

Otto Loewi's Great Dreams

By Renate G Justin, MD

*for a thousandth of a second
I knew for certain
the secret of life
even if forgetting descended on me
and I forgot the moment I remembered
and not a word remained
except the taste of knowledge*

— *The Dream Notebook, Agi Mishol*

We regularly slept on our homework as youngsters, never doubting the old wives' tale that we would absorb knowledge, even through a pillow. We would go to bed unprepared, expecting to awaken the next morning fully prepared for our exam.

Was there a grain of truth in this childish belief? Does the brain continue its work while we are asleep? My great-uncle (Onkel), Otto Loewi, MD, would have answered "yes," as his wrinkled face lit up, his body returning to the straight, youthful posture of former times. As he talked, his words accelerated and his voice became louder, losing the huskiness of old age. Then, he once again would tell me about his dream, with the same words he used when he recorded it in his autobiography.

"The night before Easter Sunday of that year [1920] I awoke, turned on the light, and jotted down a few notes on a tiny slip of thin paper. Then I fell asleep again. It occurred to me at six o'clock in the morning that during the night I had written down

something most important, but I was unable to decipher the scrawl."² He would pause at this point and tell me how he had tried all day, unsuccessfully, to remember his dream and to interpret the scribbled note. He said that he went to bed early Sunday night and read for a while before turning out the light. Then, Onkel Otto continued, in an animated tone, he woke up at two or three in the morning, most unusual for him, and, yes, he knew what his dream had been about the previous night. He got up immediately and went to the laboratory.

What Onkel Otto's dream had revealed to him was an elegant experiment, which proved the theory of chemical transmission of the nerve impulse. "The hearts of two frogs were isolated, the first with its nerves, the second without. Both hearts were attached to Straub canulas filled with a little Ringer solution. The vagus nerve of the first heart was stimulated for a few minutes. The Ringer solution that had been in the first heart during the stimulation of the vagus was transferred to the second heart. It slowed and its beats diminished just as if its vagus had been stimulated. Similarly, when the accelerator nerve was stimulated and the Ringer from this period transferred, the second heart speeded up and its beats increased. These results unequivocally proved that the nerves do not influence the heart directly but liberate from their terminals specific chemical substances which, in their



turn, cause the well-known modification of the function of the heart characteristic of the stimulation of its nerves."^{2a} Sir Henry Dale of Great Britain, a long-time friend and colleague of Dr Loewi's, later identified one of the chemicals involved as acetylcholine. In 1936, Dr Loewi and Sir Henry Dale were awarded the Nobel Prize for their discovery, for Onkel Otto's dream.

In our conversations Onkel Otto often expressed gratitude and puzzlement. What made him dream the first night and what refreshed the dream the second night? What if the dream had not recurred? Would he have thought of the frog heart experiment while awake? Of course we could not answer those questions we could only speculate about them.

Otto Loewi was born in 1873 in Germany where he studied medicine and pharmacology. When he was a young man he had a determined, optimistic expression. As was the



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fashion, he wore rimless glasses, a vest, bow tie and a white handkerchief in his suit coat pocket. He and his family lived in Graz, Austria, where he was professor at the University, until Hitler invaded in 1938. The Nazis arrested Onkel Otto and his two younger sons, the older son and daughter were out of the country at the time. In exchange for his possessions and the Nobel prize money, which he had to transfer from a Swedish bank to a German account, the Nazis released him, and later his sons, from jail. After several months, "Sir Henry Dale arranged for Dr Loewi to come to England, and on his arrival presented him at the railway station with his [Sir Henry's] half of the prize."³ This generous gift helped Onkel Otto get by until he could find gainful employment. In 1940, Onkel Otto emigrated to the

United States and held a research professorship in pharmacology at the New York University Medical School. He died in 1961 in New York.

He was a man of untamed enthusiasm, not only for his chosen fields of medicine and pharmacology, but also for music, poetry, and history. He had a talent for forming loyal friendships both with his colleagues and students and encouraged many in their work. I admired Onkel Otto. His interest in my own life plans, as well as in my studies, drew us together and formed one of those rare friendships that spanned the decades of difference in our ages. I was gratified, when, in 1961, in Austria, there was a formal recognition and celebration of the 100th anniversary of Onkel Otto's birth and in 1973 a stamp was issued in his honor. This did not, however, make me feel any less angry about the indignities visited upon him in 1938.

In 1958, in a talk at the opening session of the International Congress of Biochemistry, Onkel Otto questioned whether we would ever discover the essential elements that define life. He added, that in no way, would the difficulty of uncovering these elements inhibit us from searching for them. He quoted the German poet Meyerhof who, in his poem, interprets

our unquenchable thirst for seeking the answer to the secret of life, as being the task given to us by God.

*"Daß er uns gab als einziger Beruf
Voll Staunen sein Geheimnis zu
enthüllen"⁴*

*(that He gave us as our only task
with awe, to unravel His secrets)*

Onkel Otto, in his dream, unraveled part of the mystery and moved us closer to understanding the central core elements of life. ❖

a Until 1921 it was generally assumed that transmission was due to the direct spreading of the electrical wave accompanying the propagated nervous impulse from the nerve terminal to the effector organ.²

References

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2. Loewi O. An Autobiographic Sketch, Perspectives in Biology and Medicine, Vol IV,1, Autumn 1960:17.
3. Gibson WC. Physiological Progress. MD Dec 1977 p 17.
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The Flow

There is a way between voice and presence where information flows.

In disciplined silence it opens

With wandering talk it closes.

— Rumi, 1207-73, Sufi mystic, poet, jurist, and theologian