

Abstract

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The present thesis is based on a scientifically informed reading of Fleck. In addition to the monograph, the material includes his additional philosophical writings and also his internationally published scientific articles. The sources provided by Fleck have been traced back to the time of their origin. Based on the above material, it is argued that rather than relativizing science, and thereby deeply influencing Kuhn, Fleck, attempting to participate in the current debates, is an ardent proponent of science, offering an internal account of its pursuit that accords with his often-contested epistemic concepts. The exposure of his description of the Wassermann reaction discloses a highly selected reading of the, at the time, available sources, but also its relation to the current debate on *Einzelwissenschaften*, or the standing of new emerging disciplines versus age-old ones, all occasioned by the remarkable progress of science that also affected philosophy. The divide between philosophers and scientists on the philosophical implications of modern physics is exposed as well as Fleck's heuristic use of the latter topic in his epistemology. A more realistic account of his scientific accomplishment is provided that includes the unfeasibility of the manufacturing of an anti-typhus vaccine based on urine. It is finally argued that the modern interpretation, or the received humanist view of Fleck, is based on the, at the time of the rediscovery of the monograph, already endorsed program of STS writers opposing a scientifically informed reading of his texts.

Key words: Ludwik Fleck, Wassermann reaction, thought style, Denkstil

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Preface

The genesis of science is human wonder and human curiosity, and wonder, or rather confusion admixed with curiosity, has been the impetus of this thesis. It all started a few years ago with my studies in the humanities, notably the history and theory of science. My confusion was evoked when confronted with the accounts of science as presented by non-scientists. Trained as a scientist I was facing difficulties in comprehending, not only the accounts, but also capturing the issues ascribed to these undeniably great forerunners and the questions they were claimed to address. To, if possible, reduce my confusion, I turned to the original sources of some of their writings and, by so doing, I could appreciate the greatness of their mission and the wealth of their past achievements whether referred to Descartes or Darwin. Furthermore, I sometimes perceived different accounts seemingly overlooked or, at least, not found in the curricular texts, and my questions mostly failed to square with the ones posed by my colleagues within the humanities. The presence of CP Snow was deeply felt.

The inconsistencies came to a height when I was confronted with the monograph of Ludwik Fleck as a part of the curriculum. I already knew of the book and had also tried to read the English translation several years ago, but had rejected it as a somewhat sketchy account of science of little interest to me. Why, already at that time, it was regarded as an icon in certain, unknown (to me) circles was just one of those inscrutable facts we often face. However, my renewed, enforced encounter intrigued me, as the book, in my view, amply exposed the incompatibilities between the text and the unanimously received view of the text and its author. It aroused my curiosity and the field of inquiry was difficult to resist, and somewhat serendipitously, I found myself involved in the topic.

Although I was familiar with the hoax of Sokal, and found his text hilariously funny, I was ignorant of the current science, or science and technology studies (STS). For a considerable amount of time I remained ignorant of the latter writings envisaged as a school. In particular was I ignorant of the fact that Fleck, whom I was inclined to view as a 'Sokal before Sokal' on a rather local level, was viewed as a fundamental figure of STS, nowadays routinely invoked in highly diverse, seemingly incompatible contexts. Though I did read different texts of STS writers and their opponents, until I had written my three papers, I remained unaware of the full scope of their tenets, incompatibilities and idiosyncratic views, although I had captured phrases such as 'the strong program of the Edinburgh School' and the names of what turned out to be its most ardent advocates. However, sooner or later the history of any school is to be written, and finally, within the last year, the history of STS has entered the sphere of introductory textbooks, till now written by two of its proponents, one by Sismondo and one by Yearley. In a sense it was badly needed, as the abundance of abstruse acronyms attached to the field easily excludes the ones so far uninformed.

The two books might have been written in response to the quest for a comprehensive introduction articulated by Fuller in his seminal book on Kuhn, published in 2000. I knew of

Fuller, and had read a few of his articles on the Science Wars found on the Internet, but in being focused on Fleck, I was ignorant of his book on Kuhn. My ignorance may seem strange, and on my part also embarrassing. In retrospect I am, however, inclined to view it as an advantage in conferring an undisturbed, unprejudiced view upon my scrutiny. Furthermore, it made it possible for me to retrospectively compare my views, conclusions and contemplations with the strong criticism of STS recently launched by different scientists, mainly initiated by Gross and Levitt.

As a result of the perceived dichotomy, much of my confusion could be captured in the query that has worked as a heuristic throughout my pursuit dealing with the humanist versus the scientific account of science: 'What do they say that we do when we do what we do, and what do we say that we do when we do what we do'. The query also captures questions on incommensurability and translatability, in modern philosophy often linked to Fleck. Moreover, it could be used to illustrate the application of his often-contested concepts, notably *Denkzwang*, *Widerstandsavisio*, *Kopplungen*, *Sinnsehen* and *eso-* and *exoterisches Wissen*, not to forget *Denkstil* and *Denkkollektiv*.

Introduction

Although he was almost ignored by his contemporaries, Ludwik Fleck is now identified as an important contributor to contemporary history, philosophy or sociology of science. His at the time neglected monograph, *Entstehung und Entwicklung einer Wissenschaftlichen Tatsache* (EET), first published in German in 1935, was translated into English in 1979, as *Genesis and Development of a Scientific Fact* (GDSF). The latter has been the object of extensive secondary writings ever since, mostly within the humanities.

There is an agreement bordering on consensus concerning the merits of Fleck's monograph, not least regarding its anticipation of the theses displayed in *Structure of Scientific Revolution* published by Kuhn in 1962, which was immediately acknowledged and has been immensely influential ever since (cf. Fuller 2000). This anticipation is exemplified in the vocabulary deployed by Kuhn. His concepts, such as *paradigm* and *scientific community*, have been seen as equivalents to Fleck's much earlier formulated notions of *thought style* and *thought collective*. The link between the two writers is to be found in the by now well-known reference to Fleck, made in passing by Kuhn, in the preface to *Structure of Scientific Revolution*, which later turned out to be decisive for the almost serendipitous rediscovery of Fleck's monograph. Kuhn's own reluctance to acknowledge a more substantial influence from Fleck, as clarified in his preface to the English translation of Fleck's monograph, has, if anything had the opposite effect (1979). A deep influence is nowadays often depicted as a fact (Goldman 1983, Simmons 1991). Reservations remain the exception (Harwood 1986, Wettersten 1991).

Fleck's work, notably the monograph, has preferably been subject to an interpretative tradition in which the scientific notions used by Fleck in his case histories have been excluded. A cautious estimate would be that almost half, probably more, of the monograph is directly devoted to the scientific issues, mostly bacteriology and immunology. In other words, at least half of the book, or the basis of his epistemology, has been considered dispensable. That the neglect of these parts could obscure their relation to the rest of the text has not been contemplated.

The aim of the thesis

The thesis is based on three papers, referred to in the text by their Roman numerals. All are related to the reading of Fleck, including his philosophical and scientific writings in the original German or English translation and, also, the different texts on Fleck traced back to their origins in the 1920-1930s and onwards, covering the rediscovery of the monograph in the late seventies and its aftermath.

By digging deeper into the material on Fleck, that is, not only the monograph, but also his additional philosophical writings (III), and his highly acclaimed, though scarcely studied scientific writings (II) and, not the least, his explicit and so far overlooked sources (I), a picture, or a narrative, emerged that, in the proper non-Kuhnian sense of the word, could be used as a paradigm when attempting to illustrate the different perceptions of science characterizing science and the humanities. As used in the text, the latter notion, or rather 'humanist', or its derivations, includes historians, philosophers and sociologists of science writing on science though without education or professional experience of science, basically equating to non-science scholars. The notion 'STS writers' is used in the restricted sense that corresponds to its use by its current critics referring to the adherents of the school (cf. Koertge 1998 p 3f).

Although several questions could be addressed based on the above material, few could be answered with certainty. The purpose of the study is rather to suggest that a consistent interpretation of Fleck has to take the scientific parts of his writings, the proper sources and the context into account. The question why a tiny book, written in the 1930s by a Polish-Jewish bacteriologist, contemplating microbiological questions, mainly addressing his peers, and to a great extent inaccessible to an audience without that training or lacking field specific knowledge, half a century later could develop into a cult book or the alleged foundation of modern sociology or theory of science, forms the tacit background of my efforts (cf. Kuhn 1962 p vi, 1979). Although the number of recent theses devoted to Fleck is impressively high, covering American, Dutch, Danish and Swedish examples (cf. Simmonds 1991, van den Belt 1997, Brorson 2000, Liljequist 2003), they are all based on this received, unchallenged view of Fleck as initially shaped in the 1980s. Furthermore, though Fleck is nowadays viewed as a pioneer of the studies of laboratory practices (cf Latour and Woolgar 1979, Gross and Levitt 1994), his own case studies have scarcely been studied (cf Lindenmann 2001).

Materials and questions at issue

The first paper (I) attempts to trace the text or the origin of Fleck's monograph as based on his explicit sources, and further discusses its possible impetus. It also outlines the rediscovery of the monograph and what could be described as the construction of Fleck as an important figure of modern sociology and theory of science, expounding prescient views deeply influencing Kuhn and also how this construction has influenced the views of the alleged impetus of Fleck's mission. Fleck has been interpreted as furthering a relativistic conception of science. His account of the Wassermann reaction, which forms the basis of his epistemology, has been praised as developed by a scientist well acquainted with the field in question. Because of the scarcity of available material on Fleck, however, the question of his sources has remained an unsolved issue. In the present article, an alternative reading is suggested. By focusing on the scientific content of the monograph, mainly neglected in the modern interpretations of Fleck, and on the so far overlooked sources of his writings traced back to their German origin, a better understanding of Fleck's account of the Wassermann reaction can be given. The consequences of this alternative reading for the conception of Fleck's monograph and for the impetus of his mission are discussed.

The second paper (II), the reading of the scientific text, implies the tracing of his unanimously praised, though, so far scarcely contemplated scientific texts, putting them into the context of the time of their origin, disclosing the construction of Fleck as a prominent scientist. The description of his production of an effective vaccine against typhus during World War II, when imprisoned in Buchenwald, is legendary in the scholarly literature. The claims about Fleck's scientific achievements have been justified by referring to his numerous publications in international scientific journals. Though frequently mentioned, these publications have so far not been studied. The present article discusses differences in interpretation and evaluation of science related to the background of the interpreters. For this purpose Fleck's scientific international publications have been scrutinized. In conjunction with further sources reflecting the desperate situation at the time in question, the results of the study account for a more restrained picture of Fleck's scientific accomplishments. Furthermore, based on the review of the latter, certain demands characterizing good science could be articulated. The restricted possibilities of those not trained in science or not possessing field specific knowledge, evaluating science are discussed, as are also formal aspects of scientific papers and questions related to research ethics. Publications exemplifying good and bad science, as well as questions on research ethics, are surveyed. A more realistic account of Fleck's alleged manufacturing of a vaccine against typhus is also provided.

As alluded to in the title, the third paper, Fleck in context, (III), attempts to trace the context of Fleck's philosophical writings in relation to the ongoing discourse in science and the humanities, but also taking the socio-political factors into account. The divide between philosophers and scientists on the philosophical implications of modern physics is exposed. Though the neglect of Fleck's contemporaries has been difficult to account for, the basis of his epistemology has evoked little interest, partly due to the lack of apparent sources. Fleck's

philosophical writings, published between 1927 and 1939, indicate, however, a polemic, deeply ingrained in an ongoing debate, on the standing of old established scientific disciplines versus new and emerging ones, occasioned by the rapid changes within the natural sciences. Most obvious to the lay community, and also reflected in the new positivist philosophy, were the revolutionary changes within physics. As a participant in the debate, Fleck used modern physics heuristically and as the basis of his epistemology. The tracing of his sources and the opposing views of other scientists are attempted, including the contemporaneous critique of Fleck.

Fleck's philosophical writings contain an abundance of ideas, proposals, suggestions, assertions and apodictic statements, though none is properly worked out. Yet, almost any philosophical issue could be brought up, claimed to be linked to or been deliberated upon by Fleck, and, no doubt, his monograph lends itself to multiple interpretations. In the papers I have, however, concentrated on but a few issues, which I think constitute his main concerns. The ensuing hypotheses are, firstly, that Fleck's philosophical writings are part of the so far overlooked contemporaneous debate (I, II, III). Secondly, it is argued that the modern received view of Fleck is based on a highly selective reading of the monograph conforming to the already manifest trends in modern philosophy and sociology of science (cf. Koertge 1998 p 3f). Thus, by disregarding, or perhaps more importantly, not comprehending the scientific content, the epistemic concepts used by Fleck, notably *Sinnsehen*, *Widerstandsavisio*, *Kopplungen* and *Denkzwang*, *eso-* and *exoterisches Wissen*, *Denkstil* and *Denkkollektiv*, have to a great extent been misinterpreted (I, III). Thirdly, by neglecting Fleck's explicit sources, and thereby also disregarding the context, including the historical and the socio-political conditions of the time in question, Fleck's modern interpreters have, inadvertently, not only opposed some of their own tenets (ibid), but also committed the scholarly flaws that Fleck sets about to expose and criticise (III). Fourthly, rather than relativizing science, it is argued that Fleck is an ardent proponent of science, offering an internal account of its pursuit that confers sense to his often-contested idiosyncratic epistemic concepts (II, III).

The rediscovery and the background of Fleck

For readers not acquainted with Fleck, a recapitulation of the rediscovery of his monograph, his biographic data and a brief review of the often-conflicting comprehension of his work will facilitate the ensuing discussion.

The rediscovery of Fleck's monograph in the mid-seventies is credited to W. Baldamus, a former German refugee, at the time retired from a professorship in the sociology of science at the University of Birmingham. Using the scanty information that Baldamus managed to obtain from Fleck's publisher in Basel, he concluded that the fate of Fleck was interesting and anticipated him as a possible forerunner to Kuhn. However, he cautiously pointed out that there was not yet enough information to render any conclusions possible. Baldamus also advised his German student, Thomas Schnelle, to work on Fleck. The latter, mastering Polish, complied with the advice and became involved in a three yearlong project supported by the

Volkswagen Stiftung. It was initiated 1979, headed by Lothar Schäfer, professor in the theory of science. The project aimed at investigating the biography of Fleck, elucidating the philosophical and cultural background of his thinking and publishing his writings (Cohen and Schnelle 1986a).

Thaddeus Trenn, professor in the history and theory of science, also in Germany, became attracted by Fleck's monograph in the mid-seventies when lecturing on Kuhn, and included it in the curriculum for further study. Trenn was also, in collaboration with Fred Bradley, responsible for the English translation of the monograph.

Schnelle's Dissertation "*Ludwik Fleck. Leben und Denken. Zur Entstehung und Entwicklung des soziologischen Denkstils in der Wissenschaftsphilosophie*" was published in 1982. Following the reissues of the monograph, the English, GDSF, in 1979 edited by Trenn and Merton, and the German, EET, in 1980 edited by Schäfer and Schnelle, two meetings were arranged. The first took place in Hamburg in 1981 and was headed by Schäfer and Schnelle. The second took place in Berlin in 1984 and was headed by Trenn and Cohen. Both meetings aimed at informing an English speaking audience of the monograph and launching Fleck as an important contributor to the contemporary history, philosophy and sociology of science and as a forerunner to Kuhn.

The material presented at the two meetings was published in an extensive volume titled *Cognition and Fact* (CaF) and edited by Cohen and Schnelle in 1986. The major part of the book consisted of deliberations on Fleck's epistemology by international scholars in the fields of sociology of science and philosophy. In addition, three articles were included that commented upon the medical and immunological content of Fleck's monograph, putting it into the context of the science of the period in question. These articles were unavoidably more technical in character and they have frequently been neglected in subsequent literature.

Biographic Data

An extensive biography of Fleck is found in Schnelle's dissertation published in 1982. The greater part of the biography is included in CaF. The main features, repeated in numerous articles, include a brief outline of Fleck's medical studies and his professional career as a microbiologist in the Polish city of Lwów, including the period in the early 1920s when he served as an assistant to the well-known typhus specialist Rudolf Weigl. He was dismissed from the position in 1923. After that he worked at various state-owned laboratories in parallel with work in his private laboratory set up in 1923 at the time of his dismissal. After the Nazi capture of Lwów in 1941, Fleck was evicted with his wife and his son to the Jewish ghetto of the city. Under primitive conditions, he worked in the ghetto hospital on the production of a vaccine against typhus out of the urine from patients who had already contracted the disease. After being deported in 1943, first to Auschwitz and then to Buchenwald, he continued his work. After the war, Fleck returned to Poland and worked as a microbiologist in Lublin. After his habilitation with professor Hirszfeld, he became a full professor in 1950. In 1952 he

moved to Warsaw, which gave him time to focus on research, mainly studying the phenomenon of leucergi. In 1957 he and his wife immigrated to Israel, where he continued his research. Fleck died in 1961 at the age of 64.

Besides the monograph, Fleck's philosophical work includes six articles published between 1927 and 1947. His philosophical articles, and an additional unpublished one from 1961, rejected by four journals, have been translated and are all included in CaF. A complete bibliography including his works in natural science, listing more than 150 papers, is added (idem p 445). The English edition of the monograph includes a brief account of Fleck's biography, in line with the above-mentioned sources. It is written by Trenn (1979), as is a descriptive analysis of the monograph.

Different views

The resurrection of Fleck's monograph has, like CaF, created extensive secondary writings. The scientists participating in the discussion broadly belong to one of three different fields of scholarship: philosophy, sociology of science and natural science. Scholars belonging to the first two fields have written the vast majority of the articles.

According to the predominant interpretations, Fleck was a prominent and highly regarded representative of his professional fields, bacteriology and serology, indeed influencing the development of the latter discipline. In the introduction to the German issue of his monograph (1980), which closely parallels the introductory chapter in CaF, Fleck's writings in philosophy and sociology are depicted as comparable to Popper's *Logik der Forschung*, published in 1934. In the English issue (1979), this claim is also made in relation to Robert Merton's pioneering study of economic relations. Fleck's familiarity with the two fields of scholarship is praised, and the opinion is based on his references to writers such as Jerusalem, Mach, Durkheim and Lévy-Bruhl.

An opposition to members of the Vienna Circle has been maintained, supported by a reference made in passing to "*Schlick, Carnap and others*" (GDSF, p. 50). Bohr and Heisenberg, mentioned in his 1929 article *Krise der Wirklichkeit* in *Die Naturwissenschaften*, but not in the monograph, have also been recognized as influential in his epistemological deliberations (Trenn 1981, Schnelle 1986, Löwy 1990). Despite these references, the difficulty of tracing and evaluating Fleck's sources has frequently been articulated. It has also been stressed that he does not always mention his sources. Thus the linking of a particular statement to its postulated origin becomes problematic. A further claim is that he added references that had not served as material for his writing after the completion of his work (Schnelle 1986, p. 12).

The situation easily invites the interpreter to more or less far-reaching speculations. Thus, according to Harwood, Schnelle devotes a great part of his thesis to trying to link Fleck to the logic-centered contemporary Polish philosophers at the University of Lwów, Twardowski,

Adjukiewicz and Chwistek. However, as Schnelle rightly notes, these were never mentioned by Fleck (Harwood 1986, p. 175).

In contrast, Löwy, mentioning that Fleck never viewed himself as a philosopher, gives a detailed and thorough account of the rich medico-philosophical tradition in Poland including the Polish School of Philosophy and Medicine (PSPM) (Löwy 1990). Thus there is ample evidence that Fleck visited the PSPM meetings in Lwów. He also presented a paper that was published in its journal, *Archiwum Historji i Filozofji Medycyny oraz Historji Nauk Przyrodniczych*, The Archives of History and Philosophy of Medicine. In her thesis she further includes a translation of correspondence between Fleck and one of the more prominent members of PSPM, Bilikiewicz, initiated by a comment made by Fleck on a book written by the latter (idem, p. 249). Löwy does not comment upon the correspondence. She mentions, however, that Fleck did not seem to have been accepted by PSPM. His paper was the only one not included in the recount of previous articles published in the *Archiwum*, in connection with the 1937 congress on the history of medicine in Lwów (p 223). Despite his apparent familiarity, Fleck never refers to PSPM or its members in his writings. Löwy's well-supported conclusion is rather that PSPM has to be viewed as part of the formative background of Fleck's writings.

A more recent attempt to trace contemporary influences of Fleck's writings is found in the prize-winning article by Bonah "*Experimental rage*": *the Development of Medical Ethics and the Genesis of Scientific Facts* (Bonah 2002). The hypothesis communicated by Bonah is that the main motivator for Fleck's writings, including what Bonah characterizes as his awareness of the crisis of medicine and medical science, was the impulse to react to what Bonah calls the *The Lübeck Totentanz*. In early spring 1930, the adverse effects of mass vaccination against tuberculosis of newborn children resulted in an unprecedented number of deaths in Lübeck, and an ensuing court procedure. Though Fleck never refers to the catastrophe or deals with tuberculosis in his writings, Bonah makes his claim on the assumption that Fleck must have been well aware of it.

In addition to these speculations, Fleck's alleged lack of apparent sources in his epistemic writings has also lent itself to the tenet of Fleck's prescient views of the science in general and the sociology of science in particular. This conception of Fleck is in agreement with the purported indebtedness of Kuhn towards Fleck.

The account of the Wassermann reaction and the representation of syphilis

Numerous interpreters have praised Fleck's account of the Wassermann reaction. References to it include comments such as "*masterpiece*" (Elkana 1986, p. 310), "*first hand experience*" (Bloor 1986, p. 387) and "*beautifully analyzed historical case study*" (Trenn 1979, p. XIV). The awareness expressed by Kuhn concerning his inability to comprehend the underlying

parts of the monograph due to lack of medical and biochemical background and vocabulary stands out as an exception (Kuhn 1979, p. IX).

However, in one of the three articles dealing with natural science included in CaF, Zalc gave a thorough account of the Wassermann reaction as viewed today and clarified why it was an unfortunate choice as a basis of an epistemology (p. 399). Löwy (1986 p. 421) and Moulin (1986 p. 407), added to the early criticism of Fleck's unfortunate choice of the Wassermann reaction as a basis for an epistemology (cf. Lindenmann 2001).

Fleck's representation of syphilis as a four-stage transformation of the underlying concept, presented in the first chapter, has been unquestioningly perpetuated (Schäfer 1993, p. 24). The four stages conveyed by Fleck include, from the fifteenth century onwards, carnal scourge (*Lustseuche*) implying sin, befouled blood bearing mystical-ethical overtones, a concept of cure and identification of a causative agent. In this context, the ancient concept of befouled blood has been portrayed as the actual impetus for the search for a blood test – that is the Wassermann reaction, which, when successful, finally transformed into a scientific fact (Trenn 1979, Schäfer 1993). Tsouyopoulos' rejection of the above account seems to have attracted little attention. The same applies to her remark that Fleck substantiates this first part of his story with but one quote from 1484 taken from a poem. Her main criticism is, however, not directed against Fleck but rather against the uninformed comprehension of medical science displayed by the humanist interpretation (Tsouyopoulos 1993).

Different accounts

The easiest explanation of my own conception of Fleck as a professional out of date with his time and his science was, after having excluded high age, defective scientific background, marginal position and want of literature – in other words frequently associated phenomena. This seemingly harsh conclusion was based on my reading of the text, relating the scientific statements made by Fleck to the different time periods, including his beliefs and opinions expressed in scientific questions (cf. Löwy 1986). Fleck's selective references in support of his statements added to the impression. An additional clue was his bibliography, put together in CaF, where many of the titles suggested speculation rather than substantial data (p. 445).

Even stronger evidence was found in the introductory or explanatory sections of CaF and the two issues of the monograph (1979, 1980). Behind the bright and cheerful narrative of Fleck's glorious scientific accomplishments and progress was another all too easily perceived, though so far unarticulated story, austere and dismal, inescapably linked to the history of Poland, and Germany, including the two World Wars, which both deeply affected the life of Fleck. When one takes that story into account, Fleck can be depicted as a man whose medical studies were interrupted and substantially delayed by his participation in the First World War. His early focus on bacteriology could be linked to the importance of the discipline in wartime conditions and to his teacher, Rudolf Weigl, who was at the time already involved in typhus research. The scientific accomplishments within bacteriology during the preceding decade

were not only amazing but of utmost practical importance. Since ancient times, typhus, one of Fleck's scientific concerns, has been an inevitable companion of war.

Fleck's brief research experience includes his employment as one of Rudolf Weigl's assistants. During that stay, he also completed his medical studies. This took place in a country deeply affected by the devastating consequences of the war and the ensuing humiliating peace process. Besides an early six-week study visit in Vienna, he was for almost the next 20 years confined to the city of Lwów, precariously located, torn between German and Russian interests and warfare.

The reason for Fleck's dismissal as a research assistant is unclear. It has been portrayed as being due to personal factors, the political situation or both (Schnelle 1986 p 37). After this brief experience of research he was referred to non-prestigious (*Krankenkasse*) routine laboratory work in non-academic settings and finally, without any employment to support his family, he became dependent on his private laboratory. By that time he had already published his monograph. What followed could be viewed as a brief recapitulation of wartime and post wartime European history epitomizing its long-lasting deleterious influence on scientific pursuit in east and central Europe.

The above reading, taking the subject matter as well as history and context into account, has in my further pursuit served as a complementary heuristic device in my efforts to comprehend how Fleck's account of the genesis of the Wassermann reaction could be understood in contrast to the received view provided by his modern interpreters.

The accounts of science

Different notions have attempted to capture the accounts of science. Frequently applied, though still contested, are notions such as the internal and the external accounts of science (cf. Ziman 1978, Wolpert 1992). The former, meant to account for the content, as told by the scientists, has, according to the STS doctrines, resulted in the highly distorted view of science that STS writers set out to debunk. As a corollary, the external account of science, as retold by the STS writers, is the only one there is to tell. According to the latter view, this is also the account provided by Fleck, evidenced by his case history on the Wassermann reaction (cf. Trenn 1979, Elkana 1986).

The paradoxical implications of the latter conception of Fleck and his mission, have, however, never been addressed. He is, throughout, unquestioningly viewed as a prominent scientist. Besides numerous, though scarcely scrutinised publications (II), he is also claimed to have influenced his field, the never explicated serology, and further, to have developed a workable vaccine against typhus out of the urine of patients that had contracted the disease, initially in the ghetto of Lwów and later in Buchenwald (cf. Trenn 1979, Schnelle 1986). Altogether, this forms the basis of the mythical narrative of Fleck, by now retold for decades,

crediting him with major scientific accomplishments. Moreover, in ascribing him relativistic views of science, he is to be counted as a trustworthy ally.

The interpretation that forms the basis of the received view of Fleck, is thus accomplished by the programmatically biased reading which neglects, or does not understand, either content, background, context or sources, furthering the preferred agenda (cf. Fuller 2000, p 24). Though none of Fleck's ardent advocates has ever tried to build on his epistemology (cf Harwood, 1986), Fleck is nowadays routinely invoked as a key forerunner of science studies (cf. Sismondo 2004, p 53). That Fleck's major scientific deed, his purported manufacturing of a vaccine based on urine, is unfeasible has never been considered (cf. Weindling 2000).

The epistemic concepts of Fleck and the theory of science

According to a more modest, less polarized view, propounded by many historians and philosophers of science, the internal account of science demands deep acquaintance of the field in question, generally restricted to the scientists, whereas the external account of science, expounded upon by scholars within the humanities, can aid in illuminating the broad history and context (cf Koertge 1998). According to a scientific reading (I, II), Fleck's philosophical writings fit the internal account of science (cf Ziman 1978, Elkana 1986). More importantly, his epistemic concepts that are basically non-intelligible in a non-science based interpretation, become highly sensible (III).

Though commonly overlooked, in his writings, Fleck portrays himself as a scientist. As a scientist, he criticises philosophers and the philosophical account of science as uninformed and wanting using concepts such as *eso-* and *exoterisches Wissen*, *Denkstil* and *Denkkollektiv*, whereas *Denkzwang*, *Widerstandsavisios*, *Kopplungen* and *Sinnsehen* refer to his opposing account of science. Thus read, it is understandable that the latter concepts have caused his humanist interpreters great pains, e.g. 'constraints of thought', and they have sometimes been left un-translated, e.g. 'the seeing of Sinn' (cf. Cohen and Schnelle 1986a, p XVf, III).

However, more important, though frequently overlooked, is the question on what the non-scientists, or philosophers of science, base their accounts of science upon, whether internal or external. An inevitable Kantian corollary is, of course, what they can base their accounts upon, which is the issue addressed by Fleck.

In contrast to philosophers, many scientists oppose the existence of a theory of science, and the majority of scientists remain ignorant of what philosophers claim to be the basis of their enterprise (cf. Ziman 1978, Chalmers 1978, 1990, Wolpert 1992, Steven Weinberg 1993). Fleck's monograph can be read as an elaboration on the controversy and an explanation as to why scientists resist the conception of a specific philosophy of science. The issue is fundamental to the debate in which Fleck is striving to participate (cf. Jordan 1927, 1932, Bohr 1928, Weinberg 1930, Heisenberg 1934, Jensen 1934, Infelt 1934, III). Moreover, the by now perennial issue seems to originate in that debate, notably the one between positivist

philosophers and natural scientists (cf. Neurath 1930, Reichenbach 1930, 1930a, Grelling 1931, Carnap 1932, III).

The relation between the two lines of scholarship or, rather, their synchronic incommensurability, is amply exposed by Fleck in his deliberations upon journal and textbook science versus popular science (1979 p 111f, I) and is also alluded to when he, metaphorically, depicts science as a moving river cutting its own bed or, as a marching troop with its avant-garde and its stragglers at the rear (1929, III). Fleck caustically maintains that the philosophers, in belonging to a different thought-collective and adhering to a different thought-style, in their deliberations on science, have to draw on popular science, aimed at plain and vivid understanding (1979 p 113). As a result, their account of science is based on what they think science is, or rather, what they would like it to be (1929, III, cf. Levin 1988 p 104 ff). Thus, the queried account is either shaped according to the rigid *Protokollsätze* of Carnap with its barren deductions and the inadequate application of pure logic, or, alternatively, captured by the archaic, eternal concepts of philosophy, utterly unsuited to representing the dynamics and the probabilistic nature of science (cf. 1979 p 89, III). The latter of Fleck's two alternatives conform quite well to the *Begriffsdichtung* the logical positivists were determined to replace (cf. Grelling 1931, Reichenbach 1930a, III). The futility of the philosophical enterprise is, however, according to Fleck, occasioned by the fact that scientific comprehension presupposes esoteric knowledge, ineluctably based on prior initiation (*Einweihung*), thorough practice and extensive experience (1979 p 54, I). The latter elements are repeatedly stressed by Fleck (idem p 96).

Fleck's opposing account of science is, anew, captured by his notions. *Widerstandsavisios* are experienced by the ontologically unquestioned reality (cf. 1939, III), restricting and directing the scientists in their experimental probing. *Kopplungen* and *Denkzwang* are, likewise, enforced by that same reality (1979, p 82ff, I, II), all exemplified by his account of the Wassermann reaction (I). *Sinnsehen*, or *Gestaltsehen*, as used by Fleck, captures the, sometimes sudden, epistemic intelligibility of experimental observation and data (cf. Collins 1985). Given the esoteric knowledge needed, new facts are created, captured by new, for the particular task appropriate concepts, whereas science, headed by its avant-garde, always proceeds in an unforeseeable direction (1929, 1979 p 92, III).

It should be added that the notions used by Fleck, though somewhat idiosyncratic, basically conform to the scientific vocabulary of the time (cf. Kelsen 1922, Mannheim 1925, p 592, 645, Peterson 1928, Carnap 1928). *Denkstil* and paradigm are frequent.

Fleck in context

Though so far overlooked, Fleck's different writings are deeply situated in an ongoing debate on the *Einzelwissenschaften*, constituting the basis of the different *Denkkollektive*, exposing the differences between *eso-* and *exoterische Kreise*, as well as *eso-* and *exoterisches Wissen* (Fleck 1929, 1979 p 177). The debate also implies the questioning of the standing of age-old

disciplines versus new, rapidly emerging ones, all brought about by the amazing progress of science, which also affects the standing of philosophy (III). Although the changes were daringly welcomed by Fleck, working in one of the new, although still shaky and questioned disciplines (cf. Landsteiner 1930, Peterson 1936), his enthusiasm was not always shared by his colleagues, e.g., the ones deeply rooted in the non-experimental sciences (cf. Bethe 1928, Peterson 1936, Fleck 1979, p 173, III). However, when Fleck, still working outside the academy, was scrutinised by his peers, their main criticism focused on his wanting scholarship and the untenable philosophical implications of his attempted epistemology (Mie 1932, Peterson 1936, Bilikiewicz 1939, III). Fleck, on his part, disclosed his philosophical naïveté by not comprehending the implications foreseen by his critics (1939, III).

Fleck's writings, part of which attempted inputs in an ongoing debate, are, no doubt, sketchy, contradictory and basically unfulfilled, reflecting his opposing agendas (III). They are composed and evidently completed in rapidity during the politically critical period of European history that deeply affected not only Fleck (II), but also philosophy (Nagel 1936, Koyré 1956, III). Some conclusions seem, however, warranted. Firstly, the current interpretation, or the received humanist view of Fleck, is based on the, at the time, already endorsed program of the STS writers. However, making Fleck's writings conform to that program has necessitated a disregard of the old scholarly virtues such as the mastering of the subject matter under study, the tracing of the history, the sources and the context (cf. Holton and Roller 1958, Holton 1973). The result is not Whig history, but to borrow a recently coined notion (Fuller, 2000 p 24), Prig history, which reads as the furthering of one's own needs.

Secondly, it seems reasonable to conclude that Fleck, as a partaker in a debate opposing philosophy, aims at an internal account of science based on his experience of his discipline (I). Phrased differently, Fleck's epistemology equates with his internal account. Though sketchy and unfulfilled, the account provided by Fleck, conforms, however, surprisingly well to the other more elaborate, erudite and properly worked-out internal accounts of science, whether past or present (cf. III, Weinberg 1930, Infelt 1934, Ziman 1968, 1978, Chalmers 1982, 1990, Wolpert 1992, Weinberg 1993).

Thirdly, what could be phrased as 'the Fleck affair' (cf. Wettersten 1991) exposes, distressingly clearly, the incommensurability of thought collectives and thought styles, or the deep divide between the two lines of scholarship. Moreover, what is, by now, captured by the notion 'Kuhnified philosophy' affecting not only the STS writings, but also philosophy in general (cf. Fuller 2000), was already foreseen in the 1920s (cf. Riezler, 1927, III). So, instead of viewing Fleck as an early forerunner of relativist philosophy deeply influencing Kuhn, he could rather be read as an early critic of an emergent, already 'Kuhnified' philosophy (cf. Weinberg 1930, III).

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