

## Historical Article

# ‘Treatise on the Spinal Marrow and its Diseases’ (Anatomy, functions and general considerations on its diseases) by Ollivier d’ Angers CP (1796–1845)

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**Study design:** Collecting and analyzing all possible documents by internet, and consulting medical libraries in different countries.

**Objective:** To focus on the work of Ollivier d’Angers who, in the beginning of the 19th century, spent most of his professional life studying the spinal cord, marrow (SM), or medulla spinalis, and publishing the first comprehensive treatise on the subject in 1824.

**Setting:** ParaDoc database, Swiss Paraplegic-Centre, 6207 Nottwil, Switzerland, in collaboration with Paul Dollfus, ISCoS/Paradoc, Mulhouse, France

**Results:** Some of d’Angers’s clinical descriptions, observations and also pathologic findings, described in the successive editions of his treatise, were very much in advance of his time.

**Conclusions:** To our knowledge, this was the first comprehensive treatise, in 1824, at least in France. It gave a clear picture on the matter of the SM and in that period of medical history. *Spinal Cord* (2006) 44, 700–707. doi:10.1038/sj.sc.3101956; published online 11 July 2006

**Keywords:** spinal cord history; anatomy; functions; diseases; therapeutics; 19th century

## Biography and works

Ollivier (d’Angers) Charles-Prosper (OA) (Figure 1) was born in 1796 in Angers, Western France. His father was a pharmacist, which may have influenced his interests toward the medical sciences.<sup>1</sup> At the age of 17 years he entered the military school, became an officer in Napoleon’s Young Guard and fought in the last imperial battle. However, his military career became uncertain when royalty regained power with the return of Louis the 18th (1814–1815). This may also have persuaded him to change career in favor of medicine. Professor Béclard, a famous surgeon in Paris, who also came from Angers, encouraged him to study the spinal cord. At the time, this had been rather neglected and ignored by the anatomists and clinicians.

Although at first he was rather reluctant, he presented his medical thesis, in 1823, at the Medical Faculty in Paris on the subject: ‘*Essai sur l’anatomie et les vices de conformation de la moelle épinière chez l’homme*’<sup>2</sup> (Essay on the anatomy and conformation defects of the spinal cord in Man). After 1 year, in 1824, he published his first comprehensive work as a clinician, anatomist, and pathologist entitled: ‘*De la moelle épinière et de ses*



**Figure 1** Ollivier (d’Angers) Charles-Prosper (Wellcome Library, UK)

*maladies*’ (On the spinal cord and its diseases).<sup>3–5</sup> This edition was well (but anonymously) reviewed in *The Lancet*<sup>6</sup> (probably by a very well-known scientist!).

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In this work OA ‘coined’ the term ‘syringomyelia’, and its different forms, to which we shall refer to later.<sup>4</sup> However, this first publication, in 1824, would only constitute a part of his major comprehensive study on the spinal cord. It was improved, doubled in size, and republished in 1827.<sup>7</sup> He, then published the third edition of his work on the spinal cord in 1837<sup>8</sup> with more drawings and reported cases. He also published several essays on the subject of the embryologic development of the spinal cord, hydromyelia,<sup>9</sup> anencephaly, and the different forms of Spina-Bifida. He was contemporary, in the UK, with several clinicians such as Sir Charles Bell (1774–1842), Sir Astley Paston Cooper (1768–1841), and Marshall Hall (1790–1857).<sup>5,10,11</sup> In his discussions, he referred mainly to Sir Charles Bell as well as to the famous French physiologist: F Magendie (1783–1855). Magendie was the first, in 1822, to prove the sensory role of the posterior roots of the spinal cord, marrow (SM)<sup>12</sup> although Ch Bell did, in 1811, some works on the function of the anterior roots of the SM (Bell-Magendie Law); the ‘law’ was confirmed by Müller.<sup>13</sup> He was also influenced by the works of Bichat (1771–1802), the Baron G Dupuytren (1777–1835) and many others who collaborated with him in France and abroad by giving him their clinical and pathological reports. The origin of these reports is mentioned in all his referred cases.

He wrote 32 books, legal reports, and original opuscles. He participated in the second edition of the French Medical Dictionary, the Historical Dictionary of Ancient and Modern Medicine. He wrote several essays in legal and social medical journals. He also participated in the re-edition of the ‘Treatise on Children’s Diseases’. He became a member of the French National Academy of Medicine in 1835<sup>1</sup> and of many European Medical Academies. He was honored with the distinction of Member of the ‘*Legion d’Honneur*’. He died in 1845. His funeral eulogy was given by Pariset, the Secretary of the Academy of Medicine.<sup>1</sup>

### Third edition of the spinal marrow and its diseases

Here, we have focused on the third edition of his work. These volumes were published in 1837 with a far better typography and general presentation than preceding editions. His hypotheses are still sometimes difficult to comprehend. References to other authors, at the bottom of each page, have also increased and are, today, easier to trace.

The text is split into three parts: ‘Anatomy – Functions – General considerations on its diseases’. Of these, the longest is the third, which spills over into the second volume of the work. Each part is then subdivided into chapters and paragraphs.

#### Introduction

In this introduction in 1837, OA mentions that the term ‘spinal irritation’ ‘*meningism*’ (?), was baring some small differences, with what was being used by different authors in England, America, and Germany. He draws

the relation between this definition and the one he used in his chapter on the ‘Spinal congestion’ in Part I.

*Part I: the anatomy of the spinal marrow Chapter 1:* This deals with the embryology of the SM, and the spine, through the weeks and months before birth. OA insists on the importance of the SM, its trajectory towards the brain at the level of the Medulla Oblongata.

After discussing the different historical terminologies concerning the SM, OA presents a description of the spine, its relative differences according to its levels and the correlative role between the SM and its segments (a term which was discussed, with greater value, much later in that century). He mentions the absence of relation between the vertebral spine and the SM, and the difference in their development. He focuses, in the second paragraph, on the anatomy and role of the dura mater, the arachnoid space as well as the level of the production of the ‘vertebral liquid’ (after Magendie: CSF) by the pia mater and not, as today, by the choroid plexuses; although their function was not quite clear at that time. He discusses in detail the anatomical findings of Magendie (foramen of M) concerning the CSF, the 4th ventricle and the others higher up, and its anatomical relations with the central canal. He insists on the pia mater, its intimate relationship with the SM, and the production of the denticulate ligaments. He reviews the vascularization of the SM’s arterial and the valveless venous dispositions, including the long vein at the back of the pia mater. He focuses on the direct importance of breathing on the pressure of the CSF. The influence of breathing on the CSF pressure was studied in detail by Magendie, in 1821,<sup>14,15</sup> in Spina-Bifida cases, especially cervical ones, but also by others before, especially Portal A (1742–1832).<sup>4,14</sup>

The external conformation of the SM is discussed at length: its anatomical dispositions, and how the respiratory nerves ‘(internal’: diaphragmatic, and ‘external’) described by Ch Bell, in fact, derive for OA from the gray matter by the anterior roots of the SM and not the cervical plexus (NB: Sir Ch Bell concentrated more, as a surgeon and anatomist, with his brother John B, on the peripheral nerves in his books and drawings!). OA also discusses the long anterior medullary strips described by Ch Bell as being, possibly, the antero-lateral tracts. He describes the presence of the different sulci of the SM in relation to the analysis of other authors. This is followed by a study of the interior structure of the SM, particularly the important disposition, and the role of the gray matter, as well as that of the differences between the anterior and posterior roots. The descriptive anatomy of man, the central nervous system, including the SM and the autonomic system, was quite accurately described at that time, in 1825,<sup>16</sup> but as for the SM, not as precisely as OA did.

*Part II: the functions of the spinal marrow Chapter 1:* This part discusses the principal effects of lesions of this

organ, some of which had been known since ancient times.<sup>4,10,11</sup>

*Chapter 1:* After discussing the role of the posterior and anterior roots, OA postulates that the SM could be totally divided, functionally, into two parts and that there is no crossing of functions. After a long discussion about these roots, its 'segmental functions', he considers its relations with the brain, and compares these to the SM functions in animals, and comes to the following tentative conclusion:

"The brain, therefore, acts towards determining in the spinal cord the excitation of the movement and the latter transmits to the brain the impression received by the parts to which it distributes its nerves (direct translation)"

*Chapter 2:* In this chapter, OA studies how the SM transmits 'sensibility' and voluntary movements. He also considers its relationship with the medulla oblongata:

"...Based on the experimental hemisection of the SM, in animals, with the loss of movement on the same side all along upwards to decussation of the pyramidal fibres, where the medulla oblongata (myelencephalon) starts (at this level) the pyramidal tracts do cross conversely to the sensory fibers of the 'posterior columns'."

*Chapter 3:* This chapter is split into four subsections.

(a) *The influence of the SM on respiration*

OA describes the experiences of progressive sliced sections caudalad of the rabbit's brain down to the level of the emergence of the Pneumogastric nerve. The animal was kept on artificial respiration. The section at the level of the emergence of the Pneumogastric nerve provoked immediate death by asphyxia (paralysis involving the accessory muscles: glottis, Willis' accessory n. and diaphragm) thus proving the importance of the medulla oblongata and the upper cervical part of SM to the respiratory function, considered also to be in C3. This was confirmed by his personal experiences in traumatic lesions of the cervical cord and myelitis.

(b) *The influence of the SM on the movements of the heart and the circulation*

Here, the author describes a proof of the influence of the SM on the heart (complete arrest). He did this by destroying the upper cervical part of the SM, but not below (the autonomous heart activity could be maintained if the organ was gently removed). He describes the rapid apparition of the diminished vascular tone and through action of this on to the capillaries, and the rapid occurrence of decubiti. (He did not mention the importance of pressure.)

(c) *The influence of the SM on the cutaneous transpiration and on the 'animal heat' ('calorification')*

In paraplegia (and tetraplegia) there is an absence of perspiration below the lesion, the skin becomes dry, and its temperature drops. OA insists on the paramount role

of the SM in this phenomenon also linked with the absence of sensation.

(d) *The influence of the SM on the digestive system and the genito-urinary organs*

Here, OA insists on the role of the autonomous system of the SM on the digestive system, and in particular on the peristaltic movements of the colon. He describes how a dorso-lumbar autonomous system could influence the bladder wall, the internal sphincter and the erection of the penis. The problems of the SM can also affect the chemical consistency of the urine.

*Part III: general considerations concerning diseases of the spinal marrow Chapter 1:* This addresses defects and alterations of the spinal cord and its envelopes in the fetus.

Ancient Greek was used for the following definitions: (terms suggested by Béclard) *Amyela*: complete absence of the SM. Where this was associated with absence of the brain it was termed *Amyelencephalia*. *Atelomyelia*: imperfection of the SM. *Distomyelia*: a division (more or less extensive) of the SM. *Diplomyelia*: duplicity of the SM and its length. *Syringomyelia*,<sup>1</sup> also (*hydrosyringomyelia*), was 'coined' in his first book and is still in use today.<sup>17</sup> (although his Ancient Greek definition is not quite correct and relates more to an infection or post-traumatic one).<sup>18</sup> One should consider the definition: as a central canal cavity of the SM, often described in those days as having the diameter of a 'feather pen' in the midst of SM; perhaps in relation with the 4th ventricle. It might have a developmental cause for him as the two halves of the SM join together between the 4th and 6th month. Today, its diagnosis, origin and certain treatments have considerably improved.<sup>19-22</sup> *Hydromyelocele* is different from a Spina-Bifida, but can coexist with it. He also offers an extensive study of Spina-Bifida, and its tentative treatments; most of which were unsuccessful.

Problems at birth and in the immediate postnatal period.

His considerations include the involvement of the membranes and the partial softening of the SM observed at post-mortem examinations, which frequently revealed clinical signs of meningitis and convulsions. He concludes by noting that the tactile sensation in the newborn is very acute, although the brain is incompletely developed, suggesting that this could prove the importance of the activity of SM at that age.

*Chapter 3:* Wounds and sudden compressions of the SM and its membranes.

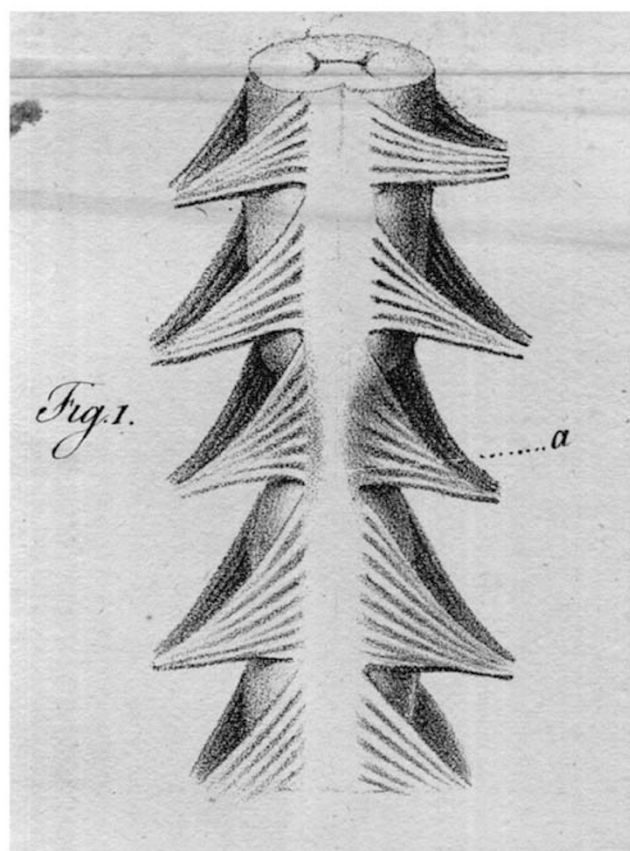
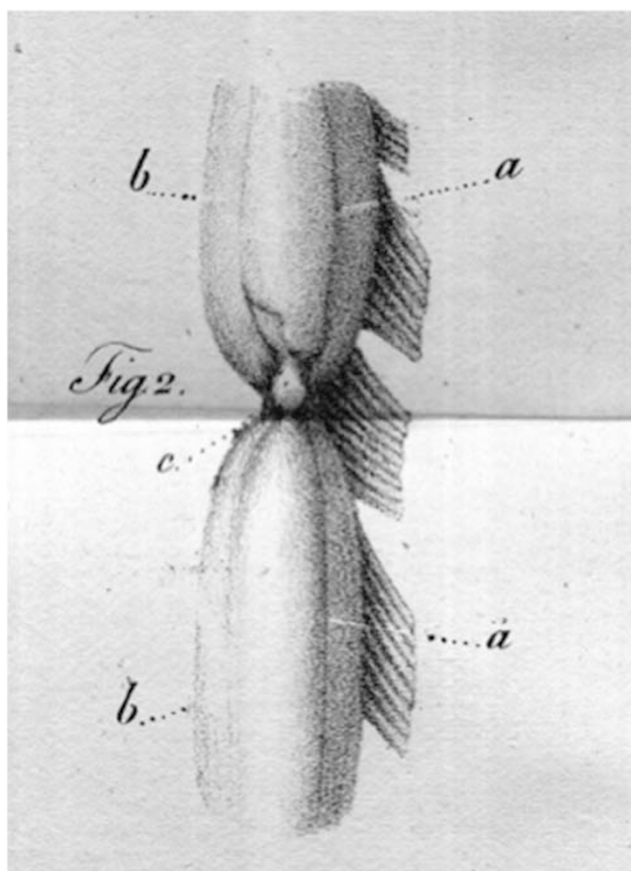
This deals with traumatic aspects of the SM including after a fracture dislocation of the vertebrae, distinguishing the levels involved, and discussing clinical findings and evolutions. The results of the post mortems are particularly interesting. OA also presents and discusses wounds inflicted by gunshot or sword wounds, as followed by death more rapidly than other wounds. In those days, wrongly, it was the level of the vertebral insult that was considered more than that of the SM level itself. Several cases are reported according to these

vertebral levels starting with C1/C2 (including a report of the method used by the hangman to 'achieve' his given task on his 'client's' C1/C2 dislocation (sic)!). He describes the clinical signs of tetraplegia at different levels, and its consequences for ventilation, motor and sensory paralysis, visceral consequences, bladder and bowel paralysis, permanent erections, and skin complications (including insensitive decubiti due to the absence of sensation in relation to the lesion of SM. This was a new concept in those days!). The vertebral and ligamentary statuses, as described in the post mortems, were reasonably accurate in those days. The descriptions of the SM signs are, understandably, less accurate. The post-traumatic destructive softening of the SM was described as 'inflammatory'. Case XVIII: is that of a strong road coachman. He sustained, after a fall, a C4/5 dislocation with an incomplete SM lesion, presenting with a right side motor impairment and left side sensory impairment. This patient (who was very strong indeed, having resisted the current 'therapeutic' methods) recovered nearly completely after 3 months. He went out looking for a job, did not find one, and on his way back, after walking three miles, collapsed. Subsequently, he presented a more pronounced, but nevertheless still incomplete, tetraplegia at the same level, due to a redislocation of C4/5. He died after 40 days. The

post mortem showed a redislocation with a half rotation from right to left, of C4 on C5, more compressive on the left, and a broken callus. In addition, the SM had ruptured posterior columns with a stricture aspect (Figure 2: plate III). OA conclusions were that 'some contention' was needed in these cases for a greater length of time and he suggests a medicated (antimony!<sup>23</sup>) plaster contention! In the same chapter he describes the consequences of injury at different levels of the spinal column, including the clinical, pathological, consequences. Interesting is the description of T12 fracture (and below) on the urinary function: paralysis of the bladder wall, the obstruction being at the level of the internal sphincter. These were probably due to SM conus or cauda-equina roots, lesions (which he did not describe anatomically). He also reports on a complete neurological sacral lesion (who incidentally managed to survive!).

*Chapter 4: Slow compression of the SM.*

These can be of different origins, slow occurring effusions of blood (hematorrachis), changes of thickness of the dura, narrowing of the canal involving several vertebrae; deformities, congenital or not (congenital rickets, dwarfness, ligament, articular, and bony infections ('caries', the same in French, that is an obsolete term for tuberculosis of bones or joints<sup>17</sup>) sometimes



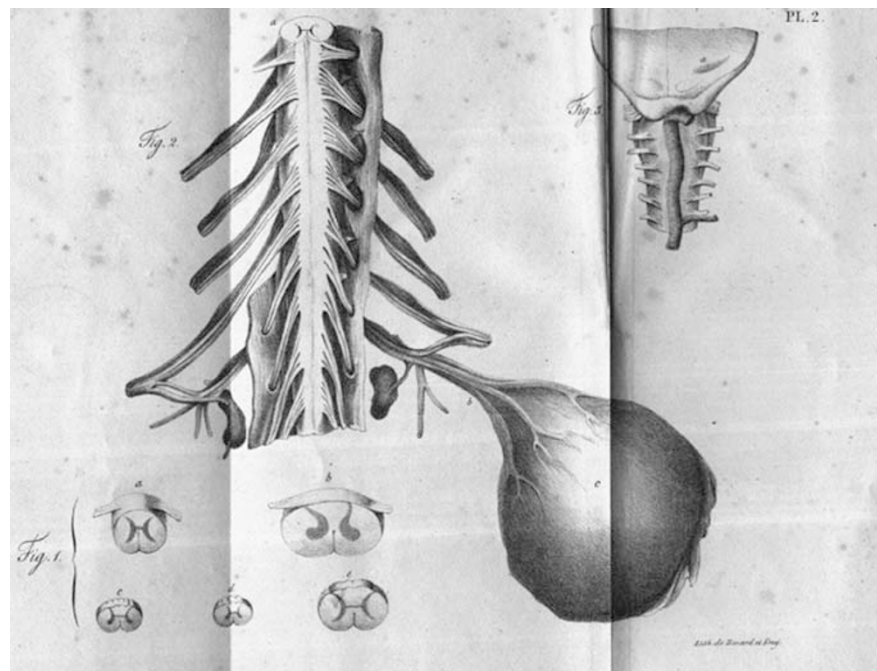
**Figure 2** Showing stricture in SM at C4/5, in case XVIII

similar, or a typical Pott's disease; especially those appearing at the level of C1/C2, with a protrusion, or dislocation narrowing the canal. Several cases are given. Usually, a paraplegia or tetraplegia appears slowly, but ends often by a sudden death. Another cause could be the protrusion of the intervertebral cartilage or disk compressing the SM.

He also describes few cases in which the dura mater, infected by tuberculosis, can also compress slowly the SM. A case of ruptured aneurysm of the aorta, partly penetrating into the canal, resulted in paraplegia and lethal chest complication is given. As the treatment possibilities are concerned, especially where there is an important associated vertebral angulation (tuberculosis), little can be performed, also in cases of aneurysms, acephalocysts, or encephaloid tumors, within the SM or its membranes. In Pott's disease a treatment was used with some success using, at times, moxibustion (Chinese or Japanese 'counterirritation') or deep cauterizations. Sometimes galvanization or 'electropuncture' could be used.<sup>24</sup> To conclude he gives the case of a woman with a gibbosity and incomplete paraplegia, in whom he used the electric current from a battery (one pole, a needle, being 'close' to the inferior part of the gibbosity and the other pole, below, by a plaque at the level of the sciatic nerve of the lower limb). Some time after, he introduced, as there was 'some' improvement, a treatment with *Nux Vomica*, and the patient further improved! OE was totally incapable of giving the least explanation!

#### Chapter 5: 'Commotions' of the SM.

These can be caused by falls on the back, on the pelvis, even on ones heels, from different heights, even from one's own height by slipping on the floor. There are many clinical evolution varieties including sensory, bladder, bowel, and sexual (erection) functions. It usually, at least for the author, can be accompanied by wounds of the SM tissue itself, or its envelopes, a tear of the pia mater with an extrusion of SM tissue, accompanied, or not by a compression due to a hemorrhachis, a vertebral fracture without displacement, and in some cases lumbar vertebrae fractures with Cauda Equina (he does not mention specifically this term) lesions. Some of the patients did survive and others recovered completely. Case XLVIII: that of a poor woman, 49 years old, suffering from a 'tumor' in the left part of the chest with great pain. She committed suicide falling from her room, on the fourth floor, and sustained a complete paraplegia by a fracture of T10, rib fractures and severe lesions of the lower limbs. At post mortem a small cancer of the breast was found on the left, but on the same side of the thorax. However, a large tumor (neuroma) was found on the left first dorsal root above the curvature of the aorta (Figure 3). One lesion must be reported. Published in Scotland, it gives the most astonishing clinical observation of what we might describe nowadays as a typical Brown-Sequard syndrome below C4, with a complete motor paralysis on the left side and sensory abolishment on the right for pain, some posterior



**Figure 3** (1) Slices of SM of a horse: (a) thoracic, (b) lumbar and that of an adult man, (c) upper lumbar, (d) thoracic, (e) cervical. Case XLVIII in the 'Commotion' chapter. Woman 49 years old. Suicide, cancer of the breast on the left. (2) The figure represents the anterior portion of the SM above C3 (C4?) to T3 showing the anterior and posterior roots on the right where the membranes of SM are reclined, on the left these are shown as well as the denticulate ligaments; the tumor in (c) (neuroma?) infiltrating the first left Th. nerve and the ramus connecting to the first great sympathetic ganglion. (3) The lithograph shows the anterior bulbocephalic part of the SM. The pons has been, partially, removed horizontally, the basilar artery is presented, in the medial sulcus, between the two pyramidal eminences

column sensation, and conversely, 'morbid sensations' on the left.<sup>25</sup> The author recorded the difference of temperature of 1°Réaumur (\*) lower on the right and compared to be higher on the left side. A hypothesis was that thermal control could be under the dependence of the 'general sensory' functioning. There was a slight tenderness on the T10 vertebra but nothing else. This patient nearly died of a medication abuse (trismus and convulsions) by *Nux Vomica* (up to 40–50 grains p.d.), which was then definitely suspended. After giving few observations of some recoveries after a SM 'commotion', the author gives his short overview, besides his advice to physicians, on the symptoms, possible evolutions, and treatments.

Therapeutical substances used in those days: strychnine (*Nux Vomica*<sup>26</sup>), given per os, or directly on the skin, by vesicatory applications at the site of the lesion, (not very efficient for the author!), repeated cantharial tincture per os, 'strong' herbal teas as purgations, (sometimes several times a day!), dry frictions on the paralyzed limbs (useful to find out, if some sensory recovery took place) besides pinching. When the vertebral displacements were obvious, then more bed rest was prescribed. Naturally: bloodletting (several cupping glasses in a row!), also a brigade of leeches, up to 50 were regular prescriptions, including diet and bed rest on a firm mattress, filled with horse hair ...but no feathers. Both were cheap materials at that time!

(\*) Réaumur degrees were used at that time, water starting to boil at 80°R (1.5° R = 1.87°C).

Here the second volume begins.

*Chapter 6:* Aspects of blood congestion, effusions of the SM and the spine itself.

The main cause is the 'slowness' of the blood circulation within the vessels at the involved level. Several other causes are given, including coitus (sic!). Clinically, the affliction concerns mainly the motor but not as much as the sensory functions. It seems frequent after child-birth (lochia discharges).

He discusses the hydropic aspects of the SM, its envelopes and the hydrorachis, and the hematorrhachis interna, (hematomyelia or 'SM apoplexy') within the SM itself. It seemed to be more frequent in the upper part of the SM. The clinical aspects can vary such as a sudden exquisite pain in the cervical part of the spine, accompanied by a loss of sensation and movement below. This affliction can take place without warning, or in a progressive manner, even over days. It can be preceded by some dull localized pain in the back. Pain can also appear as unilateral. Recoveries have been reported. The treatment is that of a 'classical one'.

*Chapter 7:* Meningitis.

The arachnoides spinalis is usually not the space for inflammation but concerns its subjacent space. The author writes: '[...] the term meningitis is the simultaneous, or isolated, inflammation of the spinal marrow's different membranes'. The arachnoid does not have any apparent vessels and the morbid phenomena takes place in the subjacent tissues of the pia mater spinalis. The meningitis can be chronic, or intermittent. Tetanic

contractions, sometimes intermittent, can appear late, and remain permanently. Meningitis can appear as a tetanic extension of the trunk muscles realizing a real state of opisthotonos. The second main symptom is pain at the site of the lesion, which can be intermittent, involving the whole back. Here, there is no sensory impairment contrary to that of a myelitis. Recovery was, sometimes, possible.

*Chapter 8:* Myelitis or inflammation of the spinal marrow.

After quite a long consideration of this term used by others, he adopted the term 'myelitis' as the inflammation of the SM tissues; its symptoms varying according to the SM level. It can be followed by a softening of the SM or its induration. The lesion can often affect the gray matter. Myelitis can also be chronic. The author discusses the symptoms: motor, sensory and visceral. He also gives his personal examination technique (pressure on each of the spinous process looking for tenderness at one particular level). Saltwater showers or baths seem to have been reported as having some therapeutical value. Survival is only of short duration in cases of acute myelitis, compared with the chronic affliction of the disease.

*Chapter 9:* Atrophy or hypertrophy of the spinal marrow.

These can result from aging and are accompanied by an increase of the volume of CSF. Atrophy can be concomitant with that of other parts of the CNS. Hypertrophy and induration are usually rare and more localized.

*Chapter 10:* Morbid productions developed in the membranes of the SM or within the thickness of its substance.

One can find the presence of tissues similar to healthy ones: cartilaginous plaques within the arachnoid, accidental ossifications. On the contrary, tissues which are not analogous with healthy ones such as: fungi or encephaloid tumors within the dura mater or external to the pia mater can be found below the arachnoid itself. Morbid productions within the SM itself: cancer, scirrhus (mainly indurate carcinoma<sup>17</sup>), encephaloid and hydatid cysts. Curiously, these were not found in women.

*Chapter 11:* Diseases and morbid phenomena which could originate from the SM and its envelopes.

OA offers the extensive listing of the SM and its morbid nervous communications with other organs: production of fever, some irregular movements of the organs of locomotion, epilepsy, chorea, tetanus, trismus of the newborn, it can accompany rabies (hydrophobia). He quotes a few SM relative affections with respiratory, circulatory, digestive and genital organ's symptoms. A report was given to him on the case of a woman who fell on a stone, hitting her abdomen, followed by an immediate loss of consciousness. She arose as a 'tetraplegic', but with no sign of localization. In fine, she was cured by extracts of *rhus radicans*<sup>17,27</sup> given as a potion p.d. Otherwise, he considers as relevant the treatment by strong and repetitive purgatory substances

such as in the colitis caused by lead poisoning, associated with intermittent paralysis (he was also a specialist in toxicology!). In another part of this chapter, he gives his own remarks on the substances that seem to act directly on the SM and their therapeutic indications. He notes again the particular effects of *Nux Vomica* used as a tincture in an enema, potion, frictions or via the endermic direct application of pure strychnine after vesiculation or cauterization, of the skin. He relates its excitatory action on the uterus (but warns not to be administered in pregnancy as soon as labor starts!). He thought that its modes of action appeared to be via the vascular system. The excitatory action of strychnine on paralyzed muscles was perhaps due only by the absence of a supraspinal control? Still, he seems to have some reasonable doubts on the action of this substance! The final chapter ends by a few remarks on the action of the usefulness of the hydrocyanic acid.<sup>28</sup> (But Prussic Acid still remained a lethal poison, and was removed, at that time from the British and Irish pharmacopoeia.)

### Discussion and conclusion

To our knowledge this is, at least in French, the first comprehensive book, rather difficult to summarize, on the subject of the spinal cord. It is also a precious historical reference compendium. Curiously, there were less spinal cord injuries reported due to horses (falls, riding, carriages) than one could expect and very few women cases. On the other hand, the incidence of Spina-Bifida was quite high. Some of the presented cases may already have been coined as syndromes at that time. Especially that of the hemisection of the SM, later called the Brown–Sequard syndrome. The author's discussions are often quite accurate, perhaps not quite by today's requisites. The peripheral nerves were well known at that time, their roots 'emerging' from the SM. Descriptive anatomy was already quite precise, already in 1825.<sup>16</sup> The chapter on 'Commutations of the SM' was one of the least accurate. One must not forget that the settings were very different; therapeutics were primitive, even harmful; no notion of infection (Louis Pasteur was born in 1822 and Lister in 1827); the vertebral lesions, especially traumatic, could not be accurately assessed, at least on the living; no real usage of a microscope until B. Stilling in Germany.<sup>11</sup> The pharmacopoeia even towards the middle of the century might be fascinating to read, but rather inefficient, and some medical substances were simply lethal!<sup>23,28</sup> The *Lancet's* review of his first book, in 1824, is a piece of top level Franco-British Medical Art, with naturally a British 'fair play' wish at the end: 'macte tuâ virtute' (trs: 'good luck!').<sup>6</sup>

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