Men Who Made a New Science

My Odyssey with Sir John Eccles

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It all started with a summer school in the beautiful alpine mountain area of Northern Italy, organized by a German foundation for the promotion of outstanding students. For the 1991 campaign Sir John Eccles was invited to lecture on brain physiology while in my group we discussed new developments in theoretical nuclear physics. It was the first time I have met Sir John. At this time he was already in his 89th year, but still walked with his wife Helena through the Tyrolean dolomites.

Two gorgeous weeks, full of concentrated work and wonderful relaxation in hiking, sight seeing and ever ongoing intriguing discussions in cafés, on mountain trails, and in busses highlighted the community of students and lecturers. It was this wonderful creative atmosphere where our odyssey started!

All participants of the summer school came together each evening, with the lecturers presenting talks about their interests and fields of research. So did also Sir John. Since his retirement from experimental work in the U.S. and his settlement in Switzerland, he devoted unbroken scientific vigour to his life-long strive for a solution of the mind-brain problem. As corner stone, which could lead out of the restrictions of classical physics with its strictly deterministic structure, Sir John promoted the action of quantum processes for controlling brain activity (Eccles, 1990). And, of course, this was also the subject of his passionate evening lecture which fascinated the students as well as the other lecturers present.

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After the lecture, I approached Sir John with a few critical questions about his rather unspecified application of the quantum mechanical uncertainty principle to synaptic emission of transmitter substance (*exocytosis*). What then followed was one of the outstanding experiences in my scientific life. Could I possibly expect from a renowned neuroscientist, on criticizing a quantum mechanical detail of his far-reaching ideas on mind-brain interaction, more than a few friendly and unspecific words? No! I was, however, completely wrong with my expectation. Sir John realized immediately the relevance of my question on his quantum concept, and he invited me spontaneously to his hotel for further discussions, accompanied by a bottle of excellent Italian

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red wine. Of course, I accepted his invitation, not, however, without a certain scepticism: Would it be possible to bridge the gap between the so different languages of biomedicine and physics in our discussions? But then, already during our first evening, Sir John - the *great hero of brain research*, as a colleague from Japan called him – offered me, in his passionate and masterly manner, a complete lecture on the subtleties of synaptic action and brain functioning. He expressed his ideas in such a well ordered and logical scientific language, that his reasoning was completely understandable, even for a theoretical physicist! Already at the end of this first meeting, I could clearly see where quantum dynamics could possibly enter the game. We agreed to meet for a second time, and by the end of this second evening we had all the building blocks in our hands to incorporate quantum processes into synaptic action on a physically sound basis. As a result of these two magical meetings we agreed to work out our qualitative ideas in a quantitative way, and this marked the beginning of our intense collaboration.

I must confess that Sir John was the major driving part, impassioned as well as impatient, during the following months. His life-long journey dedicated to the mind-brain problem finally ended with the discovery of a possible physical solution! For me, on the other hand, the return from the summer school meant being recaptured by all the daily duties of my home university. So, I set aside for a while what had caught both of us so enthusiastically a short time before. Then, however, I received letter after letter from Sir John, all handwritten, and with new suggestions about our ideas borne out earlier. Consequently, I was strongly driven to work on our problem! And shortly before Christmas, I had my quantum mechanical trigger model for synaptic exocytosis, based on electron tunnelling, ready in skeleton form. The next meetings took place in the Max-Planck-Institut für Hirnforschung in Frankfurt (Main), whose director, Wolf Singer, offered John Eccles and his wife, Lady Helena, frequent and friendly hospitality. And we agreed to use these occasions for our common work. The first meeting was arranged in January 1992, and it was characterized by an institute's desk full of working material, two writing pads, one for Sir John and one for me, vivid discussions, and once in a while a cup of coffee. In this atmosphere we created the first draft of our proposed publication "on the fly". Already half a year later, we had finished the basic manuscript, ready for publication in the Proceedings of the National Academy of Sciences of the USA (Beck and Eccles, 1992).

Our discussions where characterized by scientific intensity and clearness of argumentation. They benefited greatly from Sir John's overwhelming knowledge of the brain, and from his remarkable ability to follow mathematical reasoning. But they were also marked by broadness, philosophical deepness, and, not at least, by the humour, always awake in Sir John's great personality. His thinking was extremely fast and far reaching, and each meeting with him produced a wealth of new ideas. All this created bonds of deep understanding between us, and it turned our meetings into precious personal events. They usually ended with dining together with Lady Helena, a medical doctor, and so fully capable in following our ongoing discussions. The usual place was a nearby Chinese restaurant offering excellent food which the three of us enjoyed, as well as the ever continuing conversations.

After our paper had been published we obtained world-wide and vivid response, partly positive, partly critical[2]. The struggle between dualism and materialistic monism broke out again. Perceiving and reflecting these responses which came from various sides, notably from brain researchers working in the USA, and, at the same time, presenting and refining our own hypothesis, presented in various meetings and further publications, characterized the following years. Summarizing this exciting development, Sir John published his book *'How the Self*

[2] One of the main opponents to Sir John's interpretation of the quantum model as a doorway for opening a dualistic mind-brain interaction was Wolf Singer, director of the same Max-Planck-Institute where our work was performed! (Singer, 2005). Thus, offering Sir John his institute on a guest status shows the high reputation which John Eccles received even among his opponents.

Controls Its Brain' which he regarded as his scientific credo in 1994 (Eccles, 1994). One of the major publications during that period, in which I connected the synaptic quantum model with a realistic cell membrane process, occurred after Sir John's death in 1997. I submitted it, however, under both of our names, since the ideas contained therein were born out to a large part in our vivid discussions in Frankfort (Beck and Eccles, 1998). It was, at the same time, a memorial for our so happy and fruitful collaboration!

John Eccles (left) in the discussion round after his talk and Friedrich Beck (right; photo, R. Beck)

John Eccles had an almost magic ability to attract an audience to his ideas. This I experienced when he gave his talk in the splendid celebration of his 90th birthday in 1993, organized by Frankfurt's Max-Planck-Institute for brain research, and, even more significant, at the 1992 meeting of Nobel Laureates in Lindau (Bodensee). These traditional meetings bring together the Laureates with participating students for extended discussions on their fields. I accompanied Sir John to assist him in questions concerning our synaptic quantum model. So I was a witness when, after his enthusiastically acclaimed talk on the mind-brain problem, he gathered a tremendous crowd of young students around a discussion-table, while other such tables looked rather empty. Again, it was the spark of his wisdom and enthusiasm which immediately sprung over on his audience.

As a résumé, my collaboration with John Eccles offered me not only the wonderful experience of meeting a most outstanding person with the highest standards of scientific honesty and ethic responsibility. Moreover, at the same time our collaboration introduced me also into a fascinating field in which the interplay between neuroscience, non-linear dynamics and quantum physics can contribute significantly to our understanding of the most complex structure of the human brain.

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