Nosology versus pathology, two approaches to rheumatic diseases illustrated by Alfred Baring Garrod and Jean-Martin Charcot

R. Lagier

Department of Pathology, Geneva Medical School, CH-1211 Geneva 4, Switzerland

Abstract

Objectives. To show why and how, without underestimating the popular perception of the word ‘rheumatism’, a medical approach to rheumatic diseases needs to consider the distinction between nosology (the study of diseases) and pathology [anatomopathology (the study of lesions) and physiopathology (the study of functional disturbances)].

Methods. Selected quotations reflecting the thought processes of two famous physicians whose clinical activity (orientated towards nosology) was firmly based on pathology (mainly physiopathology in the case of A. B. Garrod and mainly anatomopathology in the case of J.-M. Charcot) are discussed.

Results. Starting from the physiopathological criterion of hyperuricaemia in gout, Garrod’s thought processes led him to name and study rheumatoid arthritis. Alongside his neurological work, Charcot’s thought processes led him to underline the common anatomical changes which could be observed in some nosologically distinct forms of chronic rheumatism.

Conclusions. Selected older texts of both authors provide good examples of a methodology which can still be useful for present-day rheumatologists, particularly during their training period. They could serve as a guide to clarify some semantic ambiguities concerning nosology and pathology and for a better understanding of some clinical and radiological overlaps between distinct nosological entities.

Key words: Rheumatic diseases, Nosology, Pathology, Medical nomenclature, History of medicine, A. B. Garrod, J.-M. Charcot.

... if Men would tell, what ideas they make their Words stand for, there could not be half that Obscurity or Wrangling, in the search or support of Truth, that there is.

John Locke, An Essay concerning Human Understanding, Book III

While attention must be paid to the underlying popular and common meanings of the word ‘rheumatism’, a physician confronted with rheumatic diseases must bear in mind two other approaches: not only the usual nosological approach, but also the background provided by pathology. Our purpose is to demonstrate how the two approaches, which are different in theory but often intermingled in practice, can be explained by some quotations reflecting the thought processes of two famous 19th century authors. A preliminary approach to the primary meaning of the word ‘rheumatism’ is necessary.

The origin of the word ‘rheumatism’

Already used by Galen [1, 2], the Greek word rheumatismos implied the idea of flow, through its primary form rheuma, derived from the verb rheo meaning to flow [3]. Rheuma persists in modern French rhume, referring to nasal discharge. The equivalent fluxion, of Latin origin, was referred to by Pliny the Elder when he spoke about the effect of a certain plant ‘contra fluxiones, quas Graeci rheumatismos vocant’ [4].

The etymology of the term (similar to that of various modern terms, such as ‘rheology’) implies flow and therefore motion. Both concepts appear in the definition of rheumatism proposed by Furetière’s dictionary in 1690: ‘a great fluxion which races to various parts of the...
body, and goes from one to another’ [5]. Despite the influence of modern nosological nomenclature, a similar meaning, extended to the perception of aches and pains, survives in various sociocultural spheres. The term is used either in the singular or in the plural, underlying either the concept of embodiment or that of plurality. It should be noted that, in Pliny’s words, the plural of the Latin term fluxiones has been attributed to the Greek term by some translators but not by Pliny himself.

Nosology and pathology

In nosology (the description and study of diseases), the use of the word rheumatism is attributed to Baillou in a posthumous book published in 1736 [6]. This physician and Hellenist introduced the term to label what is now known as rheumatic fever. He even evoked the possibility of chronic forms, which were further differentiated from gout by Sydenham [7]. Thus, a semantic diversion used a more general word to draw attention to osteoarticular conditions [8]. It was the starting point for modern rheumatology [9].

Pathology is another approach to rheumatology, which could well provide a guide for the understanding of a set of conditions with often unclear nosological limits. This is even more obvious if we recall that, following the classification of the sciences by the philosopher Auguste Comte, the histologist Charles Robin [10] defined pathology as the science of abnormal biology, whereas medicine is an art, the art being based on various sciences. Represented essentially by anatomopathology and physiopathology, which study anatomical and functional disturbances respectively, pathology is thus distinct from nosology, which is the study of diseases.

However, this essential distinction often clashes with semantic ambiguities, which derive mainly from the creation of the nomenclature. Often, when describing a given condition, the same author focuses simultaneously on nosology and on pathology (i.e. morphology, which today can be demonstrated by imaging). This has sometimes led to the application of a common label to two approaches which are conceptually distinct but which overlap in practice, as can be seen in the following two examples. The term ‘osteoarthritis’ (or its equivalents in other languages) can be used to label either a nosological entity or a morphological picture (i.e. anatomopathological, possibly revealed by an X-ray). According to the Oxford English Dictionary, ‘degeneration’ can be a term in pathology inspired by its etymology and meaning substitution of a lower for a higher form of structure; by ellipsis however, while it is more or less indirectly related to the above process, the term can also be used to describe nosological entities, in particular in the interpretation of X-rays of appendicular joints or of the spine.

The solution of such frequent ambiguities requires pertinent analysis of their origin and semantic discussion rather than the proposal of neologisms, which are often unrealistic and complicate translation between languages. For today’s rheumatologists, this analysis is more relevant when reading some quotations demonstrating the methodology of two great clinicians with a particular interest in nosology but who also concerned themselves with pathology—mainly physiopathology in the case of Alfred Baring Garrod in London and anatomopathology in the case of Jean-Martin Charcot in Paris.

The contribution of Alfred Baring Garrod

First at University College London then at King’s College London, the career of A. B. Garrod was essentially that of a clinician and a teacher. He was appreciated by his pupils both for his personality and his clarity of expression [11]. However, his career was dominated by the clarification of the nature of gout and of its nosographical status as opposed to that of chronic rheumatism.

Since the time of Hippocrates [12], gout has been distinguished from other painful joint disorders on the basis of clinical arguments. However, the individuality of gout has remained in question because of the lack of objective criteria. Gouty tophi were already known to contain sodium urate, and Garrod, at the age of 29, succeeded in demonstrating by a chemical method the presence of uric acid in the blood of the patients [13, 14]. His famous thread test for the demonstration of uric acid crystals provided an easier diagnostic tool for hyperuricaemia in clinical practice [14].

With the aid of this criterion, Garrod compared gouty patients with those suffering from other arthropathies. One of these comparisons was with acute rheumatism [13], which he studied ‘for the purpose of seeing the relation between this affection and gout, two diseases which have usually been considered as nearly allied . . .’ and which must be distinguished from gout ‘for no excess of uric acid was found in the blood of this affection.’ His striking conclusion was: ‘What greater analogy exists between gout and rheumatism, than between any two skin diseases?’

Garrod brought together his experience of chronic rheumatism and gout in his famous book A treatise on gout and rheumatic gout [14]. He illustrated his philosophy by providing a quotation from Jean-Jacques Rousseau as an epigraph in the original French version: ‘Observez la nature, et suivez la route qu’elle vous trace.’ This quotation reflects the personality of the author and the permanent value of his method of thinking, as the same quotation was used as an epigraph in a biographical paper heading a review of the American Rheumatism Association [15].

In this book, in addition to clinical observations about the role of heredity, Garrod illustrated the anatomopathology of articular and extra-articular gout with colour plates. He mentioned his earlier observations, in which he demonstrated the absence of hyperuricaemia in the condition which until then was often known as rheumatic gout, and concluded ‘If we agree to name a
disease simply from its external characters, then I admit that the term rheumatic gout is not inappropriate; but if we advance further, and have a regard to its more intimate pathology, then I deny the propriety of the name.’ He thus proposed a term distinguishing the condition from gout and from rheumatism: ‘Although unwilling to add to the number of names, I cannot help expressing a desire that one may be found for the disease under consideration, not implying any necessary relation to gout or rheumatism. Shortly before the first edition of the present work was published, about 1858, I proposed the term rheumatoid arthritis, by which name I wish to imply an inflammatory affection of the joints, not unlike rheumatism in some of its characters, but differing materially from it in its pathology.’ It was only in the title of the third edition of 1876 that ‘rheumatoid arthritis’ (in parentheses) was added to ‘rheumatic gout’, which is why it was not included in the only French translation, based on the second English edition [14]. The continued use of the term today justifies its choice founded on clinical analysis associated with pathophysiology.

Alfred Garrod’s great interest in therapeutics should also be noted. He wrote an important treatise on materia medica [16] and showed a particular interest in crenotherapy, as evidenced in his report on a chemical analysis of water from various European spas [14]. Concerning osteoarticular diseases (due to the limited drug therapies of the time and according to the financial means of his patients), he often prescribed hydrotherapy in Aix-les-Bains, a spa where a street is today named ‘Rue Sir Alfred Garrod’. He carefully analysed the uses of this treatment (particularly in rheumatoid arthritis, excluding the acute forms) and he concluded that ‘douche-bath with massage’ was the best method. This gave him the opportunity to make an interesting remark concerning the physiopathology of the disease: ‘there is much to show in its etiology and the distribution of the affected joints that is intimately connected with the nervous system’ [17].

Alfred Garrod died in 1907, at the ripe age of 88, but his work was developed by that of his son Archibald [18], first in A treatise on rheumatism and rheumatoid arthritis, in the preface of which he wrote ‘My father, Sir Alfred Garrod, has rendered me most valuable aid by placing his hospital note-books at my disposal’ [19]. He developed a number of important clinical and therapeutic approaches to rheumatic diseases, also taking into consideration the physiopathological role of the nervous system [20] and crenotherapy [21, 22]. Consequently, quotations from Archibald Garrod’s texts should be considered in any study of his father’s work.

As the years went by, the main features of modern rheumatology became apparent in his work, particularly those concerning osteoarthritis [23]. An original and groundbreaking overview (particularly concerning semantics) was presented at the end of his career in a discussion on ‘the aetiology and treatment of osteoarthritis and rheumatoid arthritis’ [24]. Concerning rheumatoid arthritis, he insisted ‘perhaps several maladies had been confused together under the name of rheumatoid arthritis. For this name, which was introduced by my father, I have naturally a pious respect, but I am fully alive to its shortcomings.’ Then, he underlined: ‘Another question upon which it is to be hoped that light will be thrown in the course of this discussion, is whether there be any one specific disease to which the name rheumatoid arthritis may be applied, or whether the condition so called is rather a syndrome which, like malignant endocarditis, may originate in infections by several kinds of bacteria.’ Regarding osteoarthritis, he wrote, in relation to wear and tear of the cartilage: ‘Though I believe that these influences do play a very important part in this connexion, I cannot doubt that there is also some underlying cause at work, which may be congenital or acquired.’ Among these ‘underlying causes’ he considered ochronosis, as a revival of his first observations on alcaptonuria, with which he had introduced the concept of the ‘inborn error of metabolism’. Besides establishing his own place in the history of medicine he thus extended the initial observations of Alfred Garrod on hyperuricaemia and on the familiar character of gout.

The contribution of J.-M. Charcot

Charcot’s career was spent primarily at La Salpêtrière, a hospital for chronically diseased women [25]. His neurological work on osteoarticular diseases [26] is known mainly for his description of neuroarthropathies, now referred to as Charcot’s joints in the medical literature in English. His famous description of painless tabetic arthropathies, possibly associated with spontaneous fractures, demonstrated and emphasized the role of skeletal nutritional disorders that are due to lesions of the nervous system. Simultaneous studies, however, led him to consider synovial and tenosynovial hyperaemia in arthritis in hemiplegia due to cerebral causes [27]. Charcot could therefore be considered a pioneer in the study of neurotrophic disorders in rheumatic diseases.

The study of these diseases also bears another enduring mark of J.-M. Charcot, dating back to his doctoral thesis on the condition now known as rheumatoid arthritis, which was later included in his book Clinical lectures on senile and chronic diseases, in which similar numbers of chapters are devoted to gout and chronic rheumatism [28]. Concerning the latter, Charcot’s personal experience was based mainly on his broad experience in the hospital for chronic diseases, which led him to remark later that ‘the slighter and more trivial cases are not seen. And thus one is scarcely able to observe those delicate symptomatic shades, which ofttimes alone mark the onset of certain chronic diseases’ [25]. This explains why his work was essentially based on clinicopathological studies of cases in advanced stages [28, 29].

However, thanks to his broad medical background, he distinguished, on the nosological level, what are now known as rheumatoid arthritis, osteoarthritis
and Heberden’s nodes. It was at the pathological level that his language differs from today’s nomenclature. ‘Pathological anatomy enables us in the first place to demonstrate the unity of this disease; for the various forms which it may assume differ most in their clinical characters, and so far as the local changes are concerned, present a common type, modified by some differences of secondary importance’ [28]. The dissection of advanced cases at his disposal underlined a ‘common type’ (such as synovial hyperplasia or eburnation) as opposed to the ‘secondary’ characters which were to be seen especially in less advanced cases.

In regard to such writings, it has sometimes been said that Charcot missed the modern distinction between inflammatory and degenerative chronic rheumatism. However, it must be remembered that, according to some of Archibald Garrod’s remarks [24] and the writings of various other pioneers (cited in [30]), the term ‘degenerative chronic rheumatism’ includes some conditions without any aetiological or anatomopathological specificity; thus this distinction belongs essentially to nosology and not to pathology. The contrast between the two approaches is apparent in the following quotation from Charcot, in which he is functioning first and foremost as a pathologist: ‘Chronic articular rheumatism presents itself under various aspects, which are apparently so opposed to one another that some authors have fancied that there were several different affections to deal with. I, on the contrary, only recognise different forms of one and the same disease’ [28].

The basis of Charcot’s method can be taken from the Introduction to the book cited above [28]. He was a clinician, naturally orientated towards the description of ‘diseases’, but he also introduced his students to another aspect of his activities in a teaching hospital, that of professor of anatomopathology. Using a formula already proposed by the pioneers Bayle and Laennec in naming macroscopical anatomopathology, he told his students ‘Gentlemen, if I were to describe in a single word the services rendered to us by this first pathological anatomy … I should say that it has taught the physician to think anatomically.’ He then commented on ‘morbid histology, from which histochemistry cannot be separated. …’ and went on to foresee future developments in pathology by saying ‘in histology the microscope is not the only thing to be thought of; there is, besides, a system, a doctrine. … The analysis must penetrate the depths of the organ even to its elements or indecomposable anatomical parts. … In this direction, you see, histological morbid anatomy comes in contact with pathogenesis, or rather merges in it. At the same time it is allied to physiology, which in this special direction assumes the name of pathological physiology.’

He concluded, as a clinician: ‘morbid anatomy, as it penetrates more deeply into the real nature of the tissues, becomes at the same time more animated, more living, and tends to mould itself more accurately with clinical teaching.’

However, after he had emphasized the present and the future contributions of anatomopathology, Charcot implicitly showed the importance of inductive reasoning in medicine. Inspired by the physiologist Claude Bernard, he taught his students a methodology which can still be used today to emphasize the need for objectivity and caution when dealing with the successes of fundamental biology in medicine: ‘establish first the morbid phenomena, seek then to explain them from the physiological point of view, whenever the actual state of science permits it. The inverse method, which consists in starting from anatomy and physiology in order to deduce from them the conditions of the disease, is full of dangers and beset with risks’ [28, 31: p. 291].

Concerning Charcot’s contribution—especially his writings—to the training of today’s rheumatologists, it could be said that they pinpoint a methodology which, unfortunately, is sometimes underestimated. Although he was aware of the nascent nosological classification, his advice about anatomopathology gave the student a morphological, synthetic approach which complemented the clinical, synthetic approach. It foreshadowed the diversity of types of information available today, ranging from the macroscopical view to the subtle data provided by biology, as well as some conceptual bases for the understanding of imaging.

Like Archibald Garrod, Charcot’s son was also influenced by his father’s personality. Jean-Baptiste Charcot first became a physician trained in neurology and, whereas later he turned to polar exploration, he remained influenced by his early background. Commenting on his lifetime experience in a report Titres et travaux scientifiques presented in 1921, he linked it ‘to the education and the scientific method that I was lucky enough to undergo in the hard and inflexible school of my father, professor Charcot…’

Garrod and Charcot

Regardless of differences due to their origins and to their professional activities, Garrod and Charcot engraved their names in the history of medicine, particularly that of rheumatology. Each had a flourishing private practice and had climbed high up the social ladder in his country, but what is far more interesting is their thought processes.

Both focused their approach on rheumatism as opposed to gout, which was the main osteoarticular reference in their day. As clinicians with a science-based education, they both adopted a methodology whose analysis offers today’s rheumatologists, especially those in training, useful models for an improved understanding of both nosology and pathology. The latter was represented mainly by physiopathology in Garrod’s work and by anatomopathology in Charcot’s work. It must also be remembered that both Garrod and Charcot belonged to the same generation and understood each other’s language; they therefore appreciated and respected each other [22].

In the preface to the third edition of his Treatise on rheumatic gout, Garrod commented on the French translation done at Charcot’s request, writing that he...
‘feels it incumbent on him to acknowledge his obligations to the numerous original notes appended by Dr Charcot, of Paris, whose investigations on the subject are of European celebrity.’ Charcot was also often quoted in a study published by Archibald Garrod, during his father’s lifetime, on the role of the nervous system in rheumatoid arthritis [20].

In a foreword to the French translation of the second edition of Garrod’s treatise, Charcot wrote ‘It is an incontestable fact that the valuable works of pathological chemistry and histology which have already made known to us the name of Mr Garrod, open up an era of positive knowledge for theory on gout.’ Concerning the term ‘rheumatoid arthritis’, he added: ‘The reader is thus able to appreciate the radical differences which differentiate this disease from gout, with which it is still very often confused.’

Conclusion

Selected chapters from the history of medicine offer models whose enduring vitality can provide fundamental insight into present-day and even future problems in rheumatology. Without underestimating the value of the popular perception of rheumatism, a physician must consider rheumatic diseases both nosologically and pathologically, recognizing the distinction between the two approaches, even though they are often intermingled in practice because of semantic ambiguities. As we have shown, this distinction may be illustrated by studying the works of earlier physicians such as Alfred Baring Garrod and Jean-Martin Charcot, whose rigorous methodology can still provide invaluable models for today’s rheumatologists, especially during their training.

References