only Cesca had read his works.

Cesca's concern with rejecting the possible sceptical and subjectivist results of the new critique to physical sciences in the name of a supposed positive philosophy – a philosophy that transcends physics by

providing steady fundamentals whenever physics leans dangerously towards Pyrrhonism or Idealism – can also be found in other positivists who – more or less incidentally – deal with some of the great physicists of the mechanical philosophy. That is the case of Adolfo Levi, the author of a 1909 essay on Mach's Phenomenalism, and Adolfo Faggi who, polemicizing with a book by Igino Petrone (1900) that criticises the mechanical philosophy on the basis of Stallo's and Boutroux's books, states that science must not fall prey to subjectivism: it may maintain the schemes of mechanistic determinism, so long as it recognises the superiority of philosophy over quantitative science. Philosophy can answer questions that would not find any answer in science, and Faggi (1900, 386) reiterates this idea with accents that recall Gentile's famous thesis of contrast between science (the world of dead things) and philosophy (the theory of live reality).

Italian Positivism was therefore much busier defending itself from the new epistemological critique than understanding and using it. The comparison between these two problems was sporadic and basically unimportant for this current of thought. Italian Positivism was already sailing on troubled water and by failing to recognise the latest and most stimulating trends in the field of the philosophy of science it definitely separated its rhetorical and undetermined idea of science from real science.

Pragmatism – first a travel companion and then an enemy of Idealism – was the loudest and most quarrelsome philosophy of the first decade of the twentieth century. Its fiercest upholders – Prezzolini and Papini – were essentially political and literary philosophers, and no interest for science can be detected in pragmatist journals such as “La Voce” and “Leonardo”. There is indeed some hint at “positive” science in the discussion about psychiatry and Lombroso's school in particular. Apart from that, science is discussed only as philosophy through the mediation of Nietzsche and Bergson (and their followers), whereas more serious critics of the nineteenth-century mechanical philosophy, such as Boutroux and Milhaud, are not mentioned at all.

The only one in the pragmatist group to have some interest for modern epistemology was Vailati. However, Vailati's reflection on physics, too, seems marginal and strongly influenced by his personal interest. Vailati devoted painstaking and accurate analyses to problems concerning mathematics, logic, psychology, linguistics, history of ancient science, but he wrote almost nothing about modern physics. Rare hints to themes touched by anti-mechanist critics can be found in Vailati's works, as he comments on authors such as Mach and Duhem, but his analysis of their thought is strongly limited by his personal interests, which make him lose sight of the epistemological value of such fundamental works. Thus, his reviews of Mach's books focus mainly on the psychological side of his work and Mach is considered, quite simplistically, as the author of a “psychology of scientific methods” (Vailati 1911a, 43). In his comment on Duhem's *La théorie physique*, which Vailati is the first to bring to the attention of the Italian public already in 1905, at a time when it had only appeared as separate articles, he only quotes those “conclusions” that are “strictly related” to the “philosophical direction represented by Leonardo in Italy”, namely Pragmatism (Vailati 1911b, p. 593). Although he smartly understands that Duhem's fundamental thesis is the holistic one, Vailati only touches that subject in relation to the influence it could have on the pragmatic concept of meaning, and the remaining part of Duhem's work, relevant and complex as it is, is completely ignored.

In the depressing Italian philosophical landscape a pugnacious group of opponents of Idealism and Pragmatism emerged. Since 1907 this group identified with the journal “Cultura filosofica”, edited in Florence and directed by Francesco De Sarlo. The journal's fundamental idea was the firm conviction of the inseparability of scientific and philosophical knowledge.

It can be said that, throughout the first years of its existence, the journal remained consistent, exploring the numerous links between philosophy and a vast array of scientific disciplines, including mathematics, biology, psychology, law and finally also physics.

It was on the pages of “Cultura filosofica” that the names of Mach, Duhem, Poincaré, Milhaud, etc. started to be mentioned more often, although it must be said that there are no traces of autonomous reflections by Italian scholars on determined scientific problems, and physics appears only through the mediation of these foreign authors.

The journal's first article is dedicated to Mach: “La conoscenza scientifica secondo E. Mach” [Scientific knowledge according to E. Mach], by director De Sarlo. The fundamental coordinates of the journal's interpretation of coeval epistemological critique are already outlined in the article: on the one hand, a psychological interpretation of the main works of Mach and his followers; on the other hand, a strong critique of these authors' conventionalistic, nominalistic and pragmatistic statements. It should not be forgotten that De Sarlo was then involved in an intense debate with Prezzolini's and Papini's pragmatistic



group, which had assimilated the most subjectivistic results of German Empirio-criticism and French *nouveau* Positivism. In De Sarlo's view, to criticise Mach's economic vision of science meant to fight the ideas of Mach his Italian rivals had re-elaborated.

Faithful to the idea that psychology was meant to have fundamentally important philosophical functions, and having presented his critique of Mach's science as founded on two cornerstones (history of science and "the psychology of the scientist") (De Sarlo 1907, 2), De Sarlo turns his attention to what he thinks is the main question posed by Mach, namely the objective value of scientific laws.

Although admitting that Mach's texts about history describe progress as inseparable from a realistic vision of science, De Sarlo attacks the theoretical formulations of Mach's epistemology – as they are invalidated by an unacceptable subjectivism – by counterposing a rationalistic objectivism: "It is impossible to understand how irregular successions of phenomena can lead someone to look for causes in those changes, unless we admit that the need for reason is inherent to the human mind" (De Sarlo 1907, 4).

The journal later published other articles that intended to criticise Mach in order to reaffirm a scientific Objectivism that, far from going back to the typical ideas of positivistic Empiricism, was rooted in an atmosphere of idealistic rationalism, which strived more and more towards an agreement between science and religion. Along with Mach, other critics of the mechanical philosophy were brought to the public attention – although limitedly – and attacked, e.g. Milhaud, Ostwald, Boutroux and Duhem. The latter was the one who was given the least relevance. However, they were told apart from the critics of science belonging to Bergson's school, who were considered just as literates, incapable of any actual analysis of the theories on the history of science.

Antonio Aliotta, De Sarlo's student, stands out in particular. Starting from 1908, he conducted a critical overview of the philosophy of his time, writing several essays which were later collected in the highly significant "La reazione idealistica contro la scienza" (The idealistic reaction against science), published in 1912. This text is certainly one of the most authoritative works written in Italy in those years about the crisis of the mechanical philosophy and its philosophical consequences.

Aliotta has the merit of divulging in Italy philosophers of science who were previously almost unknown, but his work gives an image of the positivistic concept of science that is historically shaped in favour of the arguments it sets forth.

That is not only clear in the very questionable measure of relevance given to the various authors – for example, Aliotta dedicates only half a page to Nietzsche and a whole chapter to Annibale Pastore –, but mostly in the historical path outlined by the book, according to which the crisis has been a predominantly philosophical event, whereas scientific developments have only played a minor role. There is almost no mention of the mechanical philosophy on a scientific level, or only a vague hint as Aliotta quotes passages of history of science by an author who had some interest in history. Therefore the chapter about Duhem, who wrote profusely about history, is quite rich with historical observations, whereas other chapters do not even touch upon the subject of nineteenth-century science. While reading Aliotta's work, one gets the impression that the author saw the "anti-intellectual reaction" as an essentially philosophical phenomenon, a process that developed on an autonomous philosophical level with only occasional points of contact with science. It does not seem Aliotta understood that in those years there had been important scientific novelties, which would eventually lead to new science-oriented philosophical developments. Aliotta was convinced that the mechanical philosophy – which philosophers had shown to be no longer conceivable in dogmatic and realistic forms – still remained a valid scientific scheme, as only it could satisfy mankind's need for intelligibility.

According to Aliotta, the mechanical philosophy must be taken as an ideal explanatory scheme that is rooted in the needs of reason and finds its motivation in it. The mechanical philosophy is irreplaceable, because we cannot think of the world but through mechanistic concepts. Thus, the concrete developments of physics in those years could not be of any interest for this vision, which saw philosophy as unrelated and superior to science and could not imagine the downfall of the mechanistic scheme. This explains the absence – or at least the sporadic mentioning – of science in Aliotta's works.

While writing his essay, Aliotta moved the fundamentals of his rationalism away from the needs of reason and towards religion. He originally criticised Conventionalism, Pragmatism, Economicism by appealing to a principle of rational order as an indispensable postulate for knowledge. Then, after 1910, in line with a similar trend in the journal "Cultura filosofica", his critique found an increasingly steady anchor in the idea of God as the guarantor of the world order: "Those who do not believe cannot and must not believe

in the objective and universal value of science” (Aliotta 1912, 219). Duhem’s complex solution of the relationship between science and religion was therefore replaced by an anathema.

The growing interest of Aliotta and the whole of De Sarlo’s group in spiritual problems in the years before the war was paired by the decreasing attention for the philosophy of science.

The same can be said about another philosopher who stood quite close to De Sarlo in his battle against Croce: Bernardino Varisco.

Varisco had studied mathematics and had written about questions related to physics in a few chapters of his book “Scienza e opinioni” [Science and opinions]. Arguing with Mach (but without knowing the coeval epistemological debate beside Mach) he upheld his characteristic thesis that the notion of force is not conventional, that it has an objective equivalent that manifests itself in the bodies’ action by contact. According to Varisco, the fact that bodies interact by contact is undeniable. Therefore also the validity of the principle of causality is to be considered a fact that no argument can deny. That blocked the way for any conventionalistic and subjectivistic vision. This appeal to common sense to put an end to “byzantine” philosophical discussions remains a distinctive aspect of Varisco’s philosophy also when he devotes himself to the study of the major epistemologists, around 1906, and he uses it to give substance to his philosophical conception of science, which appears quite abstract and generic in his 1901 book.

By studying Naville, Renouvier and Duhem, Varisco intended to continue his battle against Mach, who in the meantime had become a weapon in the hands of the idealists and the pragmatists.

This mainly polemic objective compromises Varisco’s epistemological works. He is so intent in trying to find confirmations for his personal theses that he deforms the interpretation of the authors’ work. Duhem is a good example of that. The holistic thesis, which Duhem had conceived as a logical-epistemological thesis on the procedures of empiric control on the theories of mature science, is assimilated by Varisco to his own notion of “general pressure of experience” (Varisco 1906, 48), which is a psychological notion, valid for the entire human experience, including the one of the cave man. Similar systematic distortions make Duhem’s text compatible with the existence of an objectivism that is actually closer to the everyday man (whose common sense often inspires Varisco) than to the refined French epistemologist.

In his 1909 essay “I massimi problem” [The major problems], Varisco abandoned this kind of studies and turned with increasing determination to metaphysical questions, setting off on a path that would lead him to reconcile with one of his main adversaries, Giovanni Gentile, after the war.

Whereas the “lay” supporters of religion, such as De Sarlo and Aliotta, intervened on scientific problems, discussing and criticising the wave of sceptical philosophical theories following the crisis of the mechanical philosophy in physics, the Catholic cultural world chose to ignore this question. Of course, the Italian representatives of Modernism used Pragmatism and Bergsonism to build their own theological theses, but they completely overlooked all the existing ties between those philosophical positions and science. The traditional Catholic culture, instead, turned to scientific problems, but in such forms as to exclude – particularly in the case of physics – philosophical discussions.

Starting from 1900, the Italian Catholic Society of Scientific Studies began publishing its own journal, *Rivista di fisica, matematica e scienze naturali* [Review of physics, mathematics and natural sciences] under the direction of the bishop of Pavia, Pietro Maffi.

Scientists of high renown, such as Angelo Battelli, Lavoro Amaduzzi, Giuseppe Gianfranceschi, Rinaldo Ferrini and several clergymen wrote about physics in the magazine. These articles look very much like the ones in the pedantic and insignificant annals of the most peripheral academies at a time of positivist domination. Marginal arguments discussed along the guidelines of the most rigid experimentalism, no methodological, theoretical or philosophical discussion whatsoever.

Whilst, on that same journal, Agostino Gemelli was starting to outline his vibrant critique against the mechanical philosophy in biology, physics was only seen within the framework of a “severe apologetic method” (Minutes of the meeting of the Society 1903, 315), opposed to that of “polemic apologetics”, a method based on the idea that no contraposition between faith and scientific truth was possible. It defined itself as a “positive” search for scientific truths, which would eventually – without any mediation through a philosophical and theological analysis – defeat those who wanted to turn science into an instrument against religion. The “arrogant wielders” of science were making the mistake of paying too much attention to shaky hypotheses that were destined to collapse when exposed to the test of facts. Materialists and positivists based their ideas on “castles in the sky” (Tuccimei 1903) that a really positive search would have caused to crumble. The Catholics were called to the search for the truth revealed by experience.

Convinced that “facts are divine and theories are human and therefore subject to mutations and also extinction” (Alasia 1904, 511) (in support to this thesis, Duhem’s early historical works were inaptly quoted), the editors of the journal avoided all discussion about theories and therefore about the philosophical conclusions that could be drawn from them. The “positive” realm of facts was only abandoned for obituaries of Catholic scientists or the publication of some clergymen’s contributions to science and technology.

This lack of interest for the great theoretical and methodological questions translated into very casual descriptions of key events in the history of the relationship between science and faith, such as the problems of the Copernican revolution or Galileo. In the name of the supreme value of facts, the journal offered studies that would never induce an unknowing reader to suspect that the Church ever stood against science.

There were only rare articles proposing religious beliefs, rather than facts, as the judge for scientific theories. The position of the journal’s director, Monsignor Maffi, seems to have had little influence: he postulated the faith in the wise doing of a perfect Maker of the universe as the grounds to reject theories, basically in the name of an unclear idea of simplicity. Maffi expressed himself vehemently against Positivism, which, by separating science from faith and giving it autonomy, had turned it into an inert and lifeless scheme, unable to relate to men and mean something to them.

Such reprimands are unlikely to have seemed attractive to the majority of the journal’s collaborators. The positive *apologia* promoted by the journal was based on the idea that sooner or later a vision of nature that was fully coherent with the religious dogmas would emerge from the pursuit of factual truth. And the journal’s pages were full of that “cold”, “silent” and “lifeless” science Monsignor Maffi was so strongly against.

Needless to say, Duhem’s refined epistemology-based apologetics found no space whatsoever either among the adorers of the “fact” (a notion Duhem had destroyed), or in the ideas of Maffi, who chose religion as the judge of scientific theories, whereas Duhem had separated the two areas and established they were to be connected only with the help of history.

This overview, short as it may be, should have demonstrated how the Italian philosophical circles were inherently unfit for studying and appreciating Duhem’s thought. For different reasons, Idealism, Positivism, Pragmatism, the De Sarlo group and the Catholics were all travelling on rails that could never cross paths with Duhem’s complex philosophy. However, not only philosophers were to blame. Italian scientists must be held responsible as well, as they did nothing to highlight the debates that were taking place among their French colleagues. After all, why should philosophers have been aware of Poincaré, Duhem, etc., while scientists were not? The Italian scientific circles neglected almost completely the scientific theories that served as the backdrop for the epistemological debate, namely Maxwell’s electromagnetic theory – which introduced the question of mechanical models – and thermodynamics – which exposed the unsustainability of the mechanical philosophy. Without this scientific background, the thoughts of Poincaré or Duhem lose all meaning and the philosophers’ lack of interest for them becomes understandable, if not excusable. However, the story of the Italian scientific community in those years is another story.

## References

- Alasia, Cristoforo. 1904. L’evoluzione della meccanica di P. Duhem. *Rivista di Fisica, Matematica e Scienze Naturali* 54: 497-511.
- Aliotta, Antonio. 1912. Le nuove teorie cosmogoniche. *Cultura Filosofica* 6: 198-219.
- Cesca, Giovanni. 1903. L’idealismo di Mach e l’energetismo di Ostwald. *Rivista di Filosofia e Pedagogia* 5: 230-249.
- Croce, Benedetto. 1945 [1918]. Contributo alla critica di me stesso. In Croce, Benedetto. *Etica e politica*. Bari: Laterza, pp. 358-435.
- De Sarlo, Francesco. 1907. La conoscenza scientifica secondo E. Mach. *Cultura Filosofica* 1: 1-13.
- Faggi, Adolfo. 1900. Sui limiti del determinismo scientifico. *Rivista di Filosofia e Pedagogia* 3: 372-390.
- Gentile, Giovanni. 1924. *Teoria Generale dello Spirito come Atto Puro*. Bari: Laterza.
- Levi, Adolfo. 1909. Il fenomenismo empiristico e la concezione fenomenista delle scienze. *Rivista di Filosofia* 4: 31-56.
- Minutes of the meeting of the Society, held in Milan in October 1901. 1903. *Rivista di Fisica, Matematica e Scienze Naturali* 39: 308-318.

- Morselli, Enrico. 1900. Review of K. Pearson's *The grammar of science*. *Rivista di Filosofia e Pedagogia* 3: 79-93.
- Petrone, Igino. 1900. *I Limiti del Determinismo Scientifico*. Modena: Vincenzi.
- Tuccimei B. I. 1903. Cattolici e le scienza naturali. In Minutes of the meeting of the Society, held in Milan in October 1901. *Rivista di Fisica, Matematica e Scienze Naturali* 39: 308-318.
- Vailati, Giovanni. 1911a. Review on *Mechanics* by Mach. In Vailati, Giovanni. Edited by Mario Calderoni, Umberto Ricci and Giovanni Vacca. *Scritti di G. Vailati (1863-1909)*. Leipzig/Firenze: Johann Ambrosius Barth/Successori Seeber, pp. 43-49.
- Vailati, Giovanni. 1911b. Review on *Duhem's Théorie*. In Vailati, Giovanni. Edited by Mario Calderoni, Umberto Ricci and Giovanni Vacca. *Scritti di G. Vailati (1863-1909)*. Leipzig/Firenze: Johann Ambrosius Barth/Successori Seeber, pp. 593-595.
- Varisco, Bernardino. 1906. Fisica e filosofia. *Rivista Filosofica* 8: 42-53.