

# A Biography of Pierre Karli

by Julien Guy



Pierre Karli is a recognized neurobiologist, especially in the fields of vision and aggressive behaviour. Member of the french Academy of Sciences, he has been distinguished by several honorific appointments and is undoubtedly among the most eminent Alsatians scientific minds. He defines himself as a humanist, driven by the urge of understanding human, a statement that clarify number of his choices.

## Studies and early works in ophtalmology

Pierre Karli was born february the 8<sup>th</sup> of 1926 in alsace. As a schoolboy, he prooved to be talented in latin and greek, and wanted to enter the ENS (*Ecole Normale Supérieure*, national superior school) to become a teacher of greek. But in 1940, Alsace was invaded ; as most pupils at that time, Karli had to continue his studies in German. In 1943, he got his *Abitur* ; and in 1944, whenn france was finally freed, he knew he had little chance to access the ENS. He chose to study mankind through medicine and applied at the Faculté de Médecine of Strabourg.

The first research field Karli came closely in touch with was neurobiology of vision. Indeed, he spent his fourth year at the clinic of ophtalmology of the Pr. Jean Normann. In the beginning of his 5<sup>th</sup> year, in october 1949, he entered the lab of biological medicine of the Pr Marc Klein, who was a follower of Paul Boin, pioneer of sexual endocrinology in france.

In that context happened an unpredictable event that should lead to a decisive choice in Karli's career. At that time, Prs. Klein and Normann invited Karli to join them for a meeting with Pr. Brückner in Basel, ophtalmologist. This professor had a son, ophtalmologist as well, whose hobby was to describe the eye of every animal species he could came across, including the varieties of the Zoo of Basel. He explained Karli how a fraction of the mice he was breeding in his basement displayed white retina, « schneeweiss » he would say, instead of the classical pink one. Karli,

influenced by his experience at the clinic, accepted two couples of these mice, which he started to breed in Strasbourg, in order to conduct histological studies on their retinas. He found out in these mice that a specific degeneration of photoreceptors would occur soon after birth, while other retinal neurons remained structurally unaffected. He found this effect to be the consequence of a genetic abnormality, a mutation he called *retinal degeneration*.

It is interesting to highlight two effects Karli observed in these mice. The first is that a progressive loss of visual afference would trigger an amazing facilitation of potentials evoked by sensory stimulation in the visual cortex, showing a certain plasticity of this area. He also observed a persistence of certain photic responses, though with much higher thresholds, in absence of rods and cones. Although the audience remained reluctant as he was presenting these results in 1962 at a meeting of the Association of French Speaking Physiologists, recent breakthroughs point out the role of a specific subpopulation of retinal ganglion cells in the latter phenomenon.

Karli became a doctor in 1952 and in 1964, he was entrusted by Pr. Jean Normann with the direction of the new laboratory of ocular electrophysiology created with the *Centres Hospitalo-Universitaires* (medical school centers). He acquired the skills needed with two famous ophthalmologists, Prs Jules François, Belgium, and Hermann Burian, US.

### **1954 : Karli embraces neurobiology of behavior**

In 1954, Marc Klein asked for the creation of a job of *agrégé* in histoembryology, and encouraged Karli to apply. Henri Hermann, influent at the government's department for research, obtained the job to be created in 1958, but in physiology. In order to apply, Karli had to specialize in physiology, which implied a change in his research line. Interested in the work of Gaston Viot, he chose neurobiology of behavior.

From september 1954 to september 1955, Karli worked at the psychobiological laboratory of the John Hopkins medical school in Baltimore, under direction of Curt Trischter, thanks to a grant from the Rockefeller Foundation. He met several psychiatrists whom he investigated with how neurobiological data could help psychiatric diagnoses and therapeutics. He concluded such data would have little interest if extracted from a broader sociobiopsychological view.

More importantly, the reason why 1954 meant so much for Karli's career lies in an unexpected event. Indeed, Karli used to breed rats and mice he needed for his experiments. Due to a shortage of boxes, he housed mice with rats, and observed an interesting behavior : a fraction of rats housed with mice would systematically kill them, while other would not. Extensive studies of intraspecific aggressive behavior had been done at that time, yet the interspecific ones remained poorly documented ; only the involvement of the hypothalamus was known thanks to Hermann Hess, who received the 1949 Nobel Prize for showing that an aggressive response can be elicited by electrical stimulation of a cat's hypothalamus. Karli chose to research on that interspecific aggressive behavior, leading further on the works of Bard, Brady or Pribram...

The results of that year-long research in Baltimore are presented in an article named "*the norway rat's killing response to the white mouse : an experimental analysis*" published in 1956 by *Behaviour*. This article is perhaps to most important, the more referred to, ever written by Karli, and is nowadays remembered by the *Current Contents* as a *Citations Classic*, cited over 170 times since 1956. The paper consisted in a descriptive study of the killing response of both wild and domesticated rat toward the mouse, including an experimental analysis of some physiological and environmental conditions affecting this response.

As mentioned, a fraction of domesticated rats, as well as a more important one of the wild ones, would systematically kill every mouse they were given. The most striking result was that this killing response could be erased in killing rats by amygdalotomy, and by contrast elicited in

peaceful rats whose forebrain was removed. But instead of pleading for a monocausal, self-explanatory reason why rats killed mouse, like the need for food or the existence of an intrinsic "pulse" of aggressiveness that would lie in the brain's normal functioning, the results pointed out the importance of three groups of factors : the internal state of the rat's organism, its life history, and the environment in which the stimulation "mouse" takes place, leading to a broad, complex view of the genesis of aggressive behaviors.

Back to France, Karli became in 1958 *maître de conférences* in physiology. He carried out his research on aggressive behavior alone, analyzing the effects of different lesions, drugs, and manipulating plamatic concentrations in steroïd hormones. In 1962, his first collaborator, Marie-Monique Vergnes, who since became *directeur de recherche* at the INSERM, joined him to study the role of serotonergic neurotransmission. They have been found to moderate both the genesis of aversive emotions and aggressive behaviors, while the use of specific inhibitor of the reuptake of serotonin significantly decreases anger and aggression.

In 1965, Karli was entrusted with the creation of a department of neurophysiology inside the new *Centre de Neurochimie* created by the CNRS and implated in the Faculty of Medecine of Strasbourg. In 1966, he officialy became Professor of neurophysiology of the Faculty. That same year, the the Association of French speaking Physiologists asked him to prepare the report speech for their meeting in Lyon in 1968. The subject chosen was "limbic system and motivational process". This huge work of synthesis made him read over 700 articles related to different disciplines, and led to a change in the framework his studies evolved in, evolving from the quest of a deterministic cause to a more probabilistic view, enhancing the need of a widened analysis.

As a result, his organized his research with two guidelines : with George di Scala, Guy Sandners and Pierre Schmitt were explored, in a neurophysiological fashion, the affective factors involved in the genesis of aggression, while Françoise Eclancher focused on the developmental aspects of emotinal reactivity, conciliating genetical potentialities and structuring influence of experience.

### **Karli as a conciliator**

It has now to be taled how Karli contributed to a fundamental change in scope occured in the in the sphere of neurobiology of aggression. Indeed, the initial framework clearly distiguished two research fields.

The first of them lies with the works of Hess and Akert among others, who showed over half a century ago how an electrical stimulation of the medial hypothalamus could elicit an aggressive behaviour in cat, while hypothalamic lateral lesions could abolish such response. For years onward, scientists had been trying to characterize the neural circuitry underlying what they considered to be the two types of aggressive behaviours : the predatory and defensive aggressions. The emphasis was clearly on neuroanatomy, on the material substrate of a given facilitation or inhibition transmitted to the hypothalamus, seen as the "control center" of aggression.

The second rerserch field concerned aggressive behaviour in humans, lying rather with psychology and direct observation. The mission here was to disentangle the cogwheels of human aggression, in order to help preventing violence in society. Now it's quite obvious that the data gathered in neuroanatomy on animals did not seem much usefull in such a perspective, which led to a lasting detachment between efforts made by both communities. Revealing is the fact that until the early 80's, whenn modest joint session were added, the meetings of the International Society for Research on Aggression (ISRA) merely consisted in two meetings run in parallel, one for each school.

Whenn Karli became president of the ISRA in 1979, a change of scope had slowly become to

emerge from two key insights. Emotions started to be no longer considered as a characteristic that would specifically accompany a given behaviour, but rather to precede it and prepare a mindset in which it might occur. Also, personal history became to be seen as a decisive factor weighing on whether aggression could be triggered by a given stimuli, giving an increased importance to memory in moderating behaviours. The result was a broader conception of aggression as part of a "behavioural strategy" far more complex than the former predatory/aggressive binary view. The emphasis was no more on understanding, in a deterministic scope, what stimuli and systems would surely trigger and control aggression, but rather how a defined set of conditions, including memory, emotional state, environment and physiology, could influence the probability for an aggressive response to take place. The hypothalamus for instance was no longer a "generator" or "control center" of aggression but one of the components that helped creating a motivational state favourable to it.

Such a new scope was more likely to conciliate psychologists focused on human aggression and biologists experimenting on animals. The work Karli had been leading since 1954 on the neural determinants of aggression, impregnated by rich interactions with psychologists and psychiatrists, obviously contributed to crafting the widened paradigm neurobiology of behaviour has since attended to. In his *presidential address* from the ISRA congress at Groningen in 1979, he analyzed the many obstacles that emerge while trying to conciliate scientist working in separated scopes ; and in the next meeting in Mexico, he proposed an unifying view of the neural mechanism involved in aggression, taking some distance from the traditional neuroanatomy for a more functional analysis, likely to bind both communities.

Karli was also one of the craftsmen of the *Université Louis Pasteur in Strasbourg*. After the faculties were abolished in 1968, Karli actively militated in favor of the creation of an UER (*Unité d'Enseignement et de Recherche*, unity of teachings and research) at the faculty of medicine that would prevail research, and be given an assignment of coordination as a scientific committee and which did not exist so far. In march 69, he was elected president of the constituting committee for the creation of the UER of biomedical sciences. As such, he took part to the difficult negotiations with the rector Maurice Bayain, acting upon the insight of the *Loi Faure*, that would result in the creation of the new Universities. He fought, in spite of heavy reluctance, in favor of regrouping former faculties of pharmacy, medicine and science, which finally occurred in the shape of the new *Université Louis Pasteur*, created January the 1st 1971. Succeeding to his friend Guy Ourisson, he became its second President the 9th of June 1975. He contributed to create an UER of behavioral and environmental sciences, by regrouping psychology and psychobiology, remained separated in different faculties so far.



## **Karli's contribution to the public sphere**

In our postmodern societies, where urban unrest has become a creeping fact and issues like homeland security a major political stake, the insight of neurobiology of aggression may enlighten the public debate. Indeed, while the ISRA was created in 1972, under the shadows of the Cold War, the Vietnam War, and after the events of 1968 to allow scholars to discuss how their knowledge could be used to prevent such disturbances, the urge for peace is still unfulfilled and recurrent violence very contemporary. In this respect, Karli has often been solicited by journalists and scholars to speak the word of an expert in aggressive behaviour.

In his public addresses, Karli kept fighting back two dangerous ideas. The belief in a "center of aggressiveness" in the brain and in an intrinsic "aggressive pulse" that would be an ineluctability in humans was one of them : in his own work and studies, Karli has never come across such phenomenon. He dismissed as well the subsequent proposal for a systematic psychiatric treatment of violence, including pharmacotherapy and surgery where required, as beneath human dignity.

Instead, he insists on the fact that violence is often the result of a complicated mix of causes, including the environment and social conditions, psychology and personal history, as well as a lack of marks and cultural emptiness. He calls for a global action against the very roots of violence, which he claims are such as exclusion, marginalization, education and unlit future prospects. He is founder and president of the *Institut pour la Promotion du Lien Social* (IPLS) which purpose is to contribute to give peace to the society and strengthen social cohesion, by leading studies on the field and public debates.

Aside of being a committed scientist and citizen, Karli is author of several books dealing with aggressiveness for the public (see appendix).

Looking back at Karli's career, one sees an example of success. The prizes he received, the many honorific appointments he was granted with reward a prolific and valuable work.

His contribution to the creation of the ULP and to the paradigm shift that occurred while he was president of the ISRA carry through his concerns for connecting disciplines he believed could, and therefore should, impregnate each other. In this respect, Karli must be remembered of as a conciliator.

Another aspect to be recalled of is how his humanistic concern shaped his career. He made a contribution to the civil society out of the knowledge he acquired through his research. Beyond the scientist, his commitment in the IPLS, his answers to the medias, public addresses, and books, reveal the much more famous philosopher and citizen, whose work keeps going on.

Finally, his career shows how the random hand of fortune can shape the work of a lifetime. He wouldn't have attempted medicine if Alsace hadn't been invaded. The unpredictable meeting with Pr. Brückner's son led to a fertile research. And of course, what happened in 1954 lied with a heaven-sent contingency : a lack of rat boxes. In an article he wrote in 1979, one can read the following : *"I happen to be the President of the International Society for Research on Aggression (ISRA) for the period 1979-1980. When thinking of the roads of human destiny, I cannot help wondering with both amusement and modesty whether I would ever have reached this kind of scientific achievement, had I not been led by necessity to house rats together with mice on my arrival at Richter's laboratory !"*. It is this not a statement in which students who doubt and worry about their future may find great comfort ?

## Appendix

### Main Facts

#### Pierre KARLI

Date of Birth : 8<sup>th</sup> of february 1926

Status :

Professor emeritus at the Faculty of medicine of the University Louis Pasteur, Strasbourg I

Degrees :

- Doctor in Medicine,
- Bachelor in biology
- Bachelor in Medicine, University Louis Pasteur

Career :

- 1988-1990 : Founder and Director of the *Centre de Recherches Transdisciplinaires sur les Sciences et les Techniques* (CRTST), of the University Strasbourg I, Louis Pasteur.
- 1987--- : Professor emeritus at the Faculty de Medicine of Strasbourg.
- 1982-1984 : President of the EBBS (European Brain and Behaviour Society).
- 1979-1984 : President of the Scientific Coucil of the ETP BBR (European Training Program in Brain and Behaviour Research).
- 1979-1980 : President of the ISRA (International Society for Research on Aggression).
- 1975-1978 : President of the University Strasbourg I, Louis Pasteur.
- 1966-1987 : Director of the Laboratory of Neurophysiology of the Center of Neurochemistry of the CNRS, founded in 1965.
- 1961-1964 : First Director of the School of Executive Nurse
  - 1958-1987 : Assistant, *Maître de conférences*, then Professor of Neurophysiology at the Faculty of Médecine of Strasbourg.

Rewards :

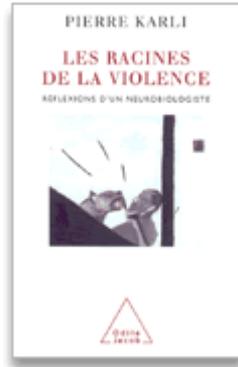
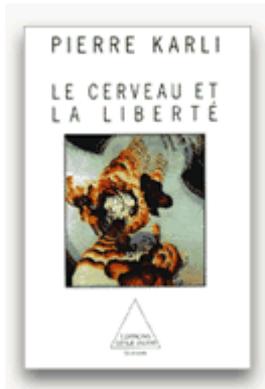
- Prize *La Caze* in Physiology of the Academy of Sciences (1975),
- Prize of the *City of Paris* of the Académie of Médecine (1972),
- Prize *Vlès* of the Faculty de Medicine of Strasbourg (1952).

Associations :

- Member of the Academy of Sciences since 18th june 1979
- Doctor Honoris causa of the University of Lausanne.

## Bibliography

- *Neurobiologie des comportements agressifs*, ed PUF, 1982  
Neurobiology of aggressive behaviours
- *L'homme agressif*, ed Odile Jacob, 1987  
The aggressive man
- *Le cerveau et la liberté*, ed Odile Jacob, 1995  
Brain and freedom
- *Les racines de la violence, réflexions d'un neurobiologiste*, ed Odile Jacob, 2002  
The roots of violence, considerations of a neurobiologist



## Links

- ISRA, official website ; <http://www.israsociety.com/index.html>
- IPLS, official website (french) ; <http://ipls.free.fr/>