



## **A REGRETTABLE MISTAKE IN THE AWARD OF THE 2003 NOBEL PRIZE IN CHEMISTRY: THE OMISSION OF GHEORGHE BENGA, THE FIRST DISCOVERER OF THE WATER CHANNEL PROTEIN IN THE RED BLOOD CELL MEMBRANE**

I. HAULICĂ

Laboratory of Physiology, Iassy Branch of The Romanian Academy,  
Vasile Conta St. No. 26, Sc. B, Et. 1, Ap. 6, Iassy, 700106 Romania  
Phone: 40-232- 256075; E-mail: [ihaulica@yahoo.com](mailto:ihaulica@yahoo.com)

*Received June 15<sup>th</sup>, 2006; Accepted August 3<sup>rd</sup>, 2005; Published May 15<sup>th</sup>, 2006*

Water channel proteins or aquaporins are the latest “newcomers” firstly in the field of physiology and secondly in cell and molecular biology. They represent a group of plasma membrane proteins that have as property to greatly increase the water transport across these membranes. Their discovery was (and still is) an object of controversy because the scientist who was awarded the 2003 Nobel Prize for Chemistry “for the discovery of water channels” (24) does not recognize, at least in one of his latest articles that I have read (18) that his discovery was preceded by the discovery of our distinguished colleague, Professor Gheorghe Benga from Cluj-Napoca. This is despite the many reviews and a book (3) published by Benga before (2,4-7) or after the Nobel Prize award (8,9).

The first proof dates from Benga’s 1986 publications (12,13), two years before Agre communicated his discovery (16). Peter Agre was recently distinguished with the Nobel Prize (24), in this way an act of injustice was committed. It is a regrettable omission and a new act of injustice to a Romanian researcher, Professor Gheorghe Benga, similarly to the act of injustice committed many years ago to Professor Nicolae Paulescu, the discoverer of insulin (20).

After their discovery the distribution of over 10 aquaporins known today and their structure were uncovered, their actions and main physiological roles were described, as well as a substantial part of their implications in pathology. Benga’s group has also a world priority in describing the medical implications of water channel proteins (19,21), notably in child epilepsy (10,11) and Duchenne muscular dystrophy (14,15,21).

I cite a few words that I wrote in one of our Romanian medical publications last year (17): “After the well known act of injustice committed

in the last century by the members of the Nobel Prize Committee for Physiology or Medicine who have not recognized the priority of the discovery of insulin by Nicolae Paulescu, another Romanian scientist was excluded from the Nobel Prize (this time the 2003 Nobel Prize in Chemistry). This is the case this time with Professor Gheorghe Benga (from the prestigious Cluj medical school), the discoverer of the water channel protein in the red blood cell membrane several years before the first researches of Peter Agre and his coworkers. As water exchange through cell membranes lay at the basis of vital cell processes I consider that the discovery by Gheorghe Benga of the first protein responsible for the passive transport of water is a fundamental contribution to the elucidation of the chemical and physiological mechanisms of maintaining the various forms of cellular activity, that fully justifies his inclusion as the main author of the discovery of water channels and legitimate candidate for the 2003 Nobel Prize in Chemistry.

For us is a duty of honor to recognize the priority of the discovery of aquaporin by Professor Gheorghe Benga and also sincerely regret that such injustices continue, despite the evidence recognized even by the beneficiary of the Nobel Prize awarded (1).”

The priority of Gheorghe Benga is now recognized by a great number of scientists from all over the world (22,23).

I would like to thank Professor Benga for his efforts made not for his own glory, but for a just recognition and wish him success in this “cruel” battle to reestablish the truth in this field of science. Fraud in science still persists and from time to time some are treated as such. However, a lot escape.

I must add that my opinion is very similar to that of another most distinguished Romanian scientist, established in the USA, Professor

George Emil Palade (1974 Nobel Laureate in Physiology or Medicine), who wrote, on December 4, 2003, in a letter to the "Iuliu Hatieganu" University of Medicine and Pharmacy in Cluj-Napoca:

"Dear Doctor Benga,

I did not expect The Nobel Committee for Chemistry to select water channels as area to give prominence this year and I did not realize either how close is your work to that of Peter Agre.

The idea of a petition has the merit of attracting the attention to the scientific community to the regrettable mistake of your omission from the group of laureates this year.

It is highly unlikely that the committee will reverse it's decision but none the less it is important to register your grievance.

In any case I signed the petition received from you; I wish you enough courage and strength to carry through this battle and I remain your sincerely,

George E. Palade"

## REFERENCES

1. Agre, P., Aquaporin water channels (Nobel Lecture). *Angew. Chem. Int. Ed.* 2004, **43**: 4278- 4290.
2. Benga, Gh., Water transport in human red blood cells. *Prog. Biophys. Mol. Biol.* 1988, **51**: 193-245.
3. Benga, Gh. (ed.), *Water Transport in Biological Membranes*, CRC Press, Boca Raton, 1989.
4. Benga, Gh., Permeability through pores and holes. *Curr. Opinion Cell Biol.* 1989, **1**: 771-774.
5. Benga, Gh., Water exchange through the erythrocyte membrane. *Int. Rev. Cytol.* 1989, **114**: 273-316.
6. Benga, Gh., Membrane proteins involved in the water permeability of human erythrocytes: binding of p-chloromercuribenzenesulfonate to membrane proteins correlated with nuclear magnetic resonance measurements. In: *Water Transport in Biological Membranes*, Benga, Gh. (ed.), CRC Press, Boca Raton, 1989, pp. 41-61.
7. Benga, Gh., Birth of water channel proteins - the aquaporins. *Cell Biol. Int.* 2003, **27**: 701-709.
8. Benga, Gh., The first water channel protein (later called aquaporin1) was first discovered in Cluj-Napoca, Romania. *Romanian J. Physiol.* 2004, **41**: 3-20.
9. Benga, Gh., Water channel proteins: from their discovery in 1985 in Cluj-Napoca, Romania, to the 2003 Nobel Prize in Chemistry and their medical implications. In *Proceedings of The 9<sup>th</sup> World Multi-Conference on Systemics, Cybernetics and Informatics*, July 10-13, Orlando, FL, USA, Zinn, D., Savoie, M., Lin, K.-C., El-Badawy, El-S., Benga, Gh. (eds.), International Institute of Informatics and Systemics, ISBN 980-6560-62-0, 2005, Vol. 10, pp. 99-104.
10. Benga, I. and Benga, Gh., Priorities in the discovery of the implications of water channels in epilepsy and Duchenne muscular dystrophy. In *Proceedings of The 9<sup>th</sup> World Multi-Conference on Systemics, Cybernetics and Informatics*, July 10-13, Orlando, FL, USA, Zinn, D., Savoie, M., Lin, K.-C., El-Badawy, El-S., Benga, Gh. (eds.), International Institute of Informatics and Systemics, ISBN 980-6560-62-0, 2005, Vol. 10, pp. 111-115.
11. Benga, Gh. and Morariu, V.V., A membrane defect affecting water permeability in human epilepsy. *Nature* 1977, **265**: 636-638.
12. Benga, Gh., Popescu, O., Pop, V.I. and Holmes, R.P., p-(Chloromercuri)benzenesulfonate binding by membranes proteins and the inhibition of water transport in human erythrocytes. *Biochemistry* 1986, **25**: 1535-1538.
13. Benga, Gh., Popescu, O., Pop, V.I., Mureșan, A., Mocsy, I., Brain, A. and Wrigglesworth, J., Water permeability of human erythrocytes. Identification of membrane proteins involved in water transport. *Eur. J. Cell Biol.* 1986, **41**: 252-262.
14. Benga, Gh., Popescu, O., Pop, V.I., Borza, V., Mureșan, A., Hodărnău, A., Benga, I. and Ionescu, I., Recent investigations on water permeability of erythrocytes in normal and Duchenne muscular dystrophy subjects. In: *Biomembranes. Basic and Medical Research*, Benga, Gh. and Tager, J.M. (eds.), Springer Verlag, Berlin, 1988, pp. 204-219.
15. Benga, Gh., Popescu, O., Pop, V.I., Borza, V., Hodarnau, A., Popescu, M., Serbu, A.M. and Benga, I., Studies of water permeability and proteins of erythrocyte membranes in patients with Duchenne muscular dystrophy. *Muscle & Nerve* 1989, **12**: 294-301.
16. Denker, B.M., Smith B.L., Kuhaida F.P. and Agre P., Identification, purification and partial characterization of a novel Mr 28,000 integral membrane protein from erythrocytes and renal tubules. *J. Biol. Chem.* 1988, **263**: 15634-15642.
17. Haulica, I., A regrettable omission (in Romanian), *Viata medicala*, 2004, No.18 (748):1.
18. King, L.S., Kozono, D. and Agre, P., From structure to disease: the evolving tale of aquaporin biology, *Nature Reviews (Mol. Cell Biol.)*, 2004, **5**: 687-698
19. Morariu, V.V. and Benga, Gh., Evaluation of a nuclear magnetic resonance technique for the study of water exchange through erythrocyte membranes in normal and pathological subjects. *Biochim. Biophys. Acta* 1977, **469**: 301-310.
20. Pavel, I., *The Priority of N.C. Paulescu in the Discovery of Insulin*, Editura Academiei, Bucharest, 1976
21. Serbu, A.M., Marian, A., Popescu, O., Pop, V.I., Borza, V., Benga, I. and Benga, Gh., Decreased water permeability of erythrocyte membranes in patients with Duchenne muscular dystrophy. *Muscle & Nerve* 1986, **9**: 243-247.
22. Sha'afi, R.I., Opening Address to the Symposium "Water Channel Proteins: from their Discovery in 1985 in Romania to the 2003 Nobel Prize in Chemistry and their Implications in Molecular Medicine Systems". In *Proceedings of The 9<sup>th</sup> World Multi-Conference on Systemics, Cybernetics and Informatics*, July 10-13, Orlando, FL, USA, Zinn, D., Savoie, M., Lin, K.-C., El-Badawy, El-S., Benga, Gh. (eds.), International Institute of Informatics and Systemics, ISBN 980-6560-62-0, 2005, Vol. 10, pp. 128-129.
23. [www.ad-astra.ro/benga/support](http://www.ad-astra.ro/benga/support)
24. [www.nobel.se](http://www.nobel.se)