Chapter 17. The eve of a revolution in biology?

“We greatly developed the system”

About six months after the gloomy period of December 1996, J. Benveniste wrote to the “participants in the transmission experiments”:

> “It has been a long time since you heard about our “world-famous” experiments. The last experiment at Cochin was made in the presence of the only two survivors of the group. We were able to measure only 7 recordings because guinea pigs then stopped answering to ovalbumin. The result was remarkable because, according to the code, 3 “water” recordings were declared “ovalbumin” and 4 “ovalbumin” recordings were declared “water”, thus a perfect inversion. We can always imagine an error of recording or labeling of tubes at first, but it is clear that we did not master the reliability of these experiments at that time. We are certain that there is transmission, but almost every time the code answers us that our positive transmissions take place with water, what, as I explained it to you on numerous occasions, is only proving not that the phenomenon does not exist but that there is an error of procedure.” [1]

And J. Benveniste announced important news:

> “For several months we greatly developed the system because we no longer need “water” as an intermediary for heart stimulation. We achieve, with an experimental protocol, a higher reliability since we had 12 exact results out of 12 blind experiments including some experiments performed with outside participants. The whole experiment with 3 signals lasts 3 hours. The participants blind the positive and negative activities on the computer and perform themselves the experiment by “playing” the signals one after the other. They can then verify the effect of the biological messages which they have just sent on the heart.”

Finally he invited the addressees of the letter to participate in new experiments:

> “We plan to do 3 or 4 experiments each with two or three people and with the 12 blind experiments which are already done, it would be a sufficiently large series to envisage a publication.

> Indeed, these results plus those of Chicago would be completely demonstrative. We can welcome you till the end of July."

All that is therefore very exciting. Especially after the last failures with public demonstrations described in the previous chapter and for which we hardly saw a possible exit. Did J. Benveniste finally succeed and find the source of his difficulties? We are thus going to examine all this new information and at first let us describe how the experimental device was modified.

The new prototype

J. Benveniste and his collaborators used since early 1997 a new prototype. In fact, from a technical point of view, there was only a small change, but from a practical and scientific point of view it was a major change. Indeed, the output coil of the computer, which "imprinted" naive water in a tube, was replaced by a new coil *directly* connected to the Langendorff apparatus (Figure 17.1). Placed above the heart, the coil surrounded the glass column where the physiological liquid came down to irrigate the heart. It was not obvious that this way of proceeding would be efficient because there were many parameters that could be a concern such as the speed of flow in the column or the time of exposition of water to the electromagnetic frequencies. But, strangely, this new device was immediately operational without particular adjustments.

The advantages of this new system were important. Indeed, there was no intermediary – tube or vial – and consequently a large number of possible errors, contaminations or interferences were eliminated. From an experimental point of view, this new system was extremely "clean" and one could hope that "inversions" or other anomalies would disappear.

A new organization

Moreover, this technological breakthrough came along with a new organization of the laboratory and with its financing. One remembers that the laboratory had received credits from Inserm – in a progressive decrease – up to the middle of the year 1995. J. Benveniste had to find sources of funding for the functioning expense of the laboratory and the salaries of his collaborators. As he explained himself:

> "Since 1994, due to the lack of sufficient grants, I am forced to dedicate a large part of my time and of my energy in searching contracts intended to finance the functioning of my team, or more precisely what remains: two technician scientists and some volunteers. For 1995 and 1996, I obtained subsidies of a few

hundred thousand francs from Bouygues group, via its water distribution subsidiary, and from the manufacturer of homeopathic medicine Dolisos. In 1997, these contracts were not renewed." [2]

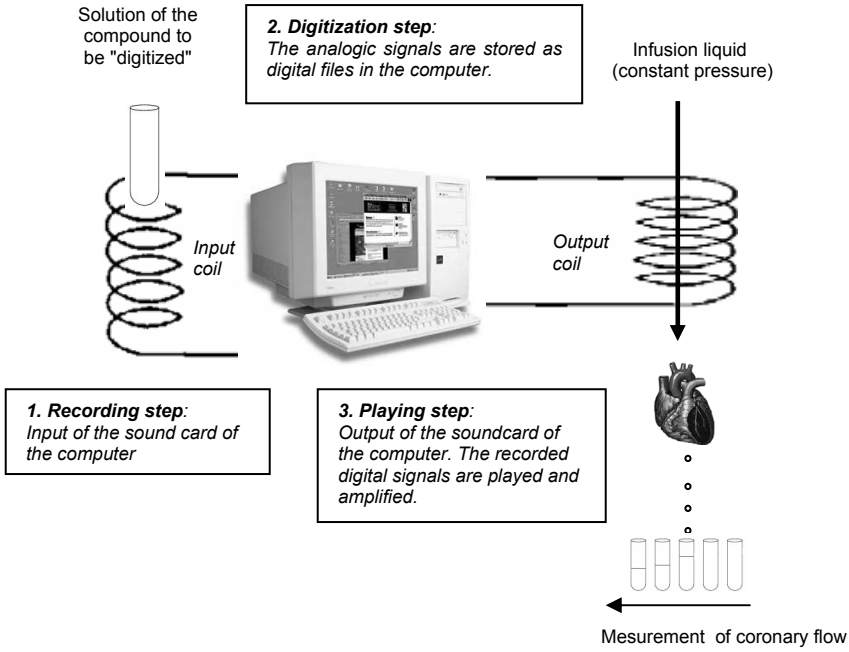

Figure 17.1. Third prototype for transmission of biological activity. The evolution is obvious after comparison with the two previous prototypes described in Figures 1.1 of Chapter 1 and 12.1 of Chapter 12 of the second part. Compared with the previous prototype, the "digital signal" was directly transmitted to the heart through the column of infusion liquid around which an electric coil (solenoid) was arranged. Therefore, intermediate water was no longer necessary.

Indeed, in February 1996, one of the sponsors who contributed most to the financing announced that he will not honor the commitment which he had taken for the coming year:

> "Martin Bouygues withdrew in his turn, depriving Benveniste of an annual 500 000-franc contribution. His last subsidies result

> from a Swiss banker and from a small penniless association, Innovative Science." [3]

Nevertheless, the laboratory survived and J. Benveniste wrote in 1997 [4]:

> "At present, new investors support my researches, in particular agri-food and water distribution firms and one French IT company, interested in the future possibilities opened by my studies in the field of the electronic transmission of the molecular signals. […]
>
> A friend Swiss banker, amateur of physics, continues too, for several years to grant me. Finally, the small association Innovative Science, created on my initiative, composed of a few hundred doctors and researchers, contributes to the survival of the team within its modest funds." [5]

The Swiss banker was Marcel Odier who, with his wife Monique Odier, led a small association which they created and was intended to support research in the controversial domain of parapsychology. This foundation was created in Geneva in 1982. Louis Pauwels was one of the founder members and Rémy Chauvin and Olivier Costa de Beauregard were among its scientific consultants.

As for the association Innovative Science that J. Benveniste had created, it allowed him to manage the diverse grants he received including the small gifts of a few hundreds of members. But the association was dissolved in November 1998. Indeed, J. Benveniste then created a limited company called Digibio in November 1997. At the same time, he met a 33-year old engineer, D. Guillonnet. Awarded a diploma from the *École Centrale* (French engineering school), the latter was an information technology specialist. His knowledge could allow analyzing the digitized information from biological molecules. D. Guillonnet brought not only his knowledge to the improvement of the system of digitization-transmission, but he also played an important role in the implementation of the limited company. A web site was then created to improve the "communication" of the company and an "industrial" strategy was set up including a search for financial partners and patenting.

These structural changes were thus a real transformation. Furthermore, in 1995, administrative reasons made J. Benveniste leave his premises which occupied a floor of the building of Inserm at Clamart. He thus withdrew in a prefabricated construction built in 1986 when the laboratory became too small. These additional premises had allowed accommodating a research team. It is now in this cramped place that the future of "digital biology" was going to

happen. J. Benveniste named his new laboratory "Laboratory of Digital Biology" when he could not longer use the name "Inserm U200".

The Digibio company was based on the model of a web-based start-up. At the end of 1990s, at the time of the speculative Internet "bubble", these young companies were on a roll and the economic newspapers were fond of some of these success-stories. The purposes of Digibio such as they were presented in the promotional documents or on the web site evoked the numerous possible applications of "digital biology", in particular in the field of agro-food industry and environment. It was thus planned to develop applications to detect contaminant microorganisms or genetically modified organism in food, to analyze the quality of water or to develop diverse biological tests to detect viruses and bacteria. Of course, biomedical applications were not forgotten and clinical tests to detect antibodies, antigens, bacteria, viruses and prions were evoked. The interest of these applications was also the possibility of realizing remote tests. The "recording" of the "digital signature" of a sample could be realized on the spot and its analysis could be centralized via the Internet network. It was also planned to improve the quality control of the manufacturing of the homeopathic medicines. Finally, "electromagnetic" pesticides, food additives, local treatments and obviously "digital" pharmacological treatments could be developed.

But the texts and the scientific results stemming from this new structure were then ambiguous. Was it always basic research or marketing? It is admittedly not specific to Digibio: the fundamental, industrial and commercial aspects are frequently entangled in young biotechnology companies. The peculiarity of the new structure of J. Benveniste was that the promises of development were based on fundamental principles that still needed to be proven.

One of the most visible consequences of this evolution was the disappearance of the public experiments. These "High Masses" which were formerly celebrated in the Cochin institute in front of numerous "believers" (at least at the beginning) did not take place any more. This retreat did not favor communication with other scientists who were now asked to sign "confidentiality agreements" as it is usual in industry, but rarely in academic circles.

New experiments rich in promises

The contribution of D. Guillonnet during this period was important, as was at their time the one of M. Schiff or A. Spira. D. Guillonnet was a regulating and structuring element who not only approached the problem with a new eye but

also brought rigor to the experiments of the team of J. Benveniste. The arrival of the engineer graduate of the *Ecole centrale* came along with a revision of the system of acquisition of the "biological signals". The team hoped that the "anomalies" were nothing more than a bad memory. The complete revision of the recording and playing system for the "biological activities" should protect from "wild transfers". The team once again trusted the future and it was in a more secure atmosphere that new experiments took place, sometimes with the cooperation of visitors.

Soon after his arrival, D. Guillonnet suggested an important modification of the recording system. Until now the "signals" supposed to be emitted by the sample were passively recorded. With the aim to escape from the "background noise" of the environment, the engineer built a system where the sample containing the substance to be recorded was placed between two coils: one coil transmitted an electromagnetic signal which was a "white noise" intended to "excite" the sample whereas the other one collected the resulting signal from the sample.[6] The first attempts with this new device were fruitful. As we have already indicated, the novelty was almost always followed with success in this story.

During spring and summer 1997, numerous experiments took place. Among the experiments intended to perfect the system of recording and replay of the "biological activities", experiments containing a limited number of blind recordings were performed. These latter experiments allowed convincing the team itself that everything worked as expected and that it did not run after a fancy. For this purpose, a new substance was successfully "digitized". It was a calcium ionophore, a compound that has the property to help penetrate calcium ions through cell membranes. This type of product is frequently used by biologists because it allows "activating" cells. Here again, it was an immediate success and "digitized ionophore" increased the coronary flow in numerous experiments.

For these experiments, the members of the team – or some visitor of passage – blinded the recordings. These blind experiments had a moderate ambition: detecting one "active" recording among 2–4 other ones. Performed in the informal frame of the laboratory, these experiments were not reported in the usual letters of J. Benveniste "to the participants in the transmission experiments".

The letter of June 30th, 1997 quoted at the beginning of this chapter reported 12 successful experiments out of 12. In fact, 22 blind experiments were performed from March 24th to July 17th, 1997. When J. Benveniste wrote this letter, 19 out of 22 experiments had already been performed. However,

J. Benveniste evoked only 12 experiments because some of the blind experiments performed between April 8th and 15th gave improper results. Once again, the team broke out in a cold sweat. The sword of Damocles of the "wild transfers" remained threatening in the sky of Clamart.

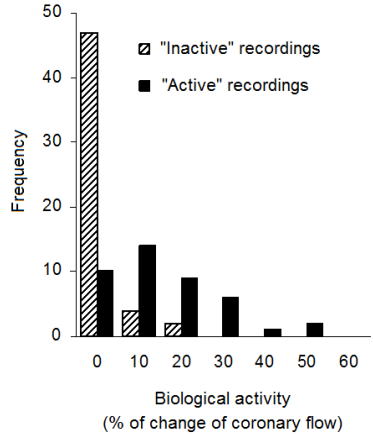

Figure 17.2. Statistical analysis of 22 in-house blind experiments performed from March 24th to July 17th, 1997 for a total of 53 measurements of water samples "imprinted" with "inactive" recordings and 42 measurements of water samples "imprinted" with "active" recordings. The mean change of the coronary flow with the "inactive" samples was 5.6 ± 5.2% whereas it was 20.3 ± 13.6% for the "active" samples.
Each percentage of *x*-axis is the lower limit of the corresponding interval (for example, "0" corresponds to changes from 0% to 10%).

However, if one were to globally analyze all the experiments – including those with problems from April 8th to 15th – everything indicates that the recordings of "digital ionophore" had a very different behavior from that of the controls which were supposed to be inactive. Indeed, the mean change of the the coronary flow associated with "inactive" recordings was 5.6 ± 5.2% while the mean change with "active" recordings was 20.3 ± 13.6%. The distribution of the changes of coronary flow described in Figure 17.2 shows that the active and inactive recordings belong obviously to two very different "populations" as for their effects on the coronary flow, what the statistical tests easily confirm.

As already stated, some experiments were not a "success" according to the criteria of J. Benveniste who practiced an analysis on the model of "arrival of a horse race". In the present analysis, we simply tried to find out whether there

was a difference between two treatments, in other words if a "biological signal" emerged from the background noise.

Indeed many results in biology, medicine or epidemiology are presented using statistical tools. Nobody is surprised that in a clinical trial some patients are improved after having taken a placebo and on the contrary that an "active" medicine has no effect. What is requested in such a trial is that there are *statistically* more patients improved with the "true" medicine compared to placebo. One does not try to establish a link of causality at the individual level but *at the level of the population*.

The determination of J. Benveniste "to guess" the code without errors like the arrival of a horse rate was very demanding for these experiments of the summer 1997. If one places a limit at 10% to discriminate the biological "signal" (i.e. the change of the biological parameter) from background noise, one notices that approximately 3 times out of 4, a supposed active recording gave the "expected" effect and 1 time out of 9 a supposed "inactive" recording gave nevertheless an effect on the heart. A statistical approach was probably less spectacular and had certainly less "panache" than the announcement that "12 experiments out of 12 were a success" or "29 experiments out of 29 were a success" as it was the case with the experiments of Chicago. But if among all the experiments, some of them "failed", the result is less striking even though the overall result remains statistically significant and extremely interesting from a scientific point of view.

Indeed, by examining the results of Figure 17.2, it is difficult not to be intrigued because the possibilities to explain them are limited: 1) there was a real effect of the "digitized" biological activities, 2) there was an artefact, 3) the results were "made up". This last hypothesis is certainly an eventuality which as a matter of principle one should not neglect, but it supposes that the whole team was concerned including D. Guillonnet who had just joined the team. Among the coders of these experiments, there are a dozen of names (including mine…) corresponding to team's members, visitors as well as… the computer.

One thus understands why it was difficult for J. Benveniste and his team to just dismiss these results. Behind the closed door of the laboratory, the active digital signals induced clearcut effects. Thus, in the experiments performed from 8th to 15th, April for which "oddities" (interpreted as "inversions") occurred, it is *a contrario* an argument in favour of the "sincerity" of the results. Indeed, the experiments were then performed "in house", without a sceptic public, without any particular stake or outside pressure. Paradoxically, the fact that "unexpected" results were obtained during this period is an argument in favor of the validity of the whole series.

Why is it then so difficult to set up a convincing experiment? A statistical presentation of the results – and not a presentation as a lottery – would raise maybe fewer issues. Such an approach would avoid focusing on the question of the "inversions" or "wild transfers" which in some cases could be only an *a posteriori* "explanation" of statistical fluctuations. Nevertheless, whatever the type of analysis, there was a real obstacle as soon as the stake was to "demonstrate" the reality of "digital biology" with an outside controller who blinded the experiments and assessed the rate of success. It is what we will be describing in the next chapter.

Notes of end of chapter

[1] Letter of J. Benveniste "to the participants in the tranmission experiments" of June 30th, 1997.

[2] J. Benveniste. Ma vérité sur la mémoire de l'eau, p. 172.

[3] E. Fottorino. La mémoire de l'eau. Une vérité hautement diluée. *Le Monde*, January 23rd,1997.

[4] The text of the book of J. Benveniste "Ma vérité sur la mémoire de l'eau" [*"My truth on memory of water"*] is overall not bery different of the version of 1997 which he drafted with the help of François Cotte.

[5] J. Benveniste. *Ibid.*, p. 173.

[6] Technical details can be obtained in patent n° 6,541,978 of US Office of Patents: J. Benveniste and D. Guillonnet. "Method, system and device for producing signals from a substance biological and/or chemical activity" (April 1st, 2003).