

PublisherInfo		
PublisherName	:	BioMed Central
PublisherLocation	:	London
PublisherImprintName	:	BioMed Central

## Ubiquitin researchers win Nobel

ArticleInfo		
ArticleID	:	5007
ArticleDOI	:	10.1186/gb-spotlight-20041007-02
ArticleCitationID	:	spotlight-20041007-02
ArticleSequenceNumber	:	70
ArticleCategory	:	Research news
ArticleFirstPage	:	1
ArticleLastPage	:	3
ArticleHistory	:	RegistrationDate : 2004-10-7 OnlineDate : 2004-10-7
ArticleCopyright	:	BioMed Central Ltd2004
ArticleGrants	:	
ArticleContext	:	130595511

**Stephen Pincock**

**Email:** [stephen@thescientisteurope.com](mailto:stephen@thescientisteurope.com)

---

Three researchers who made fundamental breakthroughs in understanding ubiquitin-mediated proteolysis have been awarded the 2004 Nobel Prize in Chemistry, the Royal Swedish Academy of Sciences [said](#) on Wednesday (October 6).

[Aaron Ciechanover](#) and [Avram Hershko](#), from the Israel Institute of Technology, Haifa, and Irwin Rose, of the University of California, Irvine, will share the prize for their discoveries in the 1970s and 1980s that began to reveal the central role of the tiny 76-amino acid protein in numerous cellular processes.

"Thanks to the work of the three laureates, it is now possible to understand at a molecular level how the cell controls a number of central processes by breaking down certain proteins and not others," the academy said.

"Without doubt they deserve this prize," [John Mayer](#), professor of molecular cell biology at the University of Nottingham, told us. "Protein modification by ubiquitylation is just as important as protein phosphorylation for what goes on in the cell."

Ubiquitin-mediated protein degradation governs processes as varied as cell division, DNA repair, quality control of newly produced proteins, and parts of the immune system. Problems with the [ubiquitin-proteasome system](#) are implicated in human diseases including cervical cancer and cystic fibrosis.

"The reason they've got this Nobel Prize is because ubiquitin is attached to proteins in different ways not only for degradation, but also to make other things happen in the cell," Mayer added.

A lot of their work was done during sabbatical breaks that Hershko and Ciechanover spent with Rose at the Fox Chase Cancer Center in Philadelphia. Beginning with a paper in [1978](#), the three laureates published a series of biochemical studies that revealed and characterized the ubiquitin system. [Two papers](#) published in *PNAS* in 1980, which started to explain the role of ubiquitin in adenosine triphosphate-dependent proteolysis, are considered pivotal.

"The possibilities arising from their work in a whole range of fields are enormous," [Michael J. Tisdale](#), professor of cancer biochemistry at Aston University, Birmingham, told us. "The discovery has opened up a whole new perspective into a number of disease states and allows a more rational means for targeting therapies."

In 2000, Ciechanover and Hershko, along with [Alexander Varshavsky](#), California Institute of Technology, Pasadena, [won](#) the Lasker Prize for Basic Medical Research.

In 2002, Hershko and Varshavsky were [awarded](#) the American Society for Cell Biology's EB Wilson Medal for their discovery of the ubiquitin system and its functions.

## References

1. Nobel Prize in Chemistry 2004, [<http://nobelprize.org/chemistry/laureates/2004/>]
2. Aaron Ciechanover, [[http://md.technion.ac.il/inner/personnel.php?Lecturer\\_ID=32](http://md.technion.ac.il/inner/personnel.php?Lecturer_ID=32)]
3. Avram Hershko, [[http://md.technion.ac.il/inner/personnel.php?Lecturer\\_ID=33](http://md.technion.ac.il/inner/personnel.php?Lecturer_ID=33)]
4. R.J. Mayer, [[http://www.nottingham.ac.uk/neuroscience/contact/a-z/mayer\\_john.phtml](http://www.nottingham.ac.uk/neuroscience/contact/a-z/mayer_john.phtml)]
5. The ubiquitin-proteasome pathway: on protein death and cell life
6. A heat-stable polypeptide component of an ATP-dependent proteolytic system from reticulocytes
7. ATP-dependent conjugation of reticulocyte proteins with the polypeptide required for protein degradation
8. Proposed role of ATP in protein breakdown: Conjugation of proteins with multiple chains of the polypeptide of ATP-dependent proteolysis
9. Michael J. Tisdale, [<http://www.aston.ac.uk/lhs/staff/tisdalmj/>]
10. Alexander Varshavsky, [<http://www.biology.caltech.edu/Facultypages/varshavsky.html>]
11. Wells W: Lasker Awards presented for work on ubiquitination and hepatitis C *Genome Biology*, September 21, 2000., [[http://genomebiology.com/researchnews/default.asp?arx\\_id=gb-spotlight-20000921-02](http://genomebiology.com/researchnews/default.asp?arx_id=gb-spotlight-20000921-02)]
12. Discoverers of ubiquitin system to receive the ASCB's top scientific medal, American Society for Cell Biology press release, July 16, 2002., [<http://www.ascb.org/newsroom/ebwilson.html>]