“Who are you, Nystagmus?” A semantic and historical approach

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Abstract. “Who are you, Nystagmus?” A semantic and historical approach. Initially, the need to name nystagmus was logically satisfied by the use of the metaphor of a galloping horse, “hippus”. Later, nictatio, oeil d’hypocrète and souris embodied the presumed connection between blinking and the rhythmic involuntary movements of the eyeball. Blinking was also considered by Boissier as an inseparable companion of the unsteadiness of the eyeballs. Since drowsiness is a good example of a state accompanied by blinking, it makes sense, strange though it may seem, to use the Greek word for drowsiness, “nustagmos”, to refer to the unstable movement of the eyeballs. From a poetic point of view and in the light of the rapid phase of the phenomenon, nystagmus can be thought of as “a modern Sisyphus, the operator of the eternal return”.

Figure 1

Excerpt from the Codex Seraphinianus by Luigi Serafini (1976-1978): “the fish emerging just above the water look like the large eyes of a movie star” (comment by Italo Calvino).

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Nystagmus was not always known under that name! Although the name prevailed in the end, the origins of its identity and success remain more or less a mystery.

1. **Hippocrates describes nystagmus but he calls it “hippos”**

   - Surprisingly, in its scientific meaning, the term *hippos* (horse) cannot be found in Hippocrates although tradition grants him the paternity of the name! To find *hippos* with a scientific sense, you have to read Galen, who wrote six centuries later that the word came from Hippocrates! In the library of Alexandria, Galen was probably able to consult written works that have not survived and that may have included that treatise on ocular diseases of which only a few extracts remain. Indeed, those may have been the only texts that were even written (this is the suggestion made by Dr. J. Sichel, an ophthalmologist and a Littré co-worker). In his “Definitiones medicae”, in which Galen looks at myopia, strabismus and chemosis, he writes: “Hippus is a congenital condition in which the eyes are in a constant state of restless motion; they are forever oscillating back and forth with a trembling movement. Hippocrates named this condition *hippos*. It is a malady of the muscles which surround the base of the globe and hold the eye in its place”.1,2 Hippus continued to have that meaning until the 18th century, after which time it was restricted to the pupil. That remains the situation at present.

   - Why was the word *hippos* chosen for the nystagmic phenomenon? Galen did not explain, but it is clear that this is a metaphor originating from the image of a galloping horse. In the 16th century, Paré confirms this. In his Introduction to Surgery (1575), he writes: “Hippus in Greek, Equus in Latin: this disease is so named because the eye jumps like a horse”. But there is another reason for the link between the eye- or a disease of the eye- and a horse.2 Figure 3 shows two Chinese pictograms dating from the 2nd and the 1st millennium BC. The first one means “eye” and the second “horse” (Figure 3). We must not lose sight of the fact that the eyes of a horse are directed not forwards, but outwards. That position was a major advantage for horses when they lived in the wild. As animals living in the plains, they could not count on natural features to provide refuge from predators: safety depended on their ability to locate enemies rapidly and take flight. The positioning of the eyes gave horses a visual field of almost 360 degrees! Most of our representations of the horse are in profile, so that the visible eye jumps out at us! Even in the absence of any links with the ancient and distant civilisation in China, the Greeks of the fifth century BC would not have had any difficulty in making the same comparison.

2. The entrance of the eyelid: “œil d’hypocrite” (the eye of an actor) and “nictatio”

   - From the Renaissance onwards, there was an established link between the functional pathology of the orbicularis oculi muscle and that of the muscles of the eyeball. This confusion undoubtedly went back to an earlier age, to Galen, and Paré confirmed it in his writings.4 This medical thinking linked, in the same disease, the uncontrolled movements of the eyelids and the unsteadiness of the eyeballs. This was thought to be either a subordinate relationship, in the case of abnormal movements beginning at the level of the eyelids before reaching the eyeball (“aucuns l’attribuent aux paupières”), or quite simply, synchronization or an alternation between the uncontrolled movements of the eyelids and these of the eyeballs (“on remue toujours les paupières ou l’œil même”) (Figure 6).4
This pathological association was confirmed by subsequent authors, including Boissier de Sauvages in the 18th century. It ended with the creation of two new names to designate nystagmus: *œil d’hypocrite* and *nictatio*. (Figures 7, 8, 9)

**“L’œil d’hypocrite”**

At the origin of the term “hypocrite”, we find the Greek verb ὑποκρίνομαι hupokrinô: “to separate summarily”, and its deponent* form ὑποκρίνομαι, hupokrinomai, which meant “to answer” as an oracle, to explain/translate the utterances of an oracle, or to interpret, for example, a dream. A specific meaning was acquired in Attic Greek: “to play opposite somebody in a dialogue on the stage”, “to play a role”, “to play a role in a mime show”.

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Figure 3. Ancient Chinese pictograms

Figure 4. Left profile of a horse

Figure 5. Modern-day Chinese pictograms. The concept of disease, which could theoretically include nystagmus, appears in the modern-day pictograms. The principal structures of the pictograms persist down the ages, and another sign of convergence is the fact that the words for an eye disease and a horse are both “ma”, the difference in meaning being made by differences in intonation.

Figure 6

Complete works of Ambroise Paré by Malgaigne. Liber XV. “Méthodique division et dénombrement des maladies qui surviennent aux yeux.”

*This deponent form is discussed in the context of ancient Greek verbs, which was not previously mentioned.*
Finally, a derived meaning was “to distort, to feign”, the meaning that is widespread today.

* A verb of passive form but of active meaning.

As for the term “hypocrite” itself, ἀποκριτής, it meant “interpreter of a dream or of a vision” (Plato), “soothsayer, prophet” (New Testament), but also “actor, comedian” (Aristotle, Plato) and finally “deceitful, hypocrite” (Greek translation of the Bible, 3rd century BC).

Paré reintroduced the word. He had in mind the actor or mime-player, whose expressive grimacing, mobility of the eyes and blinking replaced or emphasised the words. A more modern example is the blinking, the eloquent eyes, of the stars of the silent movies… The pathetic nerve (trochlear nerve) owes its name to this theatrical root.

**Nictatio**

Classical Latin did not possess the term *nystagmus*. It did use the word *nictatio* “blinking”, the root of “nictation” and “nictitating membrane”, that third eyelid that covers by fits and starts the eyeball in the transversal direction. It is worth drawing attention to the common origin of *nictatio* and the German or Dutch “neigen”: to incline, to lean over since, during blinking, the upper eyelid does indeed move downwards.

3. The emergence of "nystagmus" (Latin version) and "souris" (French version): the nosology of Boissier de Sauvages (1763-1771)

The nosology of Boissier de Sauvages (1763-1771) (Figure 10)

The term “nosology” was established in the 18th century (1747) to refer to the medical discipline that deals with the distinctive features of diseases with the aim of systematic classification. It was in the 17th century, with Sydenham, that medicine acquired a new way of viewing diseases: as abstract entities independent of individuals and specific times.

In this new view, diseases could be described as individual species on the lines of the approach of botanists to plants. During the course of the 18th century, several nosologies appeared based on that principle. One of the most remarkable of them was that of François Boissier de Sauvages de Lacroix, who took his inspiration from the classification of plants by the botanist Linné.

For instance, Boissier broke down spasms into tonic and clonic varieties. The tonic spasms included partial tonic spasms such as strabismus, torticollis and priapism! The general tonic spasms included tetanus.
The clonic spasms were broken down into the partial clonic, which included nystagmus or souris (fr: mouse). The universal clonic included epilepsy and shivers!

**The “Souris” (The Mouse)**

The rounded back of the mouse gave the word its secondary meaning of “muscle” in French from the 13th century onwards, and later of “muscular cramp” in the 17th century. The shape of the mouse resembled a muscle in a state of contraction. The most typical example was the biceps of the arm when contracting. The use of the term for a spasm, the convulsion of the muscles of the eyelid that emerged later in French, fits in well with the Latin picture of a muscle in a state of contraction.

In his Nosology, Boissier de Sauvages introduced the word nystagmus (in the Latin version) (Figure 11) and souris/mouse (in the French version). Souris was chosen as an equivalent of nystagmus to refer to the clonic spasm of the eyelids and of the eyeballs, in other words blinking and nystagmus in its proper sense; it was also sometimes used to refer to the alternating contraction and dilatation of the pupil. (Figure 12)

**Nystagmus**

- Hippocrates used nustagmos to mean “drowsiness” and the verb nustazô to mean “to fall asleep, to doze off”. The initial sense of the verb was “to let one’s head drop” as a result of either fatigue or sadness. The word and its derivatives were often found in ancient Greek, even outside Hippocrates: Aristotle, Plato, Xenophon, Plutarch, the Greek version of the Hebrew Bible produced in Alexandria during the 3rd century BC, and in Galen and Aretaeus of Cappadocia, both physicians.

Nustazô had an Indo-European root which is possibly linked to the Lithuanian “snaudzu” meaning “to doze” (Baillly dictionary) or the Lithuanian “Snusti”, “to fall asleep” (Webster dictionary). In any case, there was no relationship with the verb νευω / neuo (Baillly) (see further).

- Curiously, there was another Greek verb, not connected with the previous one (according to Baillly), but very close in terms of form, and dating back even further. This verb was νευσταζων neutazô. It was connected with the Greek verb νευо, neuo, which meant “to shake one’s head to make a sign”, and the Latin substantive nutatio (which should not be confused with nictatio) meaning “swaying, oscillation”. (In French, nutation is the periodic oscillation of the axis of rotation of the earth around its middle position and, in medicine, the continuous swaying of the head).

Neutazō neutazô meant “to make a sign with the head or with the eyes”. As in the Odyssey where Ulysses makes a sign with his eyes (in the text, literally when frowning: οφθαλμον νευσταζων) to be liberated from the ropes preventing him from approaching the Sirens (Odyssey, book XII, verse 194). Unfortunately, that verb did not have any known substantive form which could be νευσταζωνμος, neutagmos. If it had,
Boissier would have been in a position to find a term more appropriate to the movements of the eyeballs than nystagmos.

- Why did Boissier de Sauvages choose to introduce the word nystagmus (Figures 12-15)?
To remain faithful to the teachings of Galen and Paré, Boissier had to take into account the inescapable factor of blinking as a pathogen or at least as a phenomenon associated with the disorders involving ocular stability (Figure 6).

Hippus could not be used for that purpose because, since Hippocrates, it had been associated with the eyeball. Boissier decided not to avail himself of the option of nictatio, perhaps because he wanted a Greek word. In any case, to remain true to Galen's theory of the regional spasm beginning at the level of the eyelids, Boissier had to use a word naming a physiological condition involving repetitive blinking. That condition is drowsiness, nystagmos in ancient Greek.

At this point, to conform with Galen's theory, Boissier had to ensure only that nystagmus was the name for two subgroups, the one being the affection of the eyelid, “nystagmus epilepticus”, and the other the affection affecting the eyeball “nystagmus bulbi”.

However, Boissier did not altogether forget hippus. He used it as a synonym for “nystagmus epilepticus”, confirming the ocular association inherited from Hippocrates, with one proviso: Boissier also used a particular...
German version of hippoc associated with the pupil (Hippos de la prunelle) (Figure 15). This variant was destined to play a major role in the future. It became the only admitted sense for hippoc today: the rhythmic variations of the diameter of the pupil.

• Nystagmus got off to an inauspicious start in 1763.

1. The nystagmic phenomenon was ignored in the description of vertigo, and consequently the term itself was not used. Even when it was later recognised as a symptom, several leading authors preferred to adopt a periphrastic approach.

It was not until 1820, with the writings of Purkinje of Prague, that we had a description of the ocular movements occurring after the rotation of the body. Shortly thereafter, Flourens published his experiments relating to the semi-circular canals and the cerebellum. In 1824, he observed the nystagmic phenomenon in association with vertigo but the word nystagmus was not pronounced! He wrote: agitation perpétuelle des globes oculaires. Brown-Sequard spoke of convulsions de l’œil in 1853. Menière did not even mention nystagmus in his description of the famous vertigo symptoms in 1861. The same was true of Politzer, who was Menière’s pupil for a while.

2. In the meantime, the competing terms for nystagmus (nictation, souris, hippoc) were still in use and this situation persisted until the second half of the 19th century. For example:

– When publishing in French in 1771 (in Latin in 1763), Boissier de Sauvages had the following to say about the hippoc: “Nystagmus or Souris: this disease consists of an alternating spasmodic movement of the eyes or of the eyelids, and even of the iris…”

– Petit-Radel states in his Encyclopaedia that hippoc referred to “the continuous and convulsive blinking of the eyelids” (Encyclopédie méthodique, chirurgie, by M.de La Roche and M. Petit-Radel. A-KYS, Panckoucke, Paris, 1790).

– Littré gave the following definition of “nystagme”: “spasmodic blinking resembling that of a person overcome with a desire to sleep and who is trying in vain to keep awake” (1866).

– In 1873, under “hippus”, Littré was still defining this term as the: “old name for nystagmus and nictation” (Encyclopédie méthodique, chirurgie, by M.de La Roche and M. Petit-Radel. A-KYS, Panckoucke, Paris, 1790).

– In the same year, the term “nystagmus” was not pronounced! He wrote: agitation perpétuelle des globes oculaires. Brown-Sequard spoke of convulsions de l’œil in 1853. Menière did not even mention nystagmus in his description of the famous vertigo symptoms in 1861. The same was true of Politzer, who was Menière’s pupil for a while.

• Nystagmus became the generally accepted term only very gradually, bringing us to the early 20th century.

– The motor function of the facial nerve was demonstrated by Charles Bell and it was shown in the eyelids by Duchenne de Boulogne in 1862. So the spasmodic nature of nictation was confirmed; it was the only one.

– In the same year, the role of the sympathetic system in the diameter of the pupil was demonstrated by Claude Bernard, who described the syndrome which bears his name. He was followed seven years later by Horner. From that point onwards, hippoc was associated with an orthoparasym pathetic imbalance.

– Barany’s rotary and caloric tests confirmed the terminological position of nystagmus from 1905/1906 onwards.

Conclusions

1. A first conclusion can be drawn from this odyssey with respect to the evolution of the terminology of the nystagmic phenomenon.

• In the beginning, the terminology exemplified a child-like simplicity, with a dreaming quality bearing the stamp of the imagination. That image did not indicate any particular vision; it was a simple metaphor that persisted as such. The silhouette of the galloping horse, the hippoc, prevailed for centuries, and is still present today in the domain of the pupil.

• Later, the vocabulary corresponded to the need for order expressed by the scientists, to the concern to classify diseases. This was certainly a laudable development, but it did involve a risk. Even as imagery, the language could indicate a premature theory: that of the regional spasm beginning at the level of the eyelids.
d’hypocrite, nictatio, souris, and nystagmus were only variations on the theme of the spasm. From that point of view, all these terms were interchangeable and a confusion was established between the roles of the eyelids, the eyeballs and the pupil.

That disorder prevailed until other nosological concepts based on better physio-pathological knowledge ended with the dismantling of the shaky theory and the clarification of the terminology.

Figure 16
From a poetic point of view and taking into account the quick phase of the phenomenon, Nystagmus may lay to its role as “the operator of the eternal return”.


2. Finally, there is the answer given by Nystagmus to the question at the beginning of this paper “Who are you?”

“I am a Greek word. I am as old as the Parthenon, but I have no wrinkles. I dozed off because it was my destiny. My eyelids began to blink. I passed centuries like that until the day a wigged physician spotted me. My appearance was pleasing to his eye because, to comply with ancient preconceptions, he needed somebody whose eyelids were trembling. I myself was dozing, so I was rather surprised when he enlisted me into the eyeball as the driver. Since then, I have inhabited that wide open cavern where the light feels at home, among the ocular motors, the straight, the oblique and the famous pulley. I do not doze any more, I remember: in my country long ago, the Gods condemned Sisyphus to an eternity pushing a rock back up the mountain every time it hurtled down the slope. Today, I continually bring back the eye as it tries to escape. As a modern Sisyphus, I am the operator of the eternal return”.

Bibliography
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