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A Historical Vignette

"Be proud of yourself: you have a History!"

Turbulence around the otoliths
Sappey's hostility and Breschet's defence

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Abstract. *Turbulence around the otoliths. Sappey's hostility and Breschet's defence*. Nowadays, the animosity between medical scholars is seldom apparent. However, during the XIXth century it was not necessarily so. We find an example of this in Sappey's hostility against his colleague anatomist Gilbert Breschet. It concerned the discovery of the otoliths of the inner ear that Breschet attributed to himself. We present here Breschet's defence.

Sappey's hostility (Figure 1)

Marie-Philibert-Constant Sappey was a French anatomist who received from the 1900 Larousse Encyclopaedia the honour of an article with a pen-and-ink drawing. He was born at Bourg (Ain department) in 1810 and he died in Paris in 1896. He published important works concerning the lymphatic vessels. He described their anatomy, physiology, pathology and iconography. We owe him the knowledge of the lymphatic vessels and nodes of the supraglottic part of the larynx (1889) that was the basis of the radical neck dissection for laryngeal cancer. Nevertheless, Sappey was also an irascible man! In his treatise on descriptive anatomy (1845-1863), in the chapter "sense of hearing", we find a history of the discovery of the membranous labyrinth into which we read some surprising lines that censure another anatomist, Gilbert Breschet, concerning the discovery of the otoliths of the inner ear:

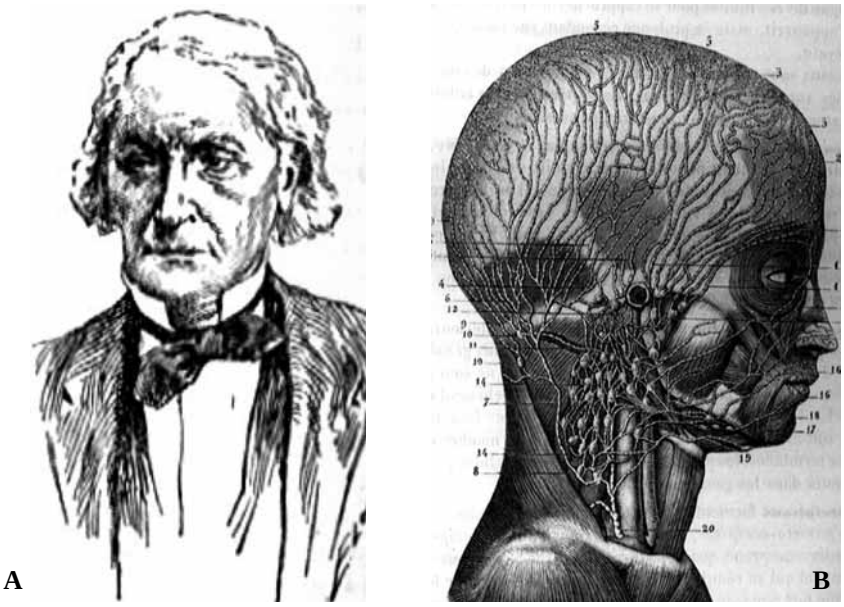

Figure 1

A. Sappey (1810-1896).
B. Lymphatic vessels of head and neck with the great lymphatic vein[1].

"After the work of Scarpa, Breschet's one appeared… In that extremely voluminous dissertation, you find only one new fact: the existence of the calcareous dust of the vestibule… This fact had probably some importance; it was very simple, to mention it was enough. To magnify it, Breschet decided to rebuild all the story of the labyrinth on a few of these grains of dust. Considering that work, Breschet had no personal investigations at his disposal.

However, he had into his hands Scarpa's work, a fruitful mine and scarcely known in France. Breschet draws largely on it, and he disguises his borrowing under new names… and as many readers think that new words are only made up to say new things, Breschet could hope that a work built on these pillars should be received with the favour attached to works of progress; such was the welcome that he received indeed. Certainly, it was not a work of progress, but it was a work full of daring and skilfulness. Daring was necessary to seize, right in the XIXth century, the search of Scarpa who possessed a European name. Skilful was necessary to Breschet to build on such a base for himself the fame of a great anatomist.

Moreover, there was another trouble with Breschet… In order to not extend this critical examination that someone could find too severe, though I tried to reduce it very much, I shall quote just one example taken at random…"[1]

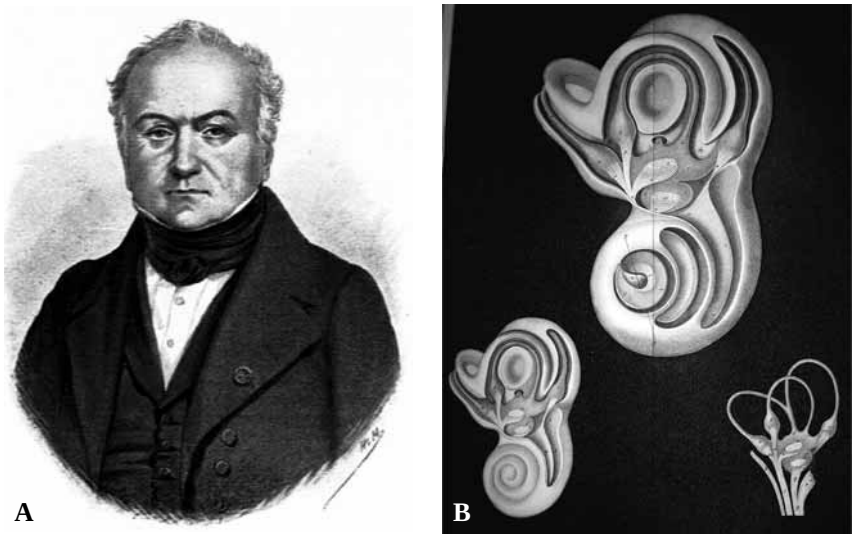

Figure 2

A. Breschet (1784-1845).
B. Inner ear of Man[2].

Breschet's defence (Figures 2,3,4)

Gilbert Breschet was born in Clermont-Ferrand (Puy de Dôme department) in 1784. He died in Paris in 1845. He was teaching Anatomy at the Faculty of Medicine of Paris and was an ordinary Surgeon at the Hotel-Dieu.

1. In fact Sappey recognizes in the paper quoted here[1] the personal contribution of Breschet in the discovery of the otoliths and otoconias , at first with some reluctance:

"… a dust that had seen briefly first by Morgagni and then by Scarpa and that the latter had even compared with the auditory stones of fishes".

At the end the truth finally comes: "… but that he (Scarpa) finished by considering as a mass of neural fibrils. The merit of Breschet was the fact of discovering that the calcareous powder of the utricle and the saccule was independent of the utricular and saccular nerves though corresponding to them.[1]

2. Let us give the word now to Breschet personally, who defends himself first by attacking the work of his predecessors:

"Comparetti like Scarpa allocates to these maculae (the whole of the otoliths) the structure of the dried out pulp of the acoustic nerve… he considers that macula as the expansion of the acoustic nerve. Mr Geoffroy Saint Hilaire writes: these lithoid organs are part of the acoustic organ as a result and not as an active agent, they are some secretions provoked by the accomplishment of the auditory process which is the origin of such stones".[2]

3. Then Breschet claims his personal role as an anatomist of the inner ear when he makes clear the identity of several structures:

"We followed Linné's example when correcting the nomenclature of the diverse parts of the inner ear"[2]

In addition, Breschet isolates and identifies several structures by giving them a name:

<u>the columella</u>: the cone-axis of the cochlea (Valsalva introduced the term "modiolus" which prevails today)

<u>the helicotrema</u> : "helicotrema, from helix, helikos, from the verb helissô: to roll, and trema, trematos, the gap; it is to say: the gap of the helix".

<u>the perilymph</u>: "it is that liquid surrounding the membranous labyrinth and occupying the whole of the cochlea, to which we give the name of perilymph"

<u>the endolymph</u>: "the interior of the membranous labyrinth contains the endolymph, a clear liquid"

<u>the otoliths</u>: "several calcareous concretions, sometimes like

stones, sometimes like dust that are swimming in the endolymph (1). When these concretions are solid, calculous as seen in the osseous fishes, we call them Otoliths (ous, ôtos, ear; lithos, stone)".
the otoconias: "if the concretion inside membranous labyrinth is dusty, as seen in most of the cartilaginous fishes and in the vertebrates animals of the three superior classes, we give them the name of Otoconias (from ous, ôtos, ear and konis, koneôs, dust or ash)".[2]

4. Then finally comes the essential part of Breschet's work concerning the otoconias, in particular at the level of the utricle (named "medial sinus" by Breschet):

"Inside the medial sinus, under and a little behind the place where the two anterior ampullae are, a small mass of calcareous substance is swimming, a substance never described until now and which establishes a supplementary analogy between the ear of man and these of the inferior vertebrates. This light dusty mass is more visible in the foetus than in the adult; it is distinguishable by a bright whiteness. It consists only of a little calcareous and very thin powder. Under the microscope, one observes that it becomes effervescent in the presence of acids and it seems that it is made of carbonate of lime. Several times, under the microscope, we thought that we recognized a crystalline form concerning that dusty matter…"[2] (Figure 3).

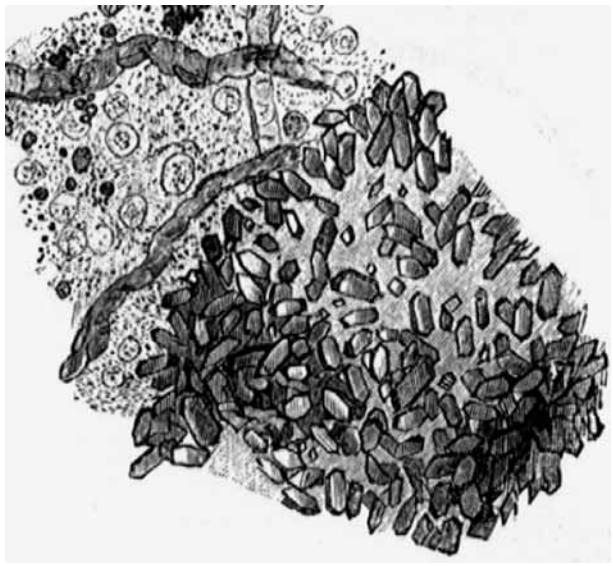

Figure 3
One of the first drawings of the otoliths in Man published by Cruveilhier from his friend Breschet's work
" *Les otoconies de Breschet ou sable auditif* : *une multitude de corpuscules microscopiques... de véritables prismes à six pans terminés en pointe à leurs extrémités*"[3].

5. Further, Breschet evokes the gelatinous substance that maintains the cohesion of the otoconias:

"When one places the mass of the calcareous powder cautiously on the slide under the microscope, one sees that the powder lies on a strip of soft and spongy tissue which holds the calcareous granulations together. Therefore, the concrete mass has always a round or a little elongated shape. The whole of the mass seems to be hold in its position by the neural endings that go on it."[2]

Some comments on the attack and on the defence

The positional vertigo of the benign paroxysmal type has its historical figures. Among them, Hallpike and Schuknecht. The otoliths and otoconias are also in the spotlight. However, people didn't pay attention to the name of the man who brought them to the fore. Why? The answer to that question must be explained.

1. First, we must put Breschet's discovery in its context. Despite Breschet's claim "So there are two nuclei of concretions in the human ear and we think to be the first to notice that curious fact considering the anatomy and so important considering the physiology"[2], the otoliths were already known before, in man and in animals. If we listen to Politzer,[4] in 1824, in Germany, Huschke verified anatomically the presence of otoliths in man[5] and in 1832, he demonstrated the crystalline shape of the otoliths of birds.[6] Did Breschet know these works in 1836?

(1) "are floating" should be preferable. Besides, Breschet uses this last verb in other parts of his work.

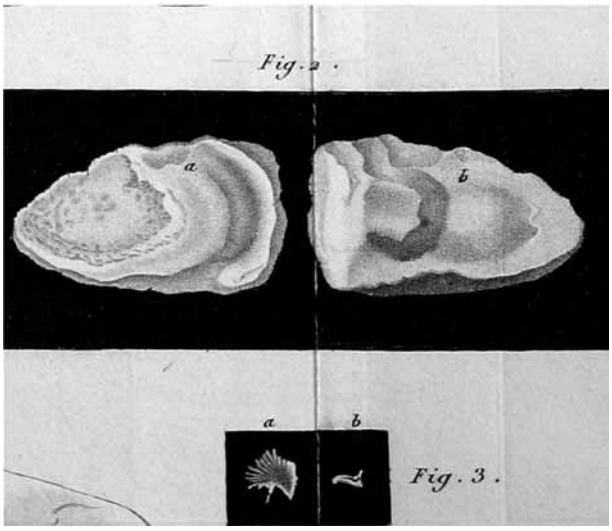

Figure 4
Figure 2. Otolithe du Loup (Bar) au niveau du saccule, en a la face interne et en b la face externe
Figure 3. Autres Otolithes du Loup au niveau du saccule, a contenu dans l'appendice du saccule, b au dessous des deux ampoules antérieures[8].

Was Breschet sincere? Anyway, we know that Breschet understood German and that he was a member of the German medical societies of Bonn, Erlangen and Heidelberg. He translated from several works written in German into French, namely from Frederic Meckel. People said of him: "he represents the medical Germany in France".[7] However, what was missing until Breschet was the fact of establishing the autonomic existence of the otoliths in relation to the nervous fibres and the fact of demonstrating on such a documented manner their relationship with the other vertebrates. Breschet did it, for he excelled in the domain of comparative anatomy (Figure 4).

2. Next, unfortunately, Breschet committed a fatal error on a physiological point of view. In 1836, he wrote:

"We presume that the otoliths are used to communicate the neural fibres a more energised, a more acute impression than a simple liquid like the endolymph does. Indeed the otoliths should be used to increase the energy of the sound… a liquid alone that vibrates does not transmit such sensible jerks as a liquid containing solid particles… the otoliths are only solid particles that stimulate, crumple the neural endings more vigorously than liquid particles could do".[2]
However, this error was not the object of Sappey's criticism and we had to wait until 1891 to see Breuer suggesting a different opinion concerning the role played by the otoliths. In addition, Breuer's opinion was only a beginning. The actual concept of the function of the otoliths appeared very slowly later.

3. Furthermore, considering his contemporaries' advice, Breschet lacked any charisma.

He looked as a very annoying scholar! This was probably the cause of the poor transmission of his souvenir:
"Mr. Breschet cannot teach: that is the right word. He chants his lesson on a drawling voice without any eloquence. The humerus saddens him, he moans with the femur, he laments over the tibia. His monotonous voice never leaves the accents of a sermon. He recites a homily. It is meant to be a lesson of anatomy but it is just a way to send the most intrepid to sleep"[9]

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