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TOWARD AN EVOLUTIONARY HISTORIOGRAPHY AND EPISTEMOLOGY OF MEDICINE. THE LEGACY OF MIRKO GRMEK

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SUMMARY

Mirko Grmek has proved that a naturalistic approach to the history of medicine is possible. In his works he showed that the historical and epistemological research can use different kind of conceptual tools and knowledge, borrowed from history, anthropology and medicine, to understand more deeply the historic development of medical thinking. Moving from Grmek original concept of "pathocenosis" is possible to link his ideas to the evolutionary perspective, present in the contemporary medical thought as "evolutionary medicine" or "Darwinian medicine". The last one sees the disease as an inconsistency between phenotypes and environmental conditions, and a by-product of the necessity to stock variations to respond to the mutability of external conditions. Today, the evolutionary approach to medicine gives us a new way for taking care of the sick. At the same time it supplies a new way to solve the eternal theoretical problem of determining a shared and consistent definition of the disease's concept and medicine status.

This essay aims at generating a deeper understanding of the contribution of Mirko Grmek to the philosophical historiography and the historiographical philosophy of medicine. It is not a detailed and critical account and assessment of the evolution of Grmek's historio-

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graphic ideas. Rather, it is a presentation of the studies and ideas that contributed to the definition of the objectives and contents of his "militant" view of medical history, which resulted capable of establishing a dialogue on a par with scientific approaches, and at the same time leveraging the most rational and empirically-based contents derived from the humanities.

1. *Which History of Medicine?*

Since the end of World War II, a debate has been ongoing on the utility of history of medicine to the education of physicians[1]. Two arguments are more frequently put forward, to support the view that an understanding of history of medicine is useful to physicians: first, it helps to understand that medical knowledge and practices change over time and, second, that ethical, psychological and socio-economical dimensions are embedded in medicine. Among medicine historians, Mirko Grmek has in particular insisted on the fact that the history of medicine and epistemological thinking can have a constructive role in the discussion on current medical issues. In his introduction to the *Western Medical Thought,* he states that medicine historiography is more than a satisfied contemplation of the past. It becomes more and more a militant discipline, enabling a better understanding of scientific ideas and their progress, the enrichment of philosophical thinking, the broadening of sociology and of the general history of humanity and, finally, a more effective governance of the research methodologies and critical evaluations on medical issues[2].

In this respect, in Grmek's view, the history of medicine (as well as the history of science) is more than a simple gathering of facts, but rather a full-blown empirical science, which resorts to working hypotheses to account for pieces of evidence available from the past and attempts to provide causal explanations of what has occurred. Grmek's historiographical approach stands out as original in that it incorporates in historical research a naturalistic account of under-

standing, i.e. he considers medical theories, and more in general the development of scientific ideas and practices, as a result of an adaptive process that determines an improvement in the strategies for categorising and accounting for natural phenomena. Grmek has implemented this historiographical perspective both in his research on the dynamics of scientific discoveries and in his analysis on the evolution of the experimental method[3].

Grmek has always been aware of the fact that the historiographical approach needs to aim at encompassing the entire itinerary of western medical thought, in its diversified complexity and in its constant relationships with the biological and social environment of human populations. In this respect, the gradually established relations between medical knowledge and historical and cultural events in societies, play an essential role in accounting for the history of medical theories and practices. Disciplines such as history, philosophy and anthropology, but also art and literature, will have to confront themselves, in a fruitful exchange, with medical, scientific and technical ideas. This requires an intellectual effort to bridge the gap between what Charles Percy Snow (almost half a century ago) referred to as *The Two Cultures*, establishing instead a strong collaboration between scientific culture and humanities. The latter can definitely provide the former with tools which are very useful to philosophical and historical analysis. Humanities, however, need to acknowledge that human culture expression also depends on, as a necessary precondition, a well defined biology, whose very characteristics allowed for cultural development. In this respect, humanists should recognize the descriptive and explanatory relevance of empirical knowledge concerning the evolutionary functional constraints of the cultural outputs of our species.

As far as medicine is concerned, such an objective implies an historical and philosophical analysis aimed at determining fundamental issues, such as, for instance, if at all and where medicine stands in

the general, and often generic, distinction between "pure sciences" and "applied sciences". No sociological competency is required to grasp the ambiguous epistemological position of medicine, which includes a purely practical dimension, but presents social and cultural constraints as far as the definition of its overarching objectives is concerned. Medicine remains nonetheless capable of pursuing the main objective for which it exists – treating ill people – only by making use of theories and pieces of knowledge of fundamental biomedical sciences. Such pieces of knowledge can not be reduced, as argued by some sociological lines of thought, to social beliefs. It is therefore incorrect to argue that, at least for its theoretical part, medicine does not meet the requirements of science. Consequently, medicine can legitimately attempt to expand the domain of naturalistic accounts of social, political, economic and cultural phenomena, to the extent to which biological sciences can provide an account on how individual and social preferences and behaviours are built up.

Epistemological thinking has already proved effective in contributing to historical accounts. These can in turn influence the theory, the practice and teaching of medicine. Above all French epistemologists, in particular Georges Canguilhem and Michel Foucault, have profoundly influenced the historiography of medicine through their methodological thinking. As a matter of fact, their contribution has been mainly in the direction of criticising and undermining the scientific aspirations of medicine; and they did so also by supporting the idea of more "human" medicine and by teaching humanities to medical students. Today medical humanities are regarded as a necessary integration to the medical education, in that the scientific or empiric approach alone would not provide the physician with the skills and capabilities to understand the personal, social, cultural or economic dimensions of disease and health. As a matter of fact, one may wonder if a humanistic education inspired by a fundamental skepticism on medical

science can effectively work as an integration of the physician's culture.

Mirko Grmek has proved that the historical and epistemological research – two areas of thought typically considered as part of the humanities – can heuristically use different theoretical and conceptual tools to reach a deeper and richer insight into the dynamics of historic development of biomedical knowledge. In his works, inspired by interests in paleopathology and in the history of human diseases, Grmek has opted for an interdisciplinary approach bearing plenty of heuristic suggestions for today's medicine. He has always held the view that pathology and paleopathology should have a *renaissance*, thanks to the availability of new biomolecular technologies, which enable to isolate and analyse the DNA contained in the most ancient archaeological finds. But, above all and on the basis of his capability to put together information and epistemological tools provided by history, anthropology and medicine, Grmek has illustrated the effectiveness and fertility of an approach to the history of human diseases which is at the same time historical and biological, in order to define a concept and a theory on the evolution of human diseases, superbly epitomized in his work on the history of AIDS[4].

2. *From the natural history of diseases to pathocenosis*

Already in the nineteenth century, infectivologists and disease geographers displayed an interest in an ecological and evolutionary approach to infectious diseases[5], and in the 1930s a number of important attempts by infectivologists and few historians have taken place in order to establish a similar view. Such attempts have anticipated more recent interesting theoretical developments. It would be more appropriate to say that several hygienists and microbiologists have had, from the beginning of the twentieth century, an interest in studying the changes in the appearances of infectious diseases. They argued that these pieces of knowledge would facilitate the diagnosis

and monitoring of epidemic diseases[6]. Thus, the fundamental elements of an evolutionary perspective made their way in the thinking on the natural history of infectious diseases through the implementation of ecologic models within the account of the quantitative and qualitative dynamics of the interactions between host and parasite. It is a rather complex story, and effective account would require more than few paragraphs. In the context of the present work, it should be sufficient recalling Charles Nicolle's views on the phylogenesis of infectious diseases[7], those of Max Sorre on the "*complexes pathogènes*" specific to human populations living in a certain place at a certain time[8], Frank MacFarlane Burnet's ideas on the importance of taking an ecological and evolutionary point of view to understand the epidemiology of infectious diseases[9], and the developments of mathematical models aimed at describing the dynamics of the transmission of infectious diseases, where the initial evolutionary standpoints have been replaced by practical-formalistic positions, eventually leading to an "evolutionary epidemiology"[10]. Even concerning medical historiography and the history of diseases, biological models have stood out in the interpretation of the historical data. Initially such models were characterised in functional or ecological terms[11], whereas more recently they have started to assume also stronger evolutionary connotations.

According to Grmek's definition, "pathocenosis" is the set of pathological conditions within a certain population at a certain time. In this system, characterised by specific properties, the frequency and distribution of each disease depend on both endogenous and ecologic factors, but as well on the frequency of all other diseases affecting the same population. Pathocenosis is therefore determined by factors such as the geographical setting, history (in that it depends on the previous circulation of diseases), the possible presence of the pathogenic parasites and their vectors, social life. Grmek's view is that the typical pattern of morbidity of a specific pathocenosis should tend

towards an equilibrium, especially in stable ecological circumstances, with a limited number of very frequent diseases and a larger number of extremely rare ones. According to Grmek, the concept of pathocenosis is valid in general and can be helpful in studying the diseases that affected the ancient world. As a result, historical studies, epistemological concepts and scientific data are strongly interconnected. In fact, accepting the epistemological postulate on the stability of the laws of nature, one can assume that in the last few millennia biological laws, which determine pathological events, have not been subject to changes; in addition, while taking into account the human biological evolution, one can also assume a certain consistency over time of the properties of the human body.
Moving from this uniformist assumption, one can argue that the biological mechanisms embedded in the diseases of the Ancient World are the same as in the current ones. Hence, if differences exist between current and past diseases, in Grmek's view this can only be explained through the differences in external factors (ailments, habitat, work and leisure activities, therapeutic practices, etc.) and changes in the relations between humans, pathogenic germs and their vectors[12]. For example, this applies to crono-degenerative diseases, inevitably linked to the aging of the human organism; but also to diseases, relatively infrequent, linked to chromosomal anomalies, whose frequency is linked to an equilibrium which is established between mutation rate and the selective pressure of the environment. In this respect, classical examples are hemoglobinopathies in malarial environments. A further case in which pathology seems to be associated with changes in the environment, more particularly social habits, is Down syndrome, determined by an extra chromosome in the fertilised cell. In this case, the risk rate is directly proportional to the age of the mother; therefore, it is more frequent in modern ages than in the ancient Greece, since the age of the mother upon conception has considerably grown.

Consequently, Grmek's thought is closely linked to the so called "evolutionary medicine" or "Darwinian medicine", put forward by R. Nesse and G. Williams[13] and by paediatrician and geneticist Barton Childs[14], the latter being characterised by a distinct genetic flavour. According to their view, disease is an inconsistency between the phenotype and environmental conditions and a by-product of the necessity to stock variations in order to preserve the species and respond to the changing environment. Grmek agrees with the view that disease is characterised by a "double causality", one genetic, the other external. In fact, he argues that the largest part of diseases stems from an inherent fragility, linked to environmental factors. Certain diseases, such as diabetes mellitus, were unknown in the age of Hippocrates. Yet, they became more frequent in the experiences of the physicians of the Imperial age, such as Celsus and Galen. This discrepancy is due to the fact that, between the former and the latter, agriculture was invented. Furthermore, scholars advocating evolutionary medicine argue that human evolution from hunter-gatherer to settler, with the introduction of agriculture and stock-breeding, has had an impact on the health of the population. Humans, for the first time living in large communities, suffer the emergence of new infectious diseases. Co-habitation of human beings with domestic animals originates a specific group of viral diseases, and the improvement of means of transportation makes the circulation of diseases easier.

It has been necessary to wait for the acquisition of fundamental notions on the molecular biology of infectious agents and on the meaning of the clinical phenomena of diseases in relation to the ways of transmission, hence to the differential reproduction of the infectious agent, to get to a full-blown Darwinian approach to infectious disease. Focus on the evolutionary aspects of infectious diseases has been revamped by the debate on the origins of AIDS and by a series of insights on the adaptive function of symptoms associated to infectious diseases[15]. The history of AIDS has epitomized the antievolu-

tionary approach as applied to the origin of infectious diseases. In the years immediately following the discovery of AIDS, theories were put forward according to which the responsible agent could have been a laboratory creation or a pathogen turning up all of a sudden, as a result of the spontaneous mutation of some pre-existing form. In fact, as it would have been soon proved, the HIV virus belongs to a family of retro-viruses with a long phylogenetic history[16]. The evolutionary history of infectious agents, jointly with the history of their hosts and of the ecological changes, it's exactly what accounts for the origin of epidemics and the dynamics of conflict and co-existence that are determined within the particular kind of "biopathologic" association known as parasitism. The virological and epidemiological studies of Steven Morse, and particularly his views on the need of an evolutionary standpoint when dealing with emerging infections, and the ecological-evolutionary views held by the researchers in the Department of Population and International Health at the Harvard School of Public Health[17] have proved the relevance of an evolutionary approach to tackle the issues on emerging infectious diseases[18]. Over the last few years, it has been repeatedly underlined the lack of preparation of health care and research organisations to respond to conditions requiring long-term strategies, i.e. inspired by evolutionary considerations rather than merely functional ones[19].

Today, for some researchers "Darwinian Medicine" corresponds mainly to the implementation of evolutionism to infectious diseases[20]. Paul Ewald, for instance, has argued that the virulence of infectious micro-organisms varies in relation to the activity of natural selection on those factors that facilitate their transmission. Reflecting from a neo-Darwinian standpoint on the extraordinary potential micro-organisms have to modify their virulence in a very short term, due to their replication capabilities, Ewald has challenged the traditional Darwinian concept that the evolution towards commensalism would

be more convenient for the infectious agent. Resorting to several epidemiological evidences on infectious diseases in which the "cultural vectors" have a predominant role, such as water for cholera and the well known risk factors for HIV, he argues that, from the point of view of the individual parasite, an increase in the virulence can be a significant advantage to maximise the transmission of its genes. Even though Ewald's studies lack of the formal rigour, which today characterises the thinking of epidemiologists and virologists[21], they nonetheless include stimulating insights on the possibility that an action on the dynamics of transmission of a disease can facilitate the selection of less virulent strains or species.

3. *Why defining disease is so difficult?*

Grmek has offered on the most effective summaries of the debate on the difficulties in determining a consistent definition of disease. He has pointed out that in Indo-European languages there is no common term to denote the above concept and that the various attempts at conceptualising it refer both to subjective criteria – such as weakness, pain, the sense of physical disorder, deformity and ugliness, not feeling well – and to objective ones – such as the loss of working capabilities, the lack of adaptation to the needs of daily life, the impairment of the body and the physiological capabilities up to a point where reproduction is hindered and death is caused.

It can be argued that, as a matter of fact, it is not a single concept, but rather a family of concepts that has evolved over history[22], or a family of notions conceptually linked one to each other[23]; or even that the complexity of the concept of disease does indeed reflect the heterogeneity of the different branches of medicine, the theoretical contexts and the explanatory objectives[24]. In fact, disease is conceived differently, depending on which medical discipline deals with it. Clinic, pathology, nosology, epidemiology and psychiatry will express different opinions on the same situation. Thus, while a clinician

considers as healthy a patient with calcified *foci* of a past tuberculosis infection in the lungs, a pathologist will consider the same patient as ill. Identical situation when considering a neurotic patient: regarded as healthy by the pathologist, as ill by the psychiatrist.
Clearly, the concept of disease is not socially neutral; it also implies moral and aesthetic judgements. Moreover, different civilisations will conceptualise disease in different ways, on the basis of the scientific level of society and of the pathological condition present at a certain time in a specific geographical area. Also according to Grmek, health and disease are value concepts, which take into account the adaptation of the individual to the social environment[25].
In addition, the steady evolution of medicine makes the whole picture, if possible, more complicated. In these conceptualisation attempts, one should not mix up "disease" and "diseases". In fact, the former refers to the general concept of disease and aims at identifying the border between health and disease and distinguishing between physiological and pathological, whereas the latter are the subject matter of nosology, whose task is to define diseases, breaking down pathologic states and processes in nosological entities. Thus, according to Grmek, when dealing with "disease" the fundamental issue is the ambiguity of the concept of biological and social *norm*, whereas nosology raises difficulties when tackling the *ontological status* of diseases[26]. He also argues that, in order to reduce the ambiguity of the concept of disease, a fundamental distinction should be drawn between "being ill" and "having a disease". In this respect, a contribution to the clarification of the concept of disease has been achieved within the English language literature, by using the term "disease" to indicate the physician's conceptualisation of disease, "illness" to indicate the personal experience of the ill person and "sickness" to denote the perception of disease by the non-medical environment around the patient.

It remains a key issue determining if specific diseases, hence not disease in general, can be regarded as objective entities or rather intellectual artefacts, through which one can govern and put in order complex and blurred phenomena such as pathologies. As a result, medicine also confronts itself with those issues that generally fall within the domain of scientific realism and generate the divide between realists and nominalists, as well as the debate between a realist ontological nosology and a dynamic nominalist pathology. The first approach acknowledges the existence of an "essence" of disease, initially conceived as a real entity, and later as an idea. Within this line of thought, the existence (in its stronger sense) of diseases in the realm of ideas is enough to assign them an objective existence of some kind, which manifests itself in specific pathologies. Instead, according to nominalism, diseases are simply explanatory models of reality and are therefore subject to change over space and time. Different pathologies have no common essence; their only thing in common is the very term through which one refers to them. Grmek advocates a nominalist standpoint, arguing that diseases really exist only in the realm of ideas and that interpreting correctly the information on pathologic events can be difficult if one does not get rid of, in the most radical way possible, of the ontological notion of disease, which is firmly rooted in the ordinary language[27]. Medical diagnosis is therefore reduced to the establishment of a link between observed phenomena and nosologic doctrine.

Attempts to define disease, as a general medical concept and not as a nosologic entity, often fail to be entirely satisfactory. Defining it as the contrary or lack of health leads into a vicious circle. Regarding it as a deviation from a norm is equally problematic, in that it is impossible to have a satisfactory definition of normalcy. It also implies social factors, that, although relevant, can not alone be sufficient in grounding the definition of what is and what is not "normal". The notion of normalcy does also involve a sort of ideal state, which is

impossible to define. On the other hand, accepting to consider disease as a lesion of organic structures, only reveals a partial truth, since disease is often not only the lesion, but also the reaction of the organism to such lesion.

Equally unsatisfactory is the sociological view stemming from the observation that institutionalised medicine decides what is a disease e what is not, with all the relevant social implications: as a consequence, in this view disease is only a social construction, set up by the community of physicians[28].

With regards to the philosophical definition of disease, there are currently two main lines of thought, i.e. normativism and naturalism. According to both, disease is a perturbation of the state of normalcy. On one hand, naturalists argue that the norm is embedded within the very nature of the biological object, on the other normativists believe that such norm is determined by expectations, values and social needs. Naturalism interprets disease in terms of a natural phenomenon, provided with empirical characteristics, which can be known through an objective study of the human organism. Christopher Boorse, a supporter of naturalism, argues that a definition of disease is possible without having to resort to human values, defining disease as a deviation from the species' project that jeopardises survival and reproduction[29]. Normativists believe instead that disease has to be something more than a mere biological event and have developed a psycho-social paradigm of disease[30].

This said, it seems that the need of a naturalistic approach to disease is emerging, an approach that should be able to encompass also the socio-cultural sides of the issue. An attempt in this direction has been made by Randolph Nesse who suggests that, in a situation characterised by positions only apparently incompatible, the study of the body and its vulnerabilities, from an evolutionary point of view, should provide an objective basis to determine when a condition can be regarded as pathological or not. According to Nesse, there is no such

thing as a shared definition of disease's concept. Therefore, having reviewed all conceptualisations that have been to date put forward, he argues that the issue should be dealt with by assuming a scientifically-proven point of view, such as that offered by evolutionary biology[31].
In his view, there are two main ways in which the issue has been approached. The first is based on the conventional use of the term "disease" and aims at identifying a state of the body which is different and disadvantageous in relation to the standard one. According to Nesse this approach is doomed to fail, since the concept of disease is based on a prototype and it is not a logic category, which can be defined through inclusion and exclusion criteria.
Individuals have always utilised the term "disease", even in the days when there was no awareness on microbes and genes, to refer in general terms to all those physical and mental conditions regarded as undesirable. Disease was identified with pain and disability. Consequently, one can not avoid a value judgement, in that pain and disability are undesirable conditions. With regards to value judgements, even though it is true that they exist only in our evolved minds, one can correctly argue that such negative judgements on pain are not arbitrary, but shaped by natural selection.
The second approach is based on the fundamental assumption that disease exists as ideal form. Both Naturalism and Normativism have developed within this line of thought, despite being normally regarded as mutually exclusive. In Nesse's view, though, the two positions are not necessarily conflicting. He argues that disease can refer to objective physical conditions and at the same time the interpretation and evaluation of these conditions may vary, even considerably, from culture to culture.
The fundamental question for Nesse is: is there any objective criterion available to determine whether a body is normal or not? Answering to this question implies a full understanding of how each part of the body works, how it contributes to fitness advantage, how

it is shaped by natural evolution. In his view, a simple definition of the concept of disease would not be enough for our purposes, if put forward without a causal analysis, clarifying what disease is, where it comes from, if it is necessary and if it can be avoided. The simple notion of disease is based on the idea that something goes wrong in the body, that some mechanism does not work properly. This implies the need to know what "working properly" means, that is, to recognize what is normal. In some cases this is quite straightforward; much less obvious in other cases, for example, pregnancy and depression. Again, the core issue is to understand what is "normal", being a merely statistical definition unsatisfactory.

The benefits of an evolutionary approach are clear. It provides a naturalistic foundation of our values, in that it proves that individuals have an intrinsic desire for health and longevity. It discriminates between the presence of pain and the ability to experience pain, between a defence mechanism of the body selected in the course of evolution and disease. Moreover, according to Nesse, the Darwinian approach enables to clarify the relations between health, reproduction and aging, highlighting the fact that the unity of selection is the gene; it challenges the ideas that "disease" and "normal" state are separated, that the body is a machine, and that a benchmark genome or phenotype exists.

Conclusion

Medicine is facing an epistemological crisis due to the present schizophrenic status of medical thinking. Today's medical thinking involves complex and dynamic interactions among different strategies and levels of categorization that try to make sense of non predefined events that can or cannot be medically relevant for the individual, the physician or the public health system, according to different criteria and contexts. According to several medical educators and philosophers, tomorrow's doctors should be endowed more

with moral and social qualities than with scientific and technical ones, and to stimulate the acquisition of such practical skills the most useful disciplines are humanities[32]. Of course a humanistic education is good in general (not only for doctors), but the usefulness of humanistic disciplines depend on how it can functionally integrate and promote (not reduce) the scientific and practical skills needed by doctors. Medicine might need a new philosophical framework, based on a scientific view of health and disease, and allowing the integration of empirical data categorized according to different objectives and strategies; an epistemological framework heuristically and explicatively more powerful than those presently defended and taught by the leading medical thinkers and teachers.

Methodological and theoretical pluralism of medicine is mainly a source of controversies, mostly addressed in term of typical philosophical issues, such as reductionism vs. antireductionism, rationalism vs. empiricism, etc., which at a practical level are represented by the theoretical and academic or political conflicts among clinicians, epidemiologists, pathologists and public health researchers. Assuming a naturalistic and historical perspective, as pursued by Grmek, medical pluralism could even be seen as a pragmatic necessity, due to the fact that human anatomy and physiology have emerged through biological evolution by natural selection. If such a hypothesis turns out to be true, the Darwinian view of biological dynamics could represent a useful heuristic stimulus for both medical theory and philosophy.

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