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Year's comments for 2006

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The end of the twentieth century marked the beginning of a unique period in microbiology, such that microorganisms are now being studied from both ends of the biological spectrum: as the driving forces behind biological processes in the biosphere and as microscopic laboratories for studying these and other processes at the molecular level [2]. Microbes pervade most biological disciplines, and they have been the subject of increasing media attention due to both their positive and negative aspects. Thus, commenting on the achievements in the field of microbiology in 2006 as well as on the news related to microbiology published in the mass media would fill an entire issue of INTERNATIONAL MICROBIOLOGY. Therefore, let us focus on just a few of this year's highlights.

In its Year's Comments for 2005, INTERNATIONAL MICROBIOLOGY noted the Nobel Prize in Physiology or Medicine, which was awarded to the discoverers of the role of *Helicobacter pylori* as the causal agent of gastric ulcers (Fig 1). In 2006, two Nobel Prizes (Physiology or Medicine, and Chemistry) were also related to microbiology. The Nobel Prize in Physiology or Medicine was awarded to Andrew Z. Fire, from Stanford University, and Craig C Mello, from the University of Massachusetts-Worcester, for their discovery of "RNA interference—gene silencing by double-stranded

RNA". Since this mechanism for controlling the flow of genetic information occurs in plants, animals, and humans, it may seem, at first glance, to have nothing to do with microbiology. However, RNA interference plays a major role in defending not only these organisms against viruses, but also "lower" organisms. In RNA interference, the presence of double-stranded RNA molecules in the cell triggers the biochemical machinery to degrade those mRNA molecules that

carry a sequence identical to that of the double-stranded RNA. As a result, the mRNA from a specific gene is degraded. The disappearance of those mRNA molecules silences the corresponding gene, and the respective protein is no longer produced. Thus, cells infected by double-stranded RNA viruses are able to overcome the infection when the RNA of the infecting virus is degraded by means of RNA interference.

The 2006 Nobel Prize in Chemistry was awarded to Roger Kornberg, from Stanford University, for his fundamental studies of the molecular basis of eukaryotic transcription. Kornberg has worked on transcription since 1974, when he was a postdoctoral student with Francis Crick and Aaron Klug, at the British Medical Research Council in Cambridge, UK. Kornberg chose *Saccharomyces cerevisiae* as the model organism for his research. The breakthrough

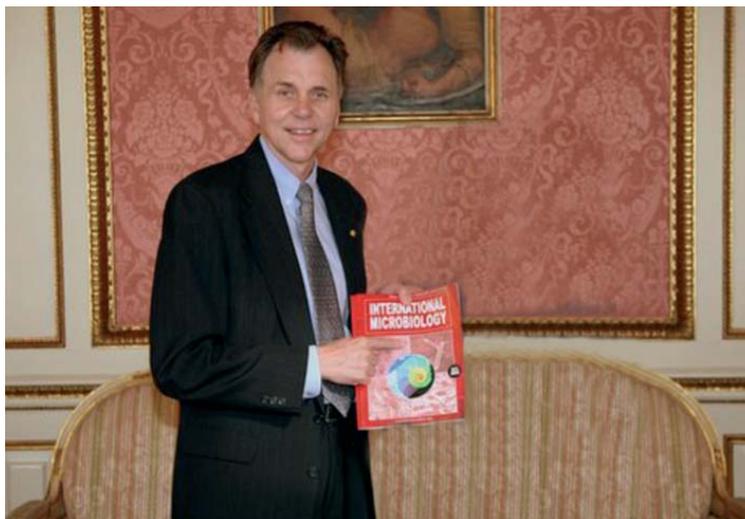


Fig. 1. Prof. Barry J. Marshall, 2005 Nobel laureate in Physiology or Medicine, holding an issue of our journal on the premises of the Barcelona City Hall (June 19, 2006).

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resulting from almost three decades of research came in 2001, when his team published two articles in *Science* describing the structure of a 10-subunit yeast polymerase at 2.8 Å resolution, and of an elongating complex consisting of RNA polymerase, template DNA, and product RNA. An understanding of the mechanisms of transcriptional regulation is crucial to our attempts to treat cancer as well as cardiac and metabolic diseases, to understand the basis of inflammation, and to control and direct the development of stem cells into highly differentiated ones.

The June 2006 issue of *Lancet Infectious Diseases* contained the results of a meta-analysis evaluating evidence for the increasingly popular but nonetheless controversial use of probiotics in the prevention of acute diarrhea. Of the 690 publications identified in the first search by the authors, only 28 studies they described fulfilled the eligibility criteria for inclusion in the analysis (the article referred to 34 trials because five of the original trials presented two or more independently analyzable results that could be considered as separate trials [6]). One of those studies had been published in *INTERNATIONAL MICROBIOLOGY* in 2004 [5]. The controversy surrounding the efficacy of probiotics in preventing various kinds of diarrhea extends beyond scientific boundaries, and is further complicated by the fact that scientists involved in research into this topic often have conflict of interest. Moreover, the scope of the debate to clearly define “probiotic” has reached the realm of politics. In Spain, for example, since 2003 and based on a politically motivated decision, yogurt that has been pasteurized can still be called yogurt, in flagrant violation of the recommendations of the Codex Alimentarius Commission.

According to the latest World Health Organization (WHO) and UNAIDS (the Joint United Nations Programme for HIV/AIDS) report on the AIDS epidemic [8], around 24.7 (21.8–27.7) million people from sub-Saharan Africa are infected with HIV. Worldwide, they account for 63% of all people infected with the virus, with southern Africa being the focus of the AIDS epidemic. Unfortunately, the forecast made by UNAIDS in 2004, that by 2010 some five million new infections would occur annually [1], appears to be accurate. Despite more effective and accessible treatment and the implementation of prevention programs in many countries, the number of people infected has continued to grow. In 2006, the global number of new infections was estimated at 4.3 (3.6–6.6) million adults and children. Adult women are the most affected group; in sub-Saharan Africa, there are about 14 adult women living with HIV for every infected man. In 1951, in what has become a classic WHO monograph, Charles Edward Winslow (1877-1957), a leading voice in Public Health, professor at Yale University, consid-

ered poverty as a major factor in the cause and spread of disease and commented on the mutual relationship that, throughout history, has established a vicious circle of poverty and sickness: “Men and women were sick because they were poor, they became poorer because they were sick, and sicker because they were poorer.”[9]. Unfortunately, the same can be said of the AIDS epidemic. Likewise, access to suitable drugs is not enough to prevent the disease; other changes addressing the roots of the problem are necessary.

Since the field of genomics is by now well-established and the sequencing of microbial genomes has become routine, it is the peculiarities found in those genomes that have made the news. The October 13, 2006 issue of *Science* contained reports of the two smallest genomes known so far: that of *Buchnera aphidicola* BCc (primary endosymbiont of the aphid *Cinara cedri*, with a circular chromosome of around 416 kb plus a 6.045-kb plasmid), reported by a Spanish group from the Cavanilles Institute, in Valencia, Spain [4], and that of *Carsonella ruddii* strain Pv (the only symbiont of the psyllid *Pachypsylla venusta*, with a circular chromosome of around 160 kb), reported by a group of Japanese and American scientists [3]. In addition to their small sizes, the two genomes have in common their high stability and lack of genes for many bacterial metabolic functions. Although other strains of *B. aphidicola* had been sequenced, they had larger genomes (615–641 kb) and greater metabolic capabilities. Interestingly, *B. aphidicola* BCc might be losing its symbiotic capacity. In fact, this primary endosymbiont is complemented by a coexisting secondary endosymbiont that could eventually replace it. In the case of *C. ruddii*, the lack of many genes for bacterium-specific processes can be explained by the transfer of some bacterial genes to the genome of an ancestor of its current host, with which the bacterium could have coevolved. It remains to be demonstrated whether *C. ruddii* is still a bacterial cell, and not an evolved organelle.

The spread of drug-resistant pathogens continues. The already-known antibiotic-resistant bacteria, methicillin-resistant *Staphylococcus aureus* (MRSA), were found in 75% of serious skin infections treated at clinics in Atlanta, Georgia, USA [7], and across that country. The reemergence of tuberculosis during the last few decades has posed another threat to humans due to the development of drug-resistant *Mycobacterium tuberculosis* strains. To date, resistant strains of *M. tuberculosis* have been found in all regions of the world, thereby qualifying the bacterium for membership in the superbug “club.” In the 1990s, the WHO recommended the DOTS strategy to control tuberculosis. DOTS, which stands for “directly-observed treatment short-course”, is a comprehensive strategy based on five elements: (i) political commitment, (ii) quality sputum microscopy for diagnosis,

(iii) a regular supply of antituberculosis drugs, (iv) standardized recording and reporting of tuberculosis data, and (v) supervised treatment by a treatment partner. However, epidemiological data indicate that DOTS alone is not enough to stop the spread of tuberculosis and the WHO has established a new strategic plan for the period 2006–2015 to fight the disease (DOTS Expansion: Working Group Strategic Plan 2006–2015; available at [http://whqlibdoc.who.int/hq/2006/WHO_HTM_TB_2006.370_eng.pdf]).

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INTERNATIONAL MICROBIOLOGY has received its first “Impact Factor” (IF) from Thomson Scientific (Philadelphia, PA, USA). The 2005 IF is 1.868, which makes INTERNATIONAL MICROBIOLOGY the fourth (out of 30) Spanish scientific and technological journals included in the *Current Contents*. Publishing thematic issues has become a tradition in our journal. The mini-reviews that make up the monographs are usually contributions from a microbiology-related meeting. For example, to commemorate the 50th anniversary of the publication of the seminal book *The Microbe's Contribution to Biology*, by AJ Kluyver and CB van Niel (Harvard University Press, 1956), an international symposium was held in Barcelona on April 27 and 28, 2006. The September 2006 issue of INTERNATIONAL MICROBIOLOGY contained contributions presented at this symposium, which was organized jointly by the Fundación Ramón Areces (Madrid) and the Institute for Catalan Studies (Barcelona). The Editorial of the issue was written especially for it by Joshua Lederberg.

INTERNATIONAL MICROBIOLOGY readers that make use of the online version of the journal may have noticed the recent changes that our webmaster introduced to make the site more user-friendly. Of the journal's viewers who access the journal directly through its website and whose country could be determined, 20% were from Spain, 25% were from North America (USA, 17.4%, Mexico, 4.4%, and Canada, 3.2%), 6% from India, 4.4% from the UK, and 3.7% from Germany. Over the last few years, our journal has become even more “international” (in 2004, the journal's Spanish viewers accounted for 39.4% of the total), not only regarding its Internet readership, but also considering the origin of the articles published. Even though most research and review articles published in 2006 came from Spanish centers (18 out of 32), there were four articles from the United States, two from Brazil, two from Germany, and 1 each from Australia, Canada, Colombia, France, Ireland, and Portugal. Now that the journal has an impact factor, the number of manuscripts received has significantly increased. The increase in the number of original articles received by the journal has meant

more editorial work and more submissions to reviewers, those anonymous people who ensure the journal's high quality, and to whom we are extremely grateful.

On November 7, 2005, the Spanish *Boletín Oficial del Estado* (Spanish Official Gazette) published the criteria for evaluating research. Regarding the publication of research results, the quality of the means of diffusion was considered an aspect of great importance. In addition to being indexed in prestigious international databases, a means of diffusion must exert a minimum level of impact. The criteria selected in the report focused on (i) the quality of the journal as a means for scientific communication; (ii) the quality of the editorial process; and (iii) the scientific quality of the journal. INTERNATIONAL MICROBIOLOGY fulfils all these requirements.

The policy of open access to the scientific literature, which INTERNATIONAL MICROBIOLOGY has always supported and applied, has gained widespread acceptance, but it also continues to be fought by the “big” commercial publishers. Currently, the recipients of grants from several public institutions, in Europe and the USA, are required to make the results of research funded by those institutions freely accessible—either from the very beginning or within a few months after publication. Both journals and authors must adapt accordingly, but changes in the budgets of grants are also necessary. The process of producing an article from a manuscript received at a journal's editorial office is complex and, even for those journals whose staff works on a voluntary basis, there are considerable expenses that must somehow be reimbursed. Who is going to bell the cat? Many commercial publishers as well as learned societies that base most of their income on the sales of their journals are reluctant to join the Open Access Initiative (OAI). By contrast, most authors have already realized that open access favors the citation of articles. The British Society for General Microbiology (SGM), which publishes *Microbiology*, *Journal of Medical Microbiology*, *Journal of General Virology*, and *International Journal of Systematic and Evolutionary Microbiology*, commented on the decision adopted by the SGM regarding its journals in its bulletin [*Microbiology Today*, August 2006, p. 140]. An important percentage of articles published in the SGM journals reported research funded by the British Wellcome Trust, which notified its grant-holders that they must provide free access to articles arising from work funded by the Trust. Even though most opinions in favor or against open access are based on economic grounds, there is an overwhelming reason for joining the OAI: making it possible that knowledge is accessible to anybody, especially to researchers from developing countries that cannot afford—either by themselves privately or by their universities or research centers—to pay for journal subscriptions.



Fig. 2. Plate presented by the ASM International Committee to the SEM during the 106th ASM General Meeting (Orlando, Florida, 21-25 May 2006).

Since its very beginning *INTERNATIONAL MICROBIOLOGY* has developed programs to promote scientific relationships with Latin American microbiologists. For example, as soon as the electronic version of the journal is online, the index is made available not only to members of the Spanish Society of Microbiology (SEM) but also to those of any Latin American microbiology society who send their emails to the editorial office. Some Spanish microbiology groups have guaranteed that copies of the printed journal reach Latin American centers or individual researchers by transferring their own institutional subscriptions. Another initiative of the journal in support of Latin American microbiology is the reproduction, on the back cover of the journal, of the portraits and signatures of great Latin American microbiologists. Brief biographies, including comments on the significance of the work of these scientists, are included on the inside title page of the journal.

The SEM has established and strengthened relationships with various foreign and international microbiological societies. The meeting on microbiological societies held in Madrid in June 2003, at the Fundación Ramón Areces, which has generously sponsored many of the SEM's activities for many years, laid the foundations for a sound collaboration between the SEM and the American Society for Microbiology (ASM). This collaboration has intensified every year since then (Fig. 2). The European Federation of Microbiolo-

gical Societies (FEMS) held its 2nd Congress in Madrid on July 4-7, 2006. The SEM intensively collaborated in the organization of the meeting (see a report by VJ Cid on p. 303 of this issue). Each of the 1500 attendants, from many different countries, received a copy of the June issue of *INTERNATIONAL MICROBIOLOGY*. The SEM belongs to FEMS since the foundation of the Federation, thirty-one years ago. The SEM was also present at the 18th Congress of the Latin American Association for Microbiology (ALAM), held in conjunction with the 28th Chilean Congress of Microbiology and the 3rd Chilean Congress of Food Microbiology, in Pucón, Chile, on October 23-26, 2006 (see a report by DS Holmes and G Mora on p.306 of this issue).

To conclude, *INTERNATIONAL MICROBIOLOGY* is a journal that is produced and published with scarce resources but with great enthusiasm, and is now entering its tenth year. We are, as we once said, "staunchly resisting improbability". These efforts are worthwhile if we can continue to improve and spread the knowledge of microbiology and an appreciation of the ubiquity and diversity of microorganisms on our planet.

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