

Acceptance Speech of

PROFESSOR RÜDIGER WEHNER

Winner of the 2008

King Faisal International Prize for Science

Sunday 09 March 2008 (1.3.1429H)

Your Majesty, King Abd Allah Ibn Abd Al-Aziz

Your Royal Highness, Prince Sultan Ibn Abd Al-Aziz

Your Highnesses

Your Excellencies

Distinguished Guests

When I received the message that I had become the Winner of this year's King Faisal International Prize for Science, I was thunderstruck, excited, and nearly speechless. But speechlessness is not what you expect of me today. Most of all, however, I felt deeply honoured. I felt honoured that my life-long work centred on the extraordinary sensory and computational capabilities of a remarkable insect had been recognized to such an extent, that the King Faisal Foundation awarded me its prestigious, world-renowned Prize for Science.

Besides its international reputation, the King Faisal International Prize for Science means much to me at a very personal level. To let you join my feelings, I must go back a bit in history. After I had finished my PhD work

on honeybee vision with Martin Lindauer at the University of Frankfurt, I entered the *Drosophila* laboratory of Ernst Hadorn at the University of Zürich. Here developmental genetics set the stage for the rising era of molecular biology. It was during these exciting times at the advent of the modern biosciences that a chance event occurred: I came across *Cataglyphis*, a little beauty, a conspicuous, long-legged, highly speedy ant as it was dashing and darting across the floor of the Saharan desert. Having grasped a food item, it returned home as the crow flies, along a straight line, over distances of many thousand times its body length. This was a task we humans would not be able to accomplish without being provided with a lot of instruments and some fairly detailed knowledge in mathematical calculus. No wonder that this ant - with its full-sounding name *Cataglyphis* - struck me immediately. There was a fascinating piece of behaviour, a feat of navigation, easily observable and potentially amenable to experimental analysis; and there was an organism endowed with a tiny brain that was somehow able to solve an extremely complex computational problem.

When I returned to Zürich with *Cataglyphis* in mind, and with the still vague idea of starting a neuroethological research project on the way this animal could navigate, everyone was sceptical; everyone warned me. My scientific gurus such as Martin Lindauer, Hansjochem Autrum and Ernst Hadorn urged me not to leave the well-established honeybee, with which I had been working ever since; not to focus my research on what was then a peculiar organism, which inhabited a remote part of the world and was completely unknown to physiologists and neuroscientists. *Cataglyphis* could – this was the general warning – destroy the career of a junior scientist. Of course, I listened to these well-intentioned advices, but I ignored them. I trusted in *Cataglyphis*, and *Cataglyphis* did not let me down. Seen in this light, I owe it to *Cataglyphis* and my early confidence in her, that I am finally considered worth the King Faisal Prize for Science, and hence and foremost, I owe a debt of gratitude to those who nominated me and to the selection committee members for selecting me for the award.

Moreover, I feel honoured that the King Faisal Foundation has recognized and rewarded a kind of biological research that had not only been adventurous, even dangerously risky in the beginning, but also multifaceted in its realisation. With generations of highly motivated graduate students I have been looking at the elaborate behavioural responses of one organism, the desert ant *Cataglyphis*, from different angles. Fine-grain behavioural experiments have been accompanied by studies in the neurosciences, in neuroanatomy and electrophysiology. The results obtained this way have led to mathematical models about neural architectures, to computer simulations, and finally to the design of robots. Now these autonomous agents move along with *Cataglyphis* across the desert floor. I am very grateful indeed, and it means a lot to me, that the King Faisal Foundation has honoured this unconventionally versatile approach in tackling one overarching scientific problem: how does an ant navigate by using skylight cues, which we humans are not able to perceive, and by employing special algorithms, which are finely tuned to the tasks to be accomplished? What does the cockpit in the insect's brain look like?

However, there is yet another field of research I have been guided into by *Cataglyphis*. This is behavioural ecology; this is the question of how an organism, which exploits its harsh desert environment as successfully as *Cataglyphis* does, is designed to fill this particular ecological niche. And it is here that I myself, together with my wife, fell deeply in love with this environment, the vast desert plains of the Sahara, the Arabian sands, the wadis and oases, and above all the human culture flourishing in this exceptionally beautiful part of our world.

It all started forty years ago, when I ignored the strong warnings of my elder colleagues, followed my intuitive inner voice, and designed a research project that in hindsight must have been outrageously daring. It might have failed completely. But obviously it did not. How else could I have been awarded this prestigious prize? I hope that the junior fellows in our

bioscience community get encouraged by the story I have told, that they become brave and adventurous enough to trust in their intuitions, that they follow new paths rather than jog along with the crowd of current mainstream research. If this happens, if you young fellow scientists discover your own Cataglyphis, so to speak, the King Faisal International Prize awarded to me will have fulfilled its purpose well beyond the present occasion. Finally, allow me to express my sincere thanks to His Royal Highness Prince Khalid Al-Faisal, Chairman of the Prize Board for this honor.