

## Neurology and Neurologists during the Franco-Prussian War (1870–1871)

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### Abstract

The Franco-Prussian War (1870–1871) ended with the firm establishment of the French Republic and with German unity under Prussian leadership. After describing the events leading to the war, we explain how this conflict was the first involving the use of machine guns; soldiers were struck down by the thousands. Confronted with smallpox and typhus epidemics, military surgeons were quickly overwhelmed and gave priority to limb injuries, considering other wounds as inevitably fatal. Here, we present detailed descriptions of spinal and cranial injuries by Léon Legouest and of asepsis prior to trepanning by Ernst von Bergmann. Both the war and the Commune had disastrous effects on Paris. Jean-Martin Charcot continued to work intensely through the conflict, caring for numerous patients at La Salpêtrière Hospital according to his son Jean-Baptiste's account, which we've also excerpted below. As for young Dejerine, he treated the wounded from France who had taken refuge in Switzerland. Désiré-Magloire Bourneville also took heroic initiatives, as did Charles Lasègue, Alfred Vulpian, Alix Joffroy and Victor Cornil.

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‘All those whose spinal cord or brain  
had been reached by bullets  
were like corpses, in a deathlike coma.’  
Emile Zola (1840–1902) [1]

### To Let Loose the Dogs of War

Chancellor Otto von Bismarck (1815–1898) in Prussia and Emperor Napoleon III (1808–1873) in France each desired a war, as much to resolve internal political difficulties as to ensure their supremacy in Europe. Prussia, which had just won the war against Austria at Sadowa (3 July 1866), initially benefitted from a certain degree of accommodation by Napoleon III, allowing Bismarck to attempt to unify the German states around Prussia. With abundant capital and labour, Bismarck rapidly organised a large and well-trained army with the support of a powerful steel industry that had grown rich from deposits in the Ruhr valley. Luxembourg was a personal possession of the King of Holland. To give the illusion of rewarding and avenging French public opinion, Napoleon III, hurt by the defeat of his imperial

armies in Mexico, decided to buy Luxembourg in December 1866. The following month, Bismarck declared he would not let a German region fall into French hands. War seemed imminent. Napoleon III, who knew that the French army was disorganized after its defeat, retreated, accepting peace talks. During this time, the French war minister failed to reform conscription procedures and thus to rebuild an operational army. France was diplomatically isolated, with a small, poorly trained army, but the country still believed in its military superiority due to its new rifle, the '*Chassepot*', and its new weapon, the machine gun. Although peace reigned between liberals and republicans, a victorious war was considered at the court of Napoléon III as the surest means of triumphing over the republican opposition and restoring the Empire's prestige. Bismarck thought that a war against France would help him consolidate German unity around Prussia. A previous diplomatic incident involving the French ambassador to Germany – the falsification of the Ems dispatch – was enough to stir French public sentiment into an outrage and leave the Germans feeling indignant.

### **After the Defeat, the Republic in France and the Revolutionary 'Commune' in Paris**

On 19 July 1870, France declared war against Germany, sending 265,000 French soldiers to confront 500,000 Germans. By 6 August 1870, Alsace was lost, and Lorraine was captured soon thereafter. Part of the French army was surrounded at Metz, another part at Belfort. After this succession of reverses, on 2 September 1870, the Battle of Sedan left Napoleon III a prisoner of the Germans, along with 100,000 of his men. Once the Sedan disaster became known in Paris, Léon Gambetta (1838–1882) declared the downfall of Napoleon III. On 4 September 1870, the Third Republic was proclaimed in Paris. Representing the provisional government, Jules Favre (1809–1880) had a secret

meeting with Bismarck on 15 September 1870. To agree to peace, Bismarck demanded that France surrender Alsace and part of Lorraine, which was totally unacceptable to the republicans. Part of the government retreated to Tours to plan the next phase of the war, just before Paris was surrounded by Prussian troops. Gambetta organised and equipped an army of 600,000 men. These improvised soldiers, lacking in equipment and proper leadership, initially had the advantage of their numbers at a time when Prussian troops were immobilised in Metz and Paris. However, the capitulation of General François Achille Bazaine (1811–1888) in Metz, clearly a mark of hostility to the newly proclaimed Republic, freed up Prussian men. Deploying rapidly towards the South, these troops crushed the Loire army headed towards Paris at Loigny, between Chartres and Orléans. In early December 1870, the Paris army failed to break through the German blockade of the capital. Refusing to lose hope, Gambetta worked out a new plan. An army from the north of France and a new army from the Loire were to converge on Paris, while the eastern army commanded by General Charles-Denis Bourbaki (1816–1897) was to re-capture Belfort and cut off provisions to Prussian troops in the east. During the particularly cold winter of 1871, the Loire army was defeated in Mans, while the northern army was defeated in Saint-Quentin. General Bourbaki lost at Héricourt and only escaped capitulation by taking refuge in Switzerland. Paris and its famished occupants surrendered on 23 January 1871. As a provisional government was struggling to form, 'La Commune', a terrible civil conflict fuelled by the miserable conditions in Paris, broke out between socialist revolutionary groups and the soldiers of the government that existed by law only, that of Adolphe Thiers (1797–1877) in Versailles. A second siege of Paris ended in what was known as the 'bloody week', 21–28 May, during which government troops pushed back the popular Parisian forces street by street towards East Paris. There were countless cruel exactions [2].



Loigny-la-Bataille (E.-et-L.) — Nuit du 2 Décembre 1870, d'après le tableau de Paul Richer

**Fig. 1.** Charcoal drawing by Paul Richer (1849–1933). Loigny's battle, 2 December 1870, by night. (Postcard, private collection of the author.)

### Military Health Services in 1870

Care of the injured on the battlefield was first provided in an organised manner by Dominique-Jean Larrey (1766–1842) and Pierre-François Percy (1757–1825) during the wars of Napoleon I. The French surgeon Venant Antoine Léon Legouest (1820–1889) noted that from 1840 to 1850, *'Algeria served as the military surgery school for our physicians, before the Oriental War. German military surgery, which hadn't benefitted from the opportunities of its French counterpart to practise on the battlefield, nonetheless profited from the precious occasions for observation during the First Schleswig War (1848–1851) and the last Austrian campaigns in northern Italy'* [3]. In particular, the Germans had learned the importance

of isolating contagious patients, something the French overlooked at that time. In the United States, medical progress was made during the Civil War (1861–1865) by the facts that nurses were incorporated into each combat unit and chloroform was used as anaesthesia.

During the War of 1870, the poor organisation of French medical care was apparent from the start of fighting. Mobile field hospitals were managed by the support corps and not located in combat areas. Due to insufficient personnel, equipment, bandaging, medication and the inability to keep up with troop movements, many wounded soldiers had to be abandoned, resulting in a horrid mortality rate. There were no trained personnel with the specific duty of clearing the battlefield of wounded men, who arrived in im-



**Fig. 2.** The crypt, the ossuary. Battles' Museum. Loigny la Bataille (France). The skulls show evidence of cranial penetrating gunshot wounds. Mairie de Loigny la Bataille (Eure et Loir, France) with kind permission.

provised horse-drawn vehicles on straw beds after prolonged delays that sometimes lasted several days and favoured contamination, not to mention the fact that haemostasis had not been achieved for their wounds. Drinking water was in very short supply, and soon famine set in (fig. 1). Amédée Dechambre (1812–1886) writes of *'lamentable and often repeated scenes of exhausted surgeons, their arms hanging, their tools broken, piling limbs up around themselves without being able to reach the end of their task'* [4]. Public buildings were hastily requisitioned to serve as temporary hospitals, operating with the support of local residents who had nothing to offer but their good will. By contrast, the German army set up a series of lazarets, regularly spaced according to troop advancement. The Germans had 21 medical trains, each with 200 beds; the French had no such specialised transport [5].

Bullets accounted for 90% of wounds; there were few shrapnel injuries (fig. 2). The rest were due to knife wounds and trauma. The helmets issued to cavalry, considered a means of defence, were heavy, unstable, and tiring to wear. They required constant adjustment; ultimately, many

soldiers took them off. French infantrymen did not have helmets [3].

The sick outnumbered the wounded by a factor of five. The deadliest battles were fought against smallpox, typhoid fever, dysentery and typhus, in addition to frostbite and gangrene during the winter of 1870–1871, which was particularly cold. In Paris, the Seine River froze. The German army was properly vaccinated against smallpox; only 261 of its soldiers died, versus more than 10,000 among the French troops [6, 7].

In 1867, in England, the surgeon Joseph Lister (1827–1912) published a paper on antiseptic principles in which he paid tribute to the work of Louis Pasteur (1822–1895) [8]. German physicians applied Lister's principle with great benefit, whereas their French counterparts completely neglected this recent finding. Ernst von Bergmann (1836–1907) was one of the Germans who facilitated this progress: *'Like cholera, every gunshot wound becomes a source of poison for the organism that receives this wound. The body then becomes a workshop for this frightful poison or germ that is then able to spread itself throughout the entire organism.'* Bergmann was both a war corre-



**Fig. 3.** Exhausted French wounded come to the poorhouse of Janville (Eure et Loir, France). A religious, Sister Saint-Henri, imposes herself upon recalcitrant Prussia to give her care and rest to the miserable soldiers. (Postcard, private collection of the author.)

spondent for a paper in Dorpat (currently Tartu, Estonia) and a surgeon. His letters reveal his rigorous hand-washing practices between patients, how he sprayed phenol on wounds, and his thoughts on organising the treatment chain from the battlefield to the hospital [9].

Techniques for managing pain were based on morphine and chloroform anaesthesia, as used during the Civil War by American physicians. One of the most prominent was William Worrall Mayo (1819–1911), who was among the founders of the Mayo Clinic and present during the Siege of Metz as part of a British team of practitioners [10].

A lack of French surgeons very rapidly became apparent. Jean-Charles Chenu (1808–1879) was a military surgeon and naturalist mostly known for his 31-volume encyclopaedia of natural history,

*Encyclopédie d'histoire naturelle ou Traité complet de cette science d'après les travaux des naturalistes les plus éminents*. In his lengthy report on care given to the wounded, he declared that '*pain was the money used to purchase victory*'. Nevertheless, he recommended the far-reaching use of daily morphine injections, made possible by the silver syringe invented by Charles Pravaz (1791–1853), '*to lessen the bitterness of the final days*' [11].

Initiated by Henri Dunant (1828–1910), the first Geneva Convention was ratified in 1864 and ensured care without discrimination to the wounded of all sides. Its first implementation was during the War of 1870, and it was applied more or less properly (fig. 3). The physicians, personnel and auxiliaries of the Swiss Red Cross, founded in 1866, offer an excellent example. They provided



**Fig. 4.** A Swiss ambulance enters Switzerland with the Eastern Army in 1871. Edouard Castres (1838–1902), who painted *'Panorama Bourbaki'*, pays here tribute to the Red Cross volunteers (he was one himself) who came to the aid of some of the 87,000 soldiers and borderland inhabitants trying to escape from the Prussian armies. Reproduced from Finck HD, Ganz MT: Bourbaki-Panorama. Werd & Weber Verlag AG, Thun/Gwatt, Switzerland, with kind permission.

care, assistance and comfort to the injured and uninjured soldiers who had escaped and the French inhabitants of the borderlands who had accompanied them as Bourbaki's army retreated towards Switzerland, fleeing the Prussian troops (fig. 4). The Scottish journalist Archibald Forbes (1838–1900) reported in the *Morning Advertiser*: *'It was touching to see how friend and enemy tried to assist each other into carriages. The same men, who fought 48 hours before, had striven to destroy one another, were now using their utmost endeavours to alleviate each other's pains'* [12].

### **Theodor Billroth, Ernst von Bergmann and Eduard Hitzig**

Theodor Billroth (1829–1894) was born in Bergen auf Rügen in Prussia and became a pioneer of abdominal surgery in Berlin (performing the first gastrectomy and oesophagectomy); he was also a musician and a friend of Brahms. In 1859, he wrote an essay on the treatment of bullet injuries. During the War of 1870, he applied solutions of creosote or phenol to soldiers' wounds, but felt these measures were not very efficient. In favour

of an initially conservative attitude and especially interested in a technique for locating bullets, Billroth did not treat cranial injuries themselves, but rather neuralgia by the use of morphine [13, 14].

Ernst von Bergmann (1836–1907) was born in Riga in Latvia (fig. 4), then under Russian control, to a family of Lutheran pastors of Prussian origin. He was trained as a chemist at the University of Dorpat before becoming a physician. As an assistant surgeon during the war between Prussia and Austria in 1866, he became aware of how inadequate care was for the wounded. After this difficult experience, he dedicated his life to understanding and controlling infection during surgery. Bergmann entered the Prussian army in 1870 with the authorisation of the Tsar, who was his patient. There he took a more interventionist approach than his contemporaries, working under aseptic conditions. He readily used trepanning, but he had not yet defined the relationship between brain compression and clinical symptoms. At that point, he had only developed the concept of deficits contralateral to the lesion. With an estimated 75% mortality rate among his trepanned patients, Bergmann was conscious of his failures and devoted himself to research after the war. He was the first to measure intracranial pressure in 1873, using this as a basis for the concept of post-traumatic or surgical brain swelling. His book *Die Lehre von den Kopfverletzungen* recounts his military experience. This pioneering work helped establish Bergmann's international reputation, along with his 1889 neurosurgical treatise *Die Chirurgische Behandlung von Hirnkrankheiten*, which was translated into English in 1890. In his conclusion, he takes a pessimistic view and predicts that brain surgery would only have a future when specific haemostatic techniques had been developed and brain swelling could be kept under control [15–18].

In 1870, Eduard Hitzig (1838–1907), a student in Berlin who studied under Emil du Bois-Reymond (1818–1896) and Rudolf Virchow (1821–1902), published his brain localisation work based

on cortical electro-stimulation in dogs. During the war, he treated a French soldier, Joseph Masseau (1850–1871), for a bullet wound on the right side of the skull. At the point of entry, he observed osteitis and an abscess with progressive facial paralysis, then paralysis of the tongue and the left hemicorpus, accompanied by localised convulsions leading to coma and death. During the autopsy, he attempted to establish an anatomico-clinical correlation in parallel to his electro-stimulation experiments in dogs, with the aim of locating cervical-facial motor centres. He would later recognise, in 1909, that his conclusions had been wrong [19–21].

Whether German or French, military surgeons were confronted with the same injuries. The detailed account of Legouest reveals the spinal and brain injuries that occurred in both armies. They are similar in all respects to those described by Edmond Delorme (1847–1929), a professor of surgery and war wounds at Val-de-Grâce Hospital [22], as well as the injuries described by Bergmann [15].

### **Léon Legouest and War Neurosurgery on Spinal and Cranial Wounds**

The son of a military surgeon under the First Empire, Léon Legouest (fig. 4) trained in Strasbourg under the military surgeon Louis Jacques Bégin (1793–1859). Starting in April 1845, having just obtained his doctoral degree in medicine, Legouest perfected his skills as a war surgeon for 3 years in Algeria. He went on to become a surgeon at Val-de-Grâce. In 1853, he worked in the field for the Crimea intervention (1854–1855) and then participated in the Italian campaign in 1859. From 1859 to 1870, Legouest taught surgery in the operating theatre at Val-de-Grâce. He was elected as a member of the French Academy of Medicine in 1867, and by the beginning of the Franco-Prussian War he was chief military physician for the Rhine army in Strasbourg. Appointed

Physician-Inspector General of the military health department in April 1882, he worked relentlessly until his death to reorganise French military health services. His *Traité de Chirurgie d'armée* recounts his experiences on the various battlefields where he served [3].

Although Legouest's descriptions do not mention the blasts of guns or the stench of bodily putrefaction, they capture the brutality of war and the dehumanisation of soldiers' broken bodies. Because they had to confront such dramatic desolation without any psychological preparation, Legouest and his surgeon colleagues seemed ensconced in a protective shell, without affect.

His descriptions of peripheral nervous lesions are detailed as follows: '*Voluminous nerve plexuses or bundles are often damaged by small projectiles. They may be completely or incompletely divided, torn, or may undergo a loss of substance [...]. Wounds from firearms are always accompanied by pain, which is less acute in the complete division than in the incomplete division of nerves, but is often immediately very intense. [...] Nerve damage favours tetanus; its main characteristic is the persistence and tenacity of paralysis and pain*' [3].

His descriptions of cranial injury are chilling: '*The points of swords, sabres, bayonets, and the like act on the bones of the skull but may not penetrate the entire thickness, or they may pass through totally and penetrate into the depths of the skull cavity.*' Legouest also describes all possible skin and bone lesions as well as their complications: '*Diagnosing the lesions of the cranial bones is often obscure.*' There were certain indications of skull fracture, such as '*the sound of a cracked pot heard by the struck soldier himself or perceived by those around him or an increase in local pain with pressure by contraction of the lower jaw muscles or by shaking of the entire head when a handkerchief between the teeth is pulled with a jerking motion*'. His conclusion is abrupt: '*The very seriousness of these accidents, almost immediately fatal, makes them devoid of interest.*' Legouest proved himself

to be a perspicacious clinician: '*The signs of fracture at the base of the skull are signs of probability and entail bruising in a part of the head not directly struck; loss of blood by the mouth, nose or ears; and loss of serous fluid by the nose and most often not by the ears.*' The persistence of this nasal loss confirmed for Legouest that the material was cerebral spinal fluid. He thus had reason to predict osteitis or osteonecrosis, erysipelas, and meningoencephalitis with headaches, fever, delirium and prostration before death inevitably ensued [3].

The prognostic was clear: '*The lesions of the medulla oblongata are always fatal; those of the cerebellum or the central and lower parts of the brain are nearly always fatal; those of the lateral parts of the cerebral hemispheres are very serious, while lesions in the upper parts are less so.*' Legouest developed a scale of severity for cranial trauma: '*First degree: commotion, the patient experiences rapid dizziness along with visual flashes, ringing in the ears; [...] Second degree, the patient loses consciousness and immediately falls, circulation and breathing are slowed [...], the pupils are large and immobile; there is complete loss of tone in the limbs but motility and sensitivity are maintained.*' The description of the third degree is difficult to follow, but for Legouest, the loss of consciousness persisted and the convulsions, contracted limb muscles, and '*constricted*' pupils were marks of severity and expected fatality. He made a distinction between rapid or slow effusions of blood; in the first case, hemiplegia was contra-lateral to the effusion with coma. In the second case, '*The patient gets up immediately after the impact. With a delay of a few minutes or hours*', the same symptoms appear with '*the immobility of the pupils, which may be dilated or constricted; there is also incontinence or complete retention of urine and faeces. [...] If the effusion is light, the functional brain disturbances result in somnolence, slowed intelligence and movements, and slight paralysis of the body on the side opposite the effusion.*' It goes without saying that recovery was

rare. Legouest made several wise observations: *'Lesions in the anterior lobes of the brain seem to cause memory loss [...] Movement coordination seems to reside in the cerebellum; lesions in this organ sometimes result in a tendency to move backward, sometimes in movement disorders'* [3].

The treatments were of course modest: *'The patients were kept lying down with their heads raised and if possible in a cool, dark and quiet place; compresses soaked in cool water were placed on their foreheads and hot water bottles at their feet; fasting and room-temperature beverages to thin the blood were prescribed [...] If brain matter was apparent through the fracture, it was covered with emollient fomentations. If the patient was vigorous, his arm was bled and leeches were then applied to the mastoid region.'* Legouest was particularly concerned with the question of when to proceed with trepanning. *'The most contradictory opinions have been advanced on this surgical issue without providing any elucidation.'* For Legouest, *'the immediate indication for cranial trepanning – drowsiness, coma, partial paralysis directly after the accident, with or without bone fracture, with or without tegumental lesion – subsists and must be acted upon, despite any facts that argue against trepanning, nonetheless fewer in number than the contrary facts. In this case, compression may occur via blood effusion; trepanning evacuates blood or removes bone fragments in the brain [...] Trepanning often makes the undesirable symptoms quickly disappear'* [3]. The military surgeon Charles Sédillot (1804–1883) considered trepanning indispensable and claimed he saw a patient come out of a coma when his skull was opened. In cases of brain hernia, he favoured a compressive bandage over excision [23]!

Spinal injuries made patients fall down, *'overcome by paralysis of movement and sensitivity. Urine and faeces escape from their reservoirs; breathing and circulation slow down'*. Progression most often ended in death, but recovery was possible: *'Little by little the accidents lessen in gravity; sensitivity and motility return, the bladder and*

*rectum regain their regular functions, and the patient is cured, in some cases very quickly, in others after a few days.'* Treatment entailed absolute immobilisation, application of leeches and suction cups around the wound, severely reduced food intake and bleedings, in addition to purgative enemas. If paralysis persisted, Legouest used *'stimulating rubefacients and frictions on the spinal column [...]'* Some time after the accident, the application of electricity and hot spring water may prove useful' [3].

### War Psychic Disturbances

For Angel Marvaud (1844–1902), *'general paralysis is the most frequent form of mental alienation amongst officers, while nostalgia is especially observed in soldiers'*. The aetiology for officers seemed to Marvaud to be excessive work and *'the sometimes exaggerated authority and satisfaction that being in command gives men who are used to obeying'*. The aetiology for the soldiers was *'the exaggerated regret caused by being far from home'* [24].

Legouest makes little mention of the psychological state of the wounded: *'Impassioned by the noise and heat of combat, the soldier wounded in action is sometimes overcome with an excitation that is merely the exaggerated continuation of the excitation of battle or the reaction of the organism against the soldier's effort to match his courage to the level of danger. At this point, the wounded are possessed by a sort of fury or rage, resulting in cries and imprecations against the enemy; their movements are out of control, they act and speak with extreme vivacity and abruptness [...] They laugh or cry involuntarily, begging that their behaviour be ignored [...] This nervous upset, somewhat similar to traumatic delirium, is not serious; its only harm is to expose the wounded to violence [...] Stupor, the other form of nervous upset, is more serious [...] it occurs in cases of lesions to the cranium'* [3].

Delorme observed the same behaviour: *'Wounded soldiers with nervous delirium are overcome with violent agitation, a sort of fury or rage. Their movements are out of control; their speech is voluble; they vividly and abruptly recount the events they took part in and make threats intended for the enemy. Some cry or laugh involuntarily as they pray.'* Others shook or showed signs of amnesia with disorientation, *'under the disturbing effect of terrifying emotions'* that could affect *'all the patients in a unit'*. Delorme disagreed with the interpretation of Guillaume Dupuytren (1777–1835), who assimilated this clinical picture with alcoholic intoxication or delirium tremens; he preferred a diagnosis of hysteria, particularly because of the behaviour's contagious nature, as described by the American Silas Weir Mitchell (1829–1914) based on his experience at Turner's Lane Hospital in Philadelphia during the Civil War [25]. The recommended treatment included *'opium and its derivatives, particularly morphine hydrochloride and potassium bromide'* [22, 26]. In his thesis, Emile Trifaud clearly distinguished the delusions from hysteria by referring to the free interval between the intoxication's abrupt cessation and the appearance of insomnia, hallucinations and shaking; this interval set the delusions apart from the immediacy of the hysterical fit [27] (see the chapter *War Psychic Disturbances* in this book).

Edmond Boisseau (1840–?), a professor at Val-de-Grâce, took an interest in *'simulated illnesses'* given that *'the military physician is certainly more exposed than other doctors to being tricked by those he is called upon to treat'*. For him, neuropsychiatric illnesses were most often simulated by those wishing to be declared unfit for service and were more common than voluntary mutilation. *'The young soldier, taken from his home and often feeling no calling for his duties, has but one goal: to return to his village. To this end, he will deploy at least perseverance in the face of every obstacle, if not actual cleverness.'* After listing all the expected benefits of simulation, Boisseau de-

scribes the semiological subtleties by which physicians can avoid being tricked. *'The individual wishing to simulate epilepsy will imitate a major attack, a "classic" seizure [...] The simulator will avoid having an attack in the physician's presence; he will instead chose a moment where he can only be observed by those incapable of evaluating the reality of his illness.'* Boisseau goes into the absence of aura, a fall without injury, the absence of nocturnal attacks, and an excessively long post-critical stupor phase. He insists on the usefulness of demonstrating a lack of amnesia and describes the many strategies used to simulate the bloody foaming at the mouth; curiously, however, he does not mention tongue biting. Boisseau covers chorea, delirium, mania, dementia, rabies, tetanus, and blindness, along with aphonia and deafness, recognising that cases of male cataleptic hysteria existed, albeit very rarely; he also reviews cutaneous, digestive and orthopaedic forms of malingering. Not once does Boisseau accuse soldiers of perversion or a lack of patriotism.

Distinguishing himself from many of the physicians writing on this subject during World War I, he emphasises the need for empathy and a medical, rather than a repressive, response: *'Simulation must not be thought of too rapidly or easily; in case of doubt, the suspicious patient should be believed [...] More violent and painful methods should be used with moderation and only when they constitute a rational treatment method, but they must remain exempt of any danger and should not include techniques resembling torture in any way'* [28].

Bénédicte-Augustin Morel (1809–1873) chose to focus on the *'influence of war's horrors'* on civilians. *'The lamentable events in the fatal years of 1870–1871 developed in a considerable proportion of the population this kind of delirium [...] Panphobics are characterised by the most intense anxiety extending to all things, especially the immediate interests of existence. This anxiety is so acute that sufferers moan constantly [...] Their faces are locked into the tense grimace of crying, but they*

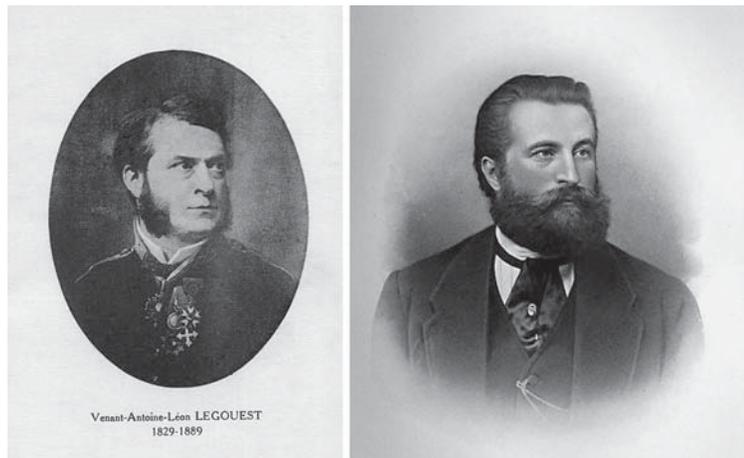
shed no tears. They remain in a squatting position with their clothes raised above their heads, in an extreme immobility that may last for months' (see the chapter *War Psychic Disturbances* in this book). He cites a man who fled to England when the Prussians arrived and considers the sentiment of dishonour to be the cause. In other cases, exactions such as theft or a sacked home caused the victims, dispossessed of all they own, to present this form of clinical panic associated with the desire to be castigated or to commit suicide out of shame. Morel included several observations of difficulties in identifying friends and family, a condition that Joseph Capgras (1873–1950) described in 1923 as a delusion of impostors and which has come to be known as the Capgras delusion [29].

### Neurology in Paris during 'La Commune'

The war and of course 'the Commune' did not spare Paris. Since 1867, Jean-Martin Charcot (1825–1893) had been working to isolate amyotrophic lateral sclerosis and was studying aphasia with regard to cerebral localisations. He became friends with Guillaume Duchenne de Boulogne (1806–1875), who conducted his electro-stimulation experiments in the department of his teacher, Pierre Rayer (1793–1867). With news of the first defeats and the threat of an attack on Paris, the two men's mutual esteem and admiration grew into a close, familial bond. Duchenne's second wife wanted to leave for London, where she had family. Too fatigued to stay in Paris, Duchenne accompanied her 'after leaving the few hundred thousand francs of his fortune with Charcot' [30]. In 1926, Jean-Baptiste Charcot (1867–1936) recounted in English how his father followed Duchenne's advice and moved his family to safety: 'When the Prussians invaded Paris, my grandfather, mother, two sisters and myself were reluctantly (my grandfather through age and a cripple and my mother, wanting to stay) huddled up and sent

to Dieppe. There, something awful nearly happened, as my mother, when Dieppe was invaded by the enemy, spat on a too-arrogant German officer, and we were all hurried off by night on a boat that took us to England. It is in London that, after the siege of Paris, my father came to fetch us, adorned with a most extraordinary beard that I remember very well and that my mother caused to be shaved in a few minutes. It is while in Dieppe that we learned by balloon post that Paris was invaded, and to this day I remember as if it was yesterday the carpet rug on which I was playing, the room of the hotel painted white with gildings more or less artistic, and the tears of my mother and eldest sister, exactly as I remember the insult of the German officer and our hurried departure from Dieppe in dark and dirty weather' [31]. During this time, Charcot discontinued consultations at his home, spending his days at the hospital: 'My father at the time of the war was "Médecin de La Salpêtrière", and this hospice for old women, or at least its infirmary, had been changed into a field hospital for wounded soldiers. Later on, the soldiers sent there were patients with nonsurgical diseases, and finally the infirmary of the Salpêtrière was the medical centre of the terrible epidemics of black smallpox and cholera that raged at the end of that war. I know that my father was officially praised and rewarded for his fine conduct during those epidemics. I do not know and do not believe that my father was actually militarised; he was certainly more or less under the control of the army but carried no uniform. He simply had a "brassard" with the red cross on it. This we kept in the family, and during the last war my sister, Madame Hendry, carried it on her arm in service at the front so that this relic carries the marks of both wars. After the war, during the revolution known under the name of "La Commune", the "brassard" was changed into a cap, something like a naval officer's cap without any ornament but adorned with a white badge with the red cross' [31].

Charcot lost weight, like all Parisians, who were victims of rationing. By signing a contract with a



**Fig. 5.** On the left, Léon Legouest (1820–1889). (Postcard, private collection of the author.) On the right, Ernst von Bergmann (1836–1907) (in Buchholtz [9]).

carriage renter, he was able to save his horses from being butchered. According to Louis Gallet (1835–1898), who was in charge of supplies at La Salpêtrière, ‘Monsieur Charcot arrived in an uncovered carriage, very calm and cold in his customary manner, his face thin and shaved, his hair long and black, a physiognomy reminiscent of Bonaparte. He related being stopped by federates erecting a barricade and managed to get by despite their protests; they wanted him to get down and lay bricks, the traditional toll exacted during the rioting’ [32].

In January 1871, after a bombing that struck La Salpêtrière, where many Parisians thought they would be safe and had thus taken refuge, a protest was delivered to the admiral Jean-François Hugueteau de Chaillé (1812–1881), head of the 9th sector of the capital. The document was signed by Charcot, Jean Cruveilhier (1791–1874), Jules Luys (1828–1897), Auguste Voisin (1829–1898), Jules Baillarger (1809–1890), Ulysse Trélat (1795–1879) and Jacques-Joseph Moreau de Tours (1804–1884). As Jean-Baptiste Charcot noted, ‘During the siege, the only correspondence between my father and mother was through balloon post or pigeon post, and all these letters full of tears on my mother’s side, full of simulated good humour, contentment and patriotism on my fa-

ther’s we keep as relies and as an example. At the beginning of the siege, my father, who was living at 6 Avenue du Coq (a sort of alley near the St. Lazare Station), used to go to the Salpêtrière at the other end of Paris in his ordinary very simple carriage, and one morning when passing near the Jardin des Plantes (our famous Natural History Museum), which was heavily bombarded as were the Hôpital de la Pitié and the Hospice de La Salpêtrière both close by, was disturbed in his reading by a shell that passed through both windows of his carriage. “He never shut his book”, said the coachman, a man with red whiskers named Berger, when he told us the tale afterwards, whilst my father muttered “humbug” [31]. Throughout his life, Charcot drew numerous caricatures. One of them, dated 1870 and entitled ‘The future’, was found in the family archives and shows a large boot sending a little German soldier flying through the air along with his pointed helmet. The drawing expresses Charcot’s anti-German sentiments, which he only shared with his most intimate circle (fig. 5).

In 1869, Alfred Vulpian (1826–1887) was elected member of the French Academy of Medicine. Vulpian could not leave Paris because of his duties there, but he sent his pregnant wife, whom he had married in 1868, to Rennes during the advance of

the Prussian troops, to spare her the privations of war. His first son was born on 2 January 1871. He corresponded with his wife daily via letters carried by balloon mail! His biographer, Maxime Laignel-Lavastine (1875–1953), wrote: ‘A lover of peace and order, Vulpian judged the Germans of 1870 severely as well as the 1871 communard physicians. Referring to the former, he wrote on 6 November 1870: “How wrong I was about the Germans for so long! I considered them amongst the highest ranks of civilised peoples. What a mistake! Whereas all the intelligent men in France cursed this war, even before it started, and considered it a revolting monstrosity, the elite of Germany threw themselves onto the battlefield with ardour and no thought for the most vulgar laws of humanity”.’ Writing of the physicians, Vulpian was no less critical: ‘Among their leaders are physicians who have for years brought shame on the profession by their ignoble charlatanism, and one can presume that their acolytes are no more respectable’ [33].

In 1871, Charles Lasègue (1816–1883) published an account of the scurvy epidemic: ‘The food shortage had reached its extreme limit, and a frightening number of Parisians paid the price with their lives.’ He accurately described all the symptoms but gave priority to the cold and general lack of nutrition as the cause, particularly among the German prisoners he cared for at Hôpital de la Pitié. Edouard de Lavarenne (1855–1907) recounted a lecture by Lasègue given in 1873: ‘With an emotion that was quick to affect his listeners, he recalled the terrible year, revealing the role of alcohol in the madness that seized Paris, and what dangers threatened the country if it didn’t stamp out the terrible plague that had invaded it’ [34]. Lasègue was worried about the German occupation of his country house, located in the combat zone in Châtillon sous Bagneux. He was also devastated to learn, 5 months after the fact, of the death of his teacher Jean-Pierre Falret (1794–1870): ‘What strange bitterness retrospective grief brings, and I can think of few sensations as regrettable as those one has in writing five months of con-

soling and affectionate letters to a man who no longer exists’ [35].

Victor Cornil (1837–1908), Charcot’s second *interne*, who would influence his interest in anatomic-pathology, spent nearly a year perfecting his skills in the laboratory of Rudolf Virchow (1821–1902) in Berlin. When he returned in 1865, he worked with Louis-Antoine Ranvier (1835–1922) to create the ‘*rue Christine*’ pathology laboratory. Famous for training several students of Charcot and Vulpian, the laboratory also gave rise in 1869 to the *Manuel d’histologie pathologique*, of which there were multiple editions and translations. The Gambetta government appointed Cornil, only 33-years old, prefect of Allier, where he was already involved in local politics. However, serious illness forced him to resign shortly thereafter. Upon returning to Paris, he cared for the injured of the Commune [36].

Alix Joffroy (1844–1908), after serving as Charcot’s *interne* in 1869, left in June 1870 to study with Virchow, known for his openly hostile attitude towards Bismarck. Afraid he would lose the benefits of his voyage, Joffroy hesitated to leave: ‘From the change in his hosts overnight, he became aware of the abyss that suddenly separated the two nations. The warm welcome he received upon his arrival was replaced at best by a cold and somewhat haughty politeness or in the worst cases by a thinly disguised hostility. He was quick to bid farewell to those physicians with whom he had worked. When he left a Berlin doctor with the words, “Adieu, Monsieur”, the other replied: “Not adieu, because I hope to see you in Paris in two months, when we reach your capital”. This impertinence was especially hurtful to the young man from Lorraine, in this particularly difficult time [...]’ [37].

Désiré-Magloire Bourneville (1840–1909) defended his thesis on 2 August 1870, 2 weeks after the fighting began. He was assigned as a surgeon to the National Guard regiment, then to the field hospital in the Jardin des Plantes, very close to Hôpital de la Pitié, where he continued to work. In this capacity, he directed the evacuation of patients dur-

**Fig. 6.** Drawing by Jean-Martin Charcot. 'L'avenir' (In the future), a German soldier kicked out of France. (Private collection with kind permission.)



ing a German bombing. Most notably, he defended the notion of hospital as asylum during 'the Commune' by physically and morally blocking Versailles troops from rounding up the wounded 'federates' under his care and shooting them [38, 39].

Jules Dejerine (1849–1917) was French but born in Geneva. Upon leaving the Academie de Geneva, where he finished his secondary studies in 1870, he asked his parents: 'Can you make me into a physician, can you? That's the only thing I want.' They agreed, but the war nearly wrecked his plans. He was assigned to the National Guard, but the signing of the armistice on 28 January 1871 ended his mobilisation. Unable to return to Paris where he had decided to study medicine, Dejerine went to work in a field hospital in Geneva that treated wounded French soldiers in Switzerland. Dejerine arrived in Paris on 21 March 1871, 3 days after the start of the uprising known as the 'Commune de Paris'. Shortly thereafter, he wrote to his mother: 'The relentlessness on both sides is worse than when we fought the Prussians. We seem to have forgotten them, even though they're at the entryways to the city and ready to come in if we don't pay our war reparations [...] The Commune wanted to reorganise

medical training – what irony! – and invited all medical students to send delegates for a commission [...] We decided not to send any delegates to the Commune, as this would in fact recognise them, and we medical students do not recognise them; I voted in this sense, as you can well imagine [...] Behind every major revolution, there's an idea; this revolution is not a political revolution, but a social one, the fight between labour and capital, and probably indicative of the extensive needs of the working class, but it's not with arms that workers will improve their fate.' All his life, Dejerine remained a vibrant patriot and favoured a society where those who disturbed the established order were dealt with severely. He thus wrote to his friend Paul Dubois (1848–1918) in 1871: 'In order that France can live, she must direct the same hatred against Germany that this enemy has cultivated against us since 1814.' In 1871, Dejerine was decorated with the 'Croix de Bronze' by 'La Société Française de Secours aux Blessés et Malades militaires' (the French Society for the Care of the Military Sick and Wounded) [40].

Finally, in the provinces, Jean-Baptiste Edouard Gélineau (1828–1906), known for the eponymous syndrome for which he created the

term narcolepsy in 1880 and for his treatment of epilepsy with arsenic bromide, exemplified the patriotic physician who entered the army early on as a volunteer surgeon in one of the regiments of his region, Charente. Gélinau was a former marine physician who had worked in Mayotte and Réunion. His exceptional dedication ended up serving measles and smallpox victims during the serious epidemics of 1870–71 more than it did the war-injured [41].

### The Call for Revenge

On 27 July 1871, a journalist for the *Union Médicale* wrote the following: ‘*Scientific and professional life was suspended everywhere during this horrible war. [...] It could not be otherwise given that these two peoples, certainly contributing the most in times of peace to keeping the sacred fire of medical science burning by emulation through research and the triumph of truth, became victims of the vastest and cruellest war imaginable. Yes, such is the predominance of Germany and France in the sphere of medical progress; the medical world seems unable to forego their powerful aid. And now, there are but imitators and rivals. These two powers have become enemies for quite some time, we fear, and won’t this severely damage our science and confraternity? All relations must definitely cease between German and French physicians because of the savage and barbaric war they inflicted on us and because of the public assent to the war by their illustrious medical leader Virchow*’ [42]. The spirit of revenge was at work. While Rudolf Virchow (1821–1902) did not adhere to the microbial theory of Pasteur, he opposed the militarism of Bismarck, as the following anecdote reveals: ‘*Virchow was opposed to Bismarck’s excessive military budget, which angered Bismarck sufficiently to challenge Virchow to a duel. Virchow, being entitled to choose the weapons, chose two pork sausages: a cooked sausage for himself and an uncooked one, loaded with *Trichinella lar-**

*vae, for Bismarck. Bismarck, the Iron Chancellor, declined the proposition as too risky.*’ Virchow had just finished describing the parasitic cycle of trichinosis (*Trichinella spiralis*) [43].

### A Lesson for the Future

The numerous soldiers wounded, the severity of their lesions and the epidemics of contagious disease very quickly overwhelmed the capacities of the military health services, insufficiently prepared and equipped as they were, especially on the French side. Only surgeons took a proactive approach, concentrating their efforts to try and save patients with limb injuries. Those with abdominal, cranial or spinal injuries were most often left to the spontaneous progression of their wounds, the prognosis being inevitably fatal in nearly all cases. The suffering endured remains difficult to imagine. Many sick and wounded received no treatment whatsoever, not even relief for thirst or pain [44].

Nonetheless, this conflict did show the efficacy of vaccinating against smallpox, the benefits of isolating contagious patients, and the reduction of mortality when wounds and operations were handled in aseptic conditions, together with the control of haemostasis. Otorrhagia and otorrhea were recognised as signs of fracture at the base of the skull. The concept of post-traumatic brain swelling concomitant with intracranial hyperpressure was developed at this time (Bergmann), validating the benefits of preventive trepanning (Sédillot). Techniques to extradurally measure intracranial pressure were invented shortly thereafter. However, tetanus was not known as an infectious disease at the time.

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