

## Neurological references in the *Divine Comedy*

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### ABSTRACT

**Background.** The *Divine Comedy* is considered one of the masterpieces of world literature. This engaging and fascinating epic poem also illustrates the knowledge of philosophy, theology, and cosmology in the Middle Ages and contains numerous references to medicine in general and to neurology in particular.

**Methods.** We searched the *Divine Comedy* for references to neurological signs and symptoms. We also reviewed the literature addressing the medical references present in this piece by Dante Alighieri (1265-1321).

**Results.** The *Divine Comedy* includes references to such varied neurological symptoms as headache, cervical dystonia, and epileptic seizures. Dante reports his own experience with amaurosis fugax and symptoms suggesting narcolepsy, and he describes depressive symptoms among the inhabitants of Hell. He delivers interesting theoretical explanations of cognitive concepts such as attention and the origin of the brain and intelligence, and references to what is known today as the theory of mind.

**Conclusions.** Although Dante never actually practised medicine, he became a member of the *Arte dei Medici e Speziali* (Guild of Physicians and Apothecaries) of Florence in order to be allowed to participate in the complex political affairs of his city. This fact may partially explain the references to neurological symptoms in Dante's masterpiece. Some of them, such as sleepiness or amaurosis fugax, play highly symbolic roles in this poem.

### KEYWORDS

Dante, *Divine Comedy*, history, neurology

*Nessun maggior dolore  
che ricordarsi del tempo felice  
nella miseria; e ciò sa 'l tuo dottore*

*...There is no greater sorrow  
than thinking back upon a happy time  
in misery and this your teacher knows.*

Inferno, V, 121-123

### Introduction

The *Divine Comedy* was written by the Florentine poet Dante Alighieri between 1304 and 1321. The magnificence of this masterpiece of world literature still captivates readers seven centuries later. This epic poem narrates Dante's travel through *Inferno* (hell), *Purgatorio* (purgatory), and *Paradiso* (paradise). At the same time, however, it represents a compilation of medieval knowledge in various fields,

including philosophy, theology, mythology, history, and science, and it is therefore open to multiple interpretations. This review aims to present a reading from the viewpoint of neurology and highlight any neurological theories or symptoms mentioned in this poem. We will also review the literature addressing medicine in the *Divine Comedy*. In order to avoid an excessively lengthy text and references section, we specify the book and the canto and verse numbers when citing passages of the *Divine Comedy* (for example: Inferno, X, 24). Although many rhymed English translations have been completed, the passages cited in this review are excerpted from Allen Mandelbaum's version.<sup>1</sup>

### Development

A brief biography of Dante Alighieri (1265-1321)

Dante Alighieri was born in the Italian city of Florence in 1265. His family, of noble extraction, supported the Guelph faction. Dante recounts that the turning point of his child-

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Received: 13 August 2014 / Accepted: 27 September 2014  
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hood, and of his entire life, was when he met Beatrice Portinari when he was nine years old and fell in love with her at first sight. Beatrice would later become the embodiment of ideal love in Dante's works. It is not known whether Dante ever spoke to her. Following his family's wishes, he married Gemma Donati, with whom he had several children. As can be deduced from his vast knowledge, Dante received a meticulous and varied education, as was common in the Middle Ages. Dante is believed to have studied at several universities and he may also have attended courses in medicine, at least at the University of Bologna. What we do know for certain is that upon returning to Florence, he became a member of the *Arte dei Medici e Speziali* (Guild of Physicians and Apothecaries) for the sole purpose of participating in the political affairs of his city. Enrolling in a guild was a requirement for taking part in political life in Florence (Figure 1). He never actually practised medicine, but rather devoted his time to literature and an active political life that was marked by disappointments. Like his father before him, Dante became a member of the White Guelph faction. He was condemned to exile in 1302 due to a series of military defeats and the envy and treachery of his enemies and some among his supposed friends. He was supported by several nobles who gave him asylum in Bologna, Pisa, Verona, and Ravenna, where he died in 1321, presumably of malaria, without ever returning to his own city. In addition to the *Divine Comedy*, Dante wrote several other pieces such as *Vita nuova* and treatises in Latin about philosophy, politics, and literature. The position he holds in Italian literature is comparable to that of Miguel de Cervantes in Spanish literature or William Shakespeare's in English literature.

### The *Divine Comedy*

The *Divine Comedy* is an extremely complex epic poem that nevertheless presents an engaging adventure. It narrates Dante's journeys from the depths of Hell to the celestial spheres, guided first by Virgil and then by Beatrice. The protagonist is transformed by his travels, and the readers are affected as well. Without detracting from the poem's other qualities, its epic scale, along with its structural perfection and the author's almost delusional inventiveness, is what has fascinated millions of readers since it was first published.

The exact date when Dante started to write the *Divine Comedy* is unknown, but we do know that it was written during his time in exile. He finished *Inferno* in 1312, *Purgatorio* in 1315, and *Paradiso* in 1321, shortly before his death. The poem's structure is entirely symmetrical:



**Figure 1.** Domenico di Michelino. *The Comedy illuminating Florence*. Dante is wearing the cape of the Guild of Physicians and Apothecaries. Fresco painting at the Cathedral of Florence.

it is divided into three books (*Inferno*, *Purgatorio*, and *Paradiso*), each of which has 33 cantos written in an interlocking three-line rhyme scheme (*terza rima*), plus a canto that introduces *Inferno*. The poem also features three main characters, representing Mankind (Dante), Reason (Virgil), and Faith (Beatrice) journeying through the circles of the inverted cone of Hell, the terraces of the Mount Purgatory, and the concentric celestial spheres of Heaven. The *Divine Comedy* has so many implications—whether literary, philosophical, theological, or mystic—that it has as many interpretations as it has readers. For example, it has been suggested that Dante wrote this piece to elicit the four senses of interpretation used to analyse sacred texts: literal, moral, allegorical, and anagogic. From a scientific perspective, some have even postulated that the *Divine Comedy* is one of the precursors of psychoanalysis,<sup>2</sup> and that Dante's rapid descent on the back of the monster Geryon provides the first description of the physical principle of Galilean invariance, several centuries before that scholar would formulated the principle.<sup>3</sup> Less eccentric in his remarks is Jorge Luis Borges, a great reader who penned the excellent recommendation that follows:

In the beginning we must read the book with the faith of a child, abandoning ourselves to it; then it will accompany us to the end. It has accompanied me for so many years, and I know that as soon as I open it tomorrow I will discover things I did not see before. I know that this book will go on, beyond my walking life, and beyond ours.<sup>4</sup>

### Physicians in the *Divine Comedy*

Dante mentions several physicians among the prominent figures that appear in the poem (including kings, popes, nobles, politicians, masters, and writers). Classical physicians (Dioscorides, Hippocrates, Galen, Avicenna, and Averroes) were to be found in limbo along with his guide Virgil. Limbo contained the souls of the virtuous who did not know Christianity and were not baptised, and who therefore could not behold God (*Inferno*, IV). Less fortunate were the alchemists such as Michael Scot, condemned to the pit of the fraudulent, in the eighth circle of *Inferno* (*Inferno*, XX, 115-117). However, Dante seemed to show the highest regard for Taddeo Alderotti (1223-1303), professor at the University of Bologna and the founder of medical dialectics, who may have been one of Dante's mentors.<sup>5</sup> The author described meeting him in Heaven, enjoying eternal life (*Paradiso*, XII, 82-83).<sup>6</sup> The introduction of *concilia*, a primitive type of case report, is attributed to Alderotti.<sup>7</sup> Another contemporary physician, Pedro Julião (1215-1277), was the author of several treatises including *Thesaurus pauperum* and *Liber de morbis oculorum*. The latter was the most widely-used ophthalmology text until the 17th century. However, he was even more successful in the Church than in medicine: elected to the papacy in 1276, he became known as John XXI. He was the first Portuguese pope as well as the only one to date, and one of the few popes to whom Dante granted the privilege of dwelling in Heaven (*Paradiso*, XII, 134-135).

### Neurology in the *Divine Comedy*

Two types of neurological references can be found in the *Divine Comedy*. Some of them are philosophical or theoretical and appear in *Purgatorio* and *Paradiso*, the most speculative books; the other references mention neurological symptoms or diseases and abound in *Inferno* along

with many other conditions affecting the doomed souls. Some of these neurological manifestations have been depicted by famous illustrators including Botticelli, Doré, Dalí, and Barceló. We will analyse these two types of references separately.

#### 1. Neurological theories in the *Divine Comedy*

Dante addresses several topics currently regarded as pertaining to neurology or psychology. In the Middle Ages, however, these concepts were mingled with philosophy and theology. There are digressions on the origin of the brain and the soul (*Purgatorio*, XXV, 31-108), attention (*Purgatorio*, IV, 1-38), intelligence (*Purgatorio*, XXV, 83; *Paradiso*, I, 1-36), and even a reference to what today might be considered the 'theory of mind': "Ah, how much care men ought to exercise/with those whose penetrating intellect/can see our thoughts not just our outer act!"; *Inferno*, XVI, 118-120. Cantos XXVIII and XXXI in *Purgatorio*, which address memory, play a major role in the poem since they also describe the passage from Purgatory to Heaven. To make this journey, Dante must follow Matilde's instructions and drink from the two rivers in Eden: the Lethe, which removes sins from the memory, and the Eunoe, which helps recall good deeds. Dante later explains that Heaven is a place for eternal contemplation such that angels do not need memories (*Paradiso*, XXIX, 80-81). According to this peculiar view, memory is considered a burden on the soul instead of a desirable human faculty.

#### 2. Neurological diseases

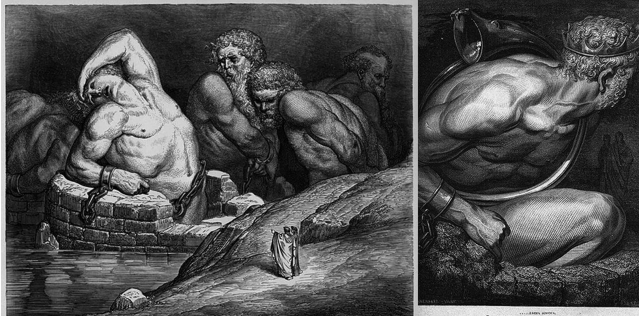
Several neurological symptoms and diseases are mentioned more or less explicitly and can be divided into two groups. On the one hand, as Dante descends through the circles of Hell, he observes various afflictions, complete with manifestations of all kinds of diseases, including depression and ascites.<sup>8</sup> Some are mentioned only briefly, for example, headache (*Inferno*, XXX, 127) or palsy (*Inferno*, XXX, 81). On the other hand, Dante's character experiences and describes his own neurological symptoms, including drowsiness, loss of consciousness, delusions, and visual hallucinations.

##### a) Cervical dystonia

In the eighth circle of *Inferno* Dante hears diviners moaning as they walk with their heads twisted backwards, as a punishment for having tried to descry the future. Dante is surprised by this unusual position of the neck and speculates about its cause: "Perhaps the force of palsy has so fully/ distorted some, but that I've yet to see,/ and I do not believe that that can be" (*Inferno*, XX, 16-18).



**Figure 2.** Priamo della Quercia. Illustration in *Inferno*, XX. Manto and the diviners in the eighth circle of *Inferno*, condemned to adopt an abnormal neck position suggesting cervical dystonia.



**Figure 3.** Gustave Doré. Illustration in *Inferno*, XXXI. Damned giants exhibiting dystonic postures.

There are many illustrations depicting this scene, and the abnormal postures resemble those of patients with cervical dystonia (Figure 2). Some Italian neurologists suggested the term ‘Manto syndrome’ for a specific type of cervical dystonia. The term, which was never widely adopted, is named after one of the diviners mentioned in canto XX.<sup>9</sup> Souls condemned to the pit of the giants are described as presenting deforming muscular contortions and rigid postures (*Inferno*, XXXI; Figure 3).

#### b) Epilepsy

One of the most dramatic episodes in the *Divine Comedy* takes place in the pit of the thieves, where the violent Vanni Fucci fights Dante after suffering an epileptic attack (Figure 4).

And just as he who falls, and knows not how  
by demon's force that drags him to the ground  
or by some other hindrance that binds man  
who, when he rises, stares about him, all  
bewildered by the heavy anguish he  
has suffered, sighing as he looks around;  
so did this sinner stare when he arose.  
Oh, how severe it is, the power of God  
that, as its vengeance, showers down such blows!  
(*Inferno*, XXVI, 112-120)

Dante's verses provide an exceptionally well-drawn account of post-ictal confusion with disorientation and anxiety. His observations on epilepsy are concise and coincide with the two causes of the disease accepted in the Middle Ages, namely religious (demonic possession) and natural (obstruction of humour or blood circulation).<sup>10</sup>

#### c) Falls and loss of consciousness

One of the most controversial symptoms described by Dante is the fainting he experiences in situations of intense emotion. The first episode takes place when Dante hears the lamentations of the doomed souls as they

embark to cross the river Acheron while Charon mocks and insults them (Figure 5):

And after this was said, the darkened plain  
quaked so tremendously the memory  
of terror then, bathes me in sweat again.

A whirlwind burst out of the tear-drenched earth,  
a wind that crackled with a bloodred light,  
a light that overcame all of my senses;  
and like a man whom sleep has seized, I fell.  
(*Inferno*, III, 130-136)

Dante falls a second time shortly thereafter, in one of the best known passages, when listening to the story of the adulterous lovers Francesca da Rimini and Paolo Malatesta (Figure 6):

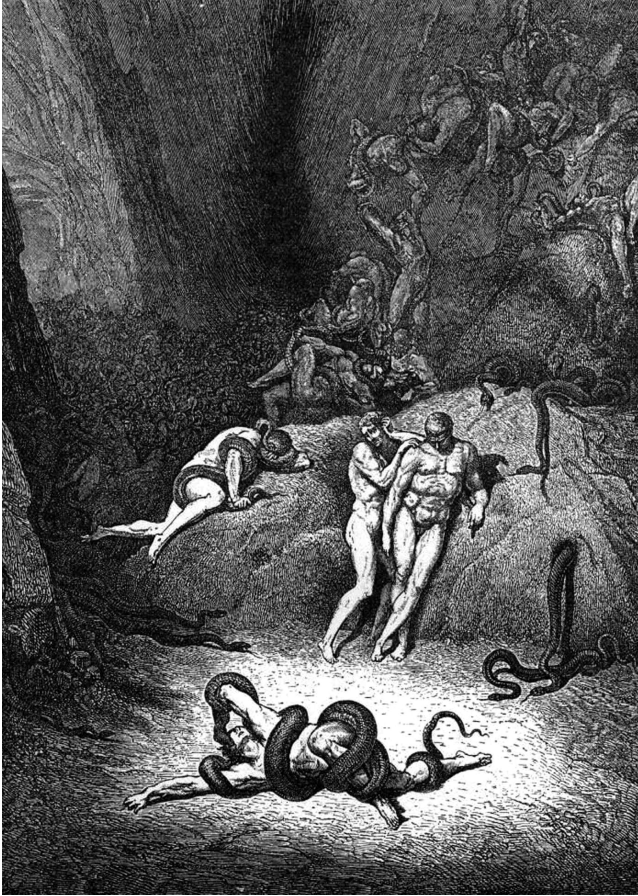
And while one spirit said these words to me,  
the other wept, so that because of pity  
I fainted, as if I had met my death.

And then I fell as a dead body falls” (*Inferno*, V, 139-142).

As we see, these two descriptions suggest loss of consciousness, leading some authors like Lombroso to include Dante in their lists of geniuses with epilepsy.<sup>11</sup> However, this hypothesis does not seem plausible due to the brevity of Dante's descriptions, the significance attached to epilepsy in the Middle Ages, and the lack of additional sources confirming this hypothesis. These manifestations probably corresponded to episodes of vasovagal syncope, a theory that is consistent with the autonomic symptoms described (“bathes me in sweat”, “I fainted”). According to another compelling hypothesis, the episodes might be due to cataplexy since the emotional stimulus is evident and it is unclear whether Dante lost consciousness. This theory is compatible with the hypothesis of narcolepsy explained below.

#### d) Narcolepsy

Perhaps one of the most appealing theories about the *Divine Comedy* to be put forth in recent years was suggested by Dr Giuseppe Plazzi. This author identifies numerous descriptions of narcoleptic symptoms throughout the poem, most of them affecting Dante himself.<sup>12</sup> Drowsiness is an essential element in the poem, appearing even in the very first verses, when Dante observes that he cannot remember how he entered Hell because “...I was so full of sleep just at/the point where I abandoned the true path” (*Inferno*, I, 10). The principal critics and scholars of the *Divine Comedy* have highlighted the dreamlike quality of the poem with its frequent references to sleep and the notion that the story ends when the poet awakes (*Paradiso*, XXXII, 132-139). If this is the case, the ‘dark wood’ which Dante claims to enter at the beginning of the poem represents falling asleep.



**Figure 4.** Gustave Doré. Illustration in *Inferno*, XXV. Epileptic seizures represented as possession and attacks by monsters.

In addition to drowsiness and falling provoked by emotional stimuli mentioned above, the hypothesis of narcolepsy would explain other isolated neurological manifestations, such as restorative sleep (*Inferno*, IV, 1-4) or visual hallucinations during both sleep and wakefulness, as described in the third terrace of *Purgatorio*: Mary embracing her lost child in the temple, Pisistratus forgiving his daughter's suitor, and the stoning of Saint Stephen (*Purgatorio*, XV, 82-114). After these hallucinations, Dante understands that his soul "returned outside itself/and met the things outside it that are real" (*Purgatorio*, XV, 115-116). Virgil also points out Dante's sleepiness and parasomnia:

My guide, on seeing me behave as if  
I were a man who's freed himself from sleep,  
said: What is wrong with you? You can't walk straight;  
for more than half a league now you have moved  
with clouded eyes and lurching legs, as if  
you were a man whom wine or sleep has gripped!  
(*Purgatorio*, XV, 118-123).

According to this hypothesis, Dante experiences all of the main symptoms of narcolepsy except for sleep paralysis: sleepiness, cataplexy, visual hallucinations, restorative sleep, and sudden sleep attacks with rapid-onset REM sleep.

#### e) Visual illusions and amaurosis fugax

In addition to sleep, the visual illusions and amaurosis fugax experienced by Dante during his ascent through Heaven also have an important symbolic role in the *Divine Comedy*. As mentioned previously, the poem's visual imagery provides a powerful description of sufferings in Hell as well as the mysticism of Heaven. At one point, Dante sees a flash that strikes him blind for a few moments:

so did I see that splendor, brightening,  
approach those two flames dancing in a ring  
to music suited to their burning love.  
(*Paradiso*, XXV, 106-108)

until these words were said: Why do you daze  
yourself to see what here can have no place?  
(*Paradiso*, XXV, 122-123)

Ah, how disturbed I was within my mind,  
when I turned round to look at Beatrice,  
on finding that I could not see, though I  
was close to her, and in the world of gladness!  
(*Paradiso*, XXV, 136-139)

While I, with blinded eyes, was apprehensive,  
from that bright flame which had consumed my vision,  
there breathed a voice that centered my attention,  
saying: Until you have retrieved the power/  
of sight....(*Paradiso*, XXVI, 1-5)

The literal description suggests photopsia and gradual loss of vision which together are very suggestive of migraine aura. What interested Dante, however, was the symbolic value of vision and visual changes. At the beginning of the *Divine Comedy*, sins do not let the poet see clearly. Saint Lucy, patron saint of the blind, therefore protects him on his journey through Hell (*Inferno*, II, 100-105) and leads him to the gate of Purgatory while he is asleep (*Purgatorio*, IX, 52-63). Thus, the sparkling



**Figure 5.** *El Infierno* (1911 Italian film directed by F. Bertoni). Dante cannot bear Charon's treatment of the doomed souls and faints, alarming Virgil.

lights and dazzling flash at the end of Heaven do not describe any type of literal blindness, but rather the moment in which he has been purified and prepared to look upon Heaven.

### Conclusions

Whether or not Dante actually received medical training remains a mystery, but medical knowledge may have had a hand in the numerous references to neurological signs in the *Divine Comedy*. Drowsiness and amaurosis fugax following phosphenes are assigned a major symbolic role.

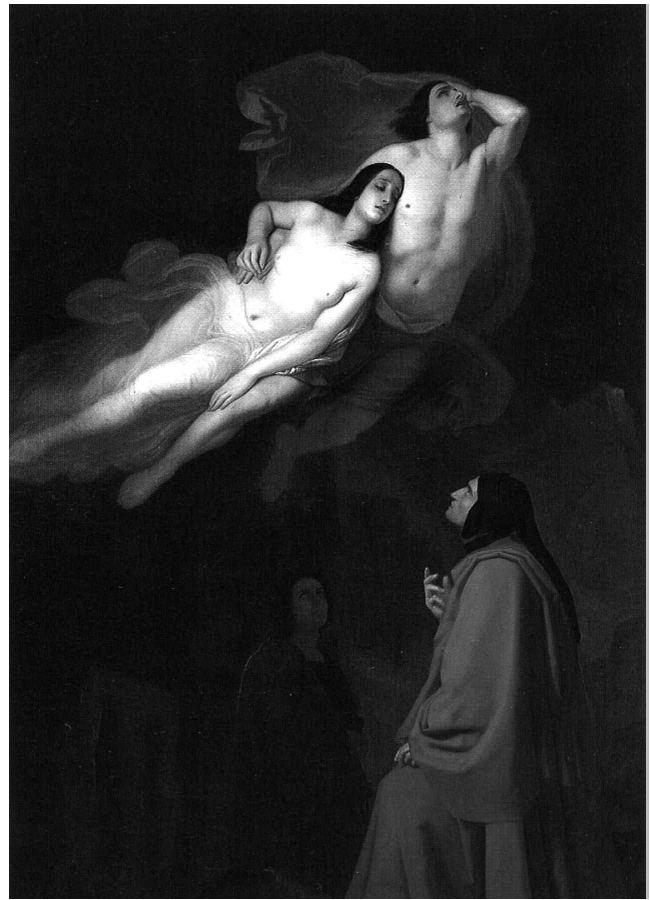
Interest in the poet's personality and the autobiographical content in the *Divine Comedy* have led many authors to state that some of the symptoms described in the poem are not fictional, but instead reflect the manifestations he might have suffered in real life. The hypothesis of narcolepsy as the cause of many of the neurological symptoms described is compelling. It would be tempting to conduct a pathographical study and to speculate on the potential influence of visual illusions and hallucinations on the boundless creativity and visual plasticity of the *Divine Comedy*. However, retrospective diagnoses and any based on limited data are problematic. We should therefore be realistic and bear in mind that the neurological descriptions contained in this poem have a significance that is more poetic and dramatic than medical. A clinical interpretation of the *Divine Comedy* is only one of many possible readings and, in fact, not the most enjoyable one.

### Conflicts of interest

This study received no public or private financial support.

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**Figure 6.** Giuseppe Frascheri. Dante listening to the story of Francesca da Rimini and Paolo Malatesta, shortly before being overcome by emotion and falling to the ground. Civica Galleria d'Arte Moderna Savona, Italy.