EMBL &cetera

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November Council meeting brings welcome news

At the end of November, the governing Council representing the 16 EMBL member states made major decisions in two main areas: the Scientific Programme and funding of the Laboratory for the next five years (2001-2005), and a significant increase in EMBL's technology transfer activities. These decisions are tremendously important for the future development of the Laboratory and will provide a very concrete impetus for biotechnology development in the member states.

Unanimous approval was required for the five-year scientific and budgetary plan, which is centered around functional genomics. This will allow EMBL to expand in critical areas while maintaining its range of activities in experimental biology, from the level of molecule to that of the developing organism, integrating them with the new systematic approaches of bioinformatics, genomics and proteomics.

"The Council decisions mean a significant and absolutely necessary increase in support for the Laboratory," says Director General Fotis C. Kafatos. "They also reflects an enormous vote of confidence from the member states, underlining and contributing to the gathering momentum in Europe for support of the life sciences. The indicative scheme, together with sustained and new external funding, will provide a realistic basis for the Laboratory to fulfill its core missions."

Two landmark decisions regarding technology transfer activities at EMBL were also made. They give EMBL the green light to create an International Technology Transfer Centre (ITTC) on the Heidelberg campus and a Technology Transfer Fund (ETF), both of which will encourage the development of European biotechnology start-ups.

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When Science meets Society

Scientists, educators, politicians, writers, journalists, artists, and members of the general public met in Heidelberg on November 10-12, for the EMBL/EMBO Conference on "Science and Society: Developing a new Dialogue." Keynote speaker Carl Djerassi, the "father of the Pill", evoked ethical concerns raised by scientific and technological developments, setting the stage for a weekend of intensive discussions and different perspectives. Participants had their say about important issues and left EMBL having seen things -- even if for a just weekend -- from their neighbour's point of view.

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On the counting of ballots and other things

The American struggle to navigate its way through a legal and political morass in the wake of the Presidential election raised an important scientific issue as well: can machines count better than human beings? Find out in this issue's column ***from the sister sciences***.

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EMBLEM on the move

Gabor Lamm, EMBLalumnus and newly-appointed head of EMBL Enterprise Management, talks about what's happening with the rapidly-developing company and what the Council decisions mean for the future of technology transfer at the Laboratory.

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Council gives EMBL the green light for the five-year Scientific Programme and stepping up Technology Transfer

In November, EMBL's Council made major decisions regarding the scientific programme, indicative scheme and technology transfer activities at the Laboratory. These decisions represent a historic moment for the EMBL and an unprecedented step forward for the Laboratory and will give EMBL a solid footing to pursue its plans for the next five years. The measures can also be regarded as a signal that the member countries are well aware of the significance of what is currently happening in the life sciences. The process of winning the necessary unanimous support, particularly in the face of recent events at the level of the EU, was a complex one and required an immense effort both on the part of Council and the Laboratory. At EMBL, Fotis C. Kafatos, Barton Dodd, and Iain Mattaj, together with the Senior Scientists, were instrumental in its success.

Scientific Programme and Indicative Scheme

Council voted unanimously to approve the Scientific Programme and a stepwise, five-year indicative scheme referred to as the "responsive case," see EMBL&cetera issue 4). Expressed at year 2000 prices, total contributions from EMBL's Council for 2001 will be 51,342 KEuro in 2001; by 2005, the yearly contribution will rise to 56,987 KEuro, compared to 45,465 KEuro in the year 2000.

In a separate decision, Council agreed to establish a funded pension scheme. In future, pensions will be drawn directly from this fund, and not from the annual research budget of the Laboratory.

At a general staff assembly held in Heidelberg on November 28, Fotis emphasized that the increased funds will be allocated in a fixed and reliable way, the basic outline of which is presented below, and individual units will maintain authority over and responsibility for their own budgets. In general, the increases will be used in ways which respond to current scientific developments and the needs of the community.

EBI: Recognizing the serious underfunding of the EBI in the past, more than half (60%) of the initial baseline increase will go to the Institute to develop and maintain urgently needed database resources and services and to build up research and training activities. Though substantial, the budget increase will only provide about 40% of the budget that the EBI needs. The rest must be obtained from external national and international sources.

Grenoble and Hamburg: Additional staff will be provided to support biologists' use of the synchrotron beamlines provided by the ESRF and DESY. These facilities represent an essential resource which is heavily used by the European scientific community for a wide variety of experiments in molecular structural biology.

Monterotondo: Over the next five years, three groups and ancillary facilities will be added to the research programme in mouse biology. This will allow the EMBL programme to function at a critical mass, alongside the EU-supported European Mouse Mutant Archive (EMMA) and Italy's CNR, establishing the campus as a European center for mouse biology research.

Heidelberg: Scientific core facilities at the Main Laboratory will be enhanced, as will support for postdoctoral fellows from all over Europe. A research group in chemical biology will be added to complement the existing programmes.

Off-baseline: Funds will be invested each year into EMBL's capital equipment and core facilities, ensuring continued quality and reliability of the Laboratory's services to the research community.

Technology Transfer

Council has also authorised new, strategically-important technology transfer measures: the funding and construction of the first phase of an International Technology Transfer Centre (ITTC) on the EMBL campus in Heidelberg, and the establishment of an EMBL Technology Transfer Fund (ETF).

ITTC: The Phase I building (6600 m^2), to be completed by June 2002 on the Heidelberg campus, will serve as an incubator, or accelerator, facility, providing space, facilities and infrastructure to start-up companies which later can be expected to relocate. The facility will be managed by EMBLEM and will accelerate the passage of top-quality science into industrial opportunities. It will also play an important role in training nationals of the member states to develop skills in technology transfer, which they will then take back to their home countries. The ITTC services can also be used by member states, as part of EMBLEM's policy of promoting viable commercial opportunities throughout Europe.

EMBL will build the facility and lease it to EMBLEM, which will manage the facility and sublet space to other companies. Funding will be obtained through several external funds, leveraged by the use of proceeds of past EMBL Technology Transfer activities. Major parties have already made leasing commitments to EMBLEM. The management expects to have the space fully leased when the ITTC is commissioned in summer 2002.

Phase II is to be approved and commenced at a later date, and involves the addition of a second building (8000 m^2).

ETF: The ETF will be initiated by EMBLEM but will be built up and managed by external investors who will make investment decisions on a market-oriented basis. It will be expected to provide seed and early funding for EMBL-associated start-ups but in part it will also be able to invest in biotech start-ups in any of the EMBL member states.

EMBL's mission is to conduct basic research in molecular biology, to provide essential services to scientists in its Member States, to provide high-level training to its staff, students, and visitors, and to develop new instrumentation for biological research. As such, the Laboratory is in a unique position to confront the rising challenges of research in the life sciences. While the measures approved by council represent a significant amount of institutional funding, the Laboratory will continue to depend heavily on competitive external funds.

Complementing the increased investment of the member states in the scientific activities of EMBL, additional approved measures will ensure that Intellectual Property from the Laboratory can move to industry in a smooth and efficient way without endangering the core mission of the EMBL as a basic research institute.

--Sarah Sherwood

Setting up the biotechnology shop at EMBL

Gabor Lamm, once a PhD student in Angus Lamond's group, is now the Managing Director of EMBLEM GmbH. He speaks to us about the changes to come.

WHAT DO COUNCIL'S DECISIONS MEAN FOR TECHNOLOGY TRANSFER AT EMBL?

The Council decisions are historic in several aspects. For technology transfer, they represent a great step forward. The approval of the ITTC means that we are now in a position to really help and facilitate start-up companies to get a good foothold. We can give them a good basis for an excellent start, and basically give them the support they need for the future. The ETF is also significant because it will put us in a position to support start-up companies and to increase the profile of EMBL and its Intellectual Property within Europe and around the world.

Technology transfer is nothing new. The process began at the Laboratory in 1996, and has been growing steadily since then. Council made several steps that paved the way for the decisions made in November. However, there is currently no such thing as technology transfer in a pan-European sense. Both the ITTC and the ETF are a step in this direction. EMBL's activities will serve as a training forum for both scientists and technology transfer professionals in Europe so that they can learn from our experiences and accelerate technology transfer in Europe. A certain amount of funds will also be invested in non-EMBL-related biotechnology in the member states. It is more than technology transfer for EMBL's sake -- it is technology transfer in a European context.

HOW WILL THE FUND WORK?

We are currently looking for a strong partner for the venture capital fund which will have a volume of 50 million euros (100 Million DM), together by the middle of next year. For a lot of start-up companies, having a good idea and developing it is not the same as having a finished product and selling it on the market. Venture capital funds have a good network of managers and a complete range of management skills. We will have access to certain human resources that otherwise we would not have, which will benefit the start-up companies.

WHAT CHANGESWILL WE SEE WITH THE WAY TECHNOLOGY TRANSFER IS RUN AT THE LAB NOW THAT EMBLEM IS FULLY OPERATIONAL?

EMBLEM has existed since May 1999, though it hasn't been very active in its daily dealings with the EMBL. What has already changed is the way in which EMBLEM deals with technology transfer toward the scientists at EMBL. We have begun to provide them with professional assistance, help them with day-to-day tasks. In a broader sense,we are fulfilling the company's mission which spans areas from identifying technology to developing it, to safeguarding, patenting and ultimately selling technology.

Our main role in the next few months will be first, to let people know in house that we are here and we are active, ready and prepared to assist you and to advise you, and secondly, to do the same sort of thing with our external partners to show them that we are a professional technology transfer company. This means that a lot of things that have been done in the past at EMBL will need to be reassessed according to market value. I have been speaking with people at EMBL for the past several weeks and have gathered a lot of information about the way things have been run, and how they should be run in the future. EMBLEM is owned 100% by EMBLand will continue to have a close relationship with the Laboratory; nevertheless we are an independent company. The technology transfer officer position, currently held by Steve Ferris, will also be incorporated into EMBLEM, so that we will have one interface with customers, both internally and externally.

We have to make sure we have a clear balance. We must do business in a professional sense and at the same time we must approach technology transfer in such a way that it preserves the basic research nature of the EMBL.

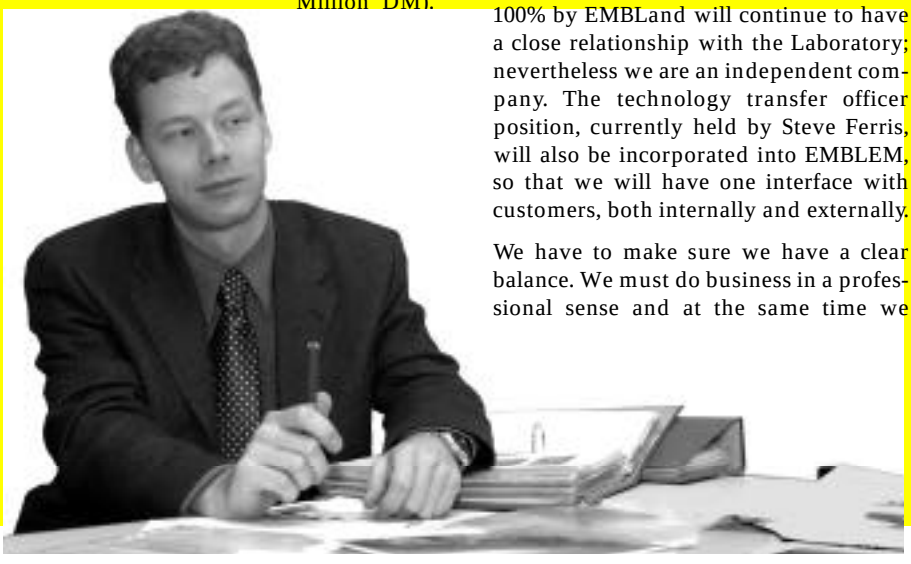
HOW DID YOU MAKE THE JUMPFROM SCIENTIST TO MANAGING DIRECTOR OF EMBLEM?

I don't know if there is any way you can plan your career. I did a PhD here at EMBL with Angus Lamond and knew then that I had other abilities and interests that I thought I could put to better use outside of basic research. I did a postdoc at the IMP in Vienna for 3 years, and still considered the option of going into business and industry. I found basic research to be fun and challenging, but it wasn't completely fulfilling. I knew I wanted to do something else. The lab was just the wrong place for me.

In 1997 I joined Wacker Chemie, a large globally active German chemical company, as a management trainee, and after a year I took an upper management position in their materials division It wasn't easy making the jump. In basic research you are always told that as soon as you leave, you are somehow less of a scientist. In retrospect it becomes obvious that sometimes basic researchers try to build walls very high around their areas. They don't like people to look across, perhaps because they might actually like what they see. I liked it. I think it was one of the best decisions I ever made.

Though it will not be our strategy nor our desire to 'braindrain' postdocs to go into business, I think that EMBLEM will create a forum in which people can retrain or discover an interest in the other side of basic research. This will not change basic research -- but it will change the possibilities open to scientists, so that if they wish to, they can look across that wall.

--interview by Sarah Sherwood



For questions about

collaborative research agreements with industrial partners

licensing agreements

start-ups

or patents issues,

contact EMBLEM's Managing Director, Gabor Lamm (lamm@embl-heidelberg.de) or EMBL's Technology Transfer Officer, Steve Ferris (ferris@embl-heidelberg.de).

An open letter to the bioinformatics community

Re: the data access agreement between *Science* and Celera for the Celera human genome sequence paper

Hinxton, December 2000

Dear fellow bioinformatics developers:

By now you have probably heard that Celera Genomics has submitted their human genome paper to the journal Science. Science and Celera have agreed to special terms for the release of the human genome sequence data. It will be made available through the Celera website, and will not be submitted to the international DNA database consortium (Genbank, EMBL, and DDBJ). Science has issued a statement regarding the agreement at [http://www.sciencemag.org/feature/data/announcement/genomesequenceplan.shl]

All major journals, including Science, have a policy of deposition of sequence data with the "appropriate data bank". The accepted community standard is submission to GenBank/EMBL/DDBJ. The reason for this deposition is to make the results of the work openly available for future research. This principle was specifically mentioned in the Clinton/Blair statement on human genome sequencing who strongly upheld the view that "unencumbered access" to genome data was critical. [http:// www.usinfo.state.gov/topical/global/biotech/00031401.htm]. Celera has in the past agreed with this view. Craig Venter, president and CSO of Celera, testified before a congressional subcommittee in April that the Celera human genome sequence would be made freely available and there would be "no restrictions on how scientists can use these data." [http://www.celera.com/ corporate/about/press_releases/celera040600.htm]

The terms of the Celera/Science agreement will give us access to the genome sequence, but not unencumbered access. Celera is suggesting publishing their data under a MTA (Material Transfer Agreement) which would prevent large scale downloads and incorporation of this data into GenBank/EMBL/DDBJ. In order to download the data, you and your institution will have to sign a contract guaranteeing that you will not "redistribute" the Celera data.

Science believes that the deal is an adequate compromise because it provides us the right to download the data and publish our results. We believe Science is thinking in terms of single gene biology, not large scale bioinformatics. It is probably not hard for you to imagine scenarios in bioinformatics in which "publication" and "redistribution" are virtually the same thing; we cannot imagine Celera allowing us to incorporate data into Pfam, for example, nor into Ensembl.

We are asking for your support in writing to Science to politely insist that genome sequence papers should be accompanied by unencumbered deposition to GenBank/EMBL/DDBJ. Please note that we have no issue with Celera either keeping this data unpublished for commercial reasons, nor with them combining their data with freely available data from the public genome projects. We would defend their right to do either. Our view is simply that the genome community has established a clear principle that published genome data must be deposited in the international databases, that bioinformatics is fueled by this principle, and that Science therefore threatens to set a precedent that undermines bioinformatics research.

We encourage you to express your views on this matter to Donald Kennedy (kennedyd@stanford.edu), the Editor-in-Chief of Science, and/or to Barbara Jasny (bjasny@aaas.org), the managing editor in charge of genomics papers at Science.

-- Dr. Sean Eddy, Dr. Ewan Birney

WHY DOES THIS MATTER?

A classic example of how our field began to have an impact on molecular biology was Russ Doolittle's discovery of a significant sequence similarity between a viral oncogene and a cellular growth factor. Russ could not have found that result if he did not have an aggregate database of previously published sequences. We have come a long way from Russ and his son typing data into the NEWAT protein sequence database by hand.

Throughout the 80's the international database community fought hard to insist that DNA sequence data be deposited into the public domain databases. Journals now generally require deposition as a condition of accepting a paper. The forming of these databases and the international agreements on data sharing between the European, American and Japanese databases fostered the rapid development of bioinformatics research. We now all take for granted the fact that large DNA databases are accessible from a single point of contact, and the identifiers are coordinated worldwide.

Bioinformatics research relies on open data with minimal legal encumbrances submitted to public databases. Without these databases there is no real substrate for bioinformatics research.

WHAT WOULD HAPPEN IF THIS PRECEDENT WAS SET?

There are a number of consequences if Science set a precedent that allowed people to publish DNA data under a variety of MTAs.

* One would not be able to form a single DNA database on which to do bioinformatics research, and the derivative databases (Swissprot, PIR, Pfam, PROSITE, etc.) would not be legal.
* Bench biologists would have to visit a number of websites and possibly enter into a number of different contracts for access to DNA data. Unexpected informative homologies could become prohibitively difficult to find.
* You may need to get a legal review before you can publish the results of an analysis, if your analysis is large-scale and detailed enough that it could be reasonably interpreted as a

"redistribution" of the primary sequence data. You could be sued for breach of contract for a Web Supplement page that discloses extensive sequence data supporting your results.

* Scientific openness will be undermined. Efforts to engage the community in cooperative annotation of large genomes, for instance, would be blocked -- we can't usefully annotate a genome we can't freely redistribute.

Clones, antibodies, and other published biomaterials are often distributed under MTAs; why should DNA sequence be any different?

Most biomaterials have fairly specific uses. There are few examples of people making unexpected discoveries by reanalyzing a collected set of monoclonal antibodies, for instance. In contrast, just on the NCBI BLAST server alone, unexpected and important discoveries are made all the time, by computational reanalysis of the public sequence databases. It's the remarkable utility of biosequence comparison to find unexpected new information that drove the creation of large aggregate public sequence databases and the rapid growth of the field of bioinformatics. This fundamental difference has led to different standards in how biomaterials and DNA sequences are handled. The existing system of public release of sequence upon publication has contributed to a powerful genomics revolution in both the public and private sectors.

The Science/Celera deal proposes to alter a system that is working spectacularly well, both scientifically and economically. We and others would argue that DNA sequence information is "precompetitive". DNA sequence data is vastly more valuable to the world in the public domain than in proprietary databases.

Celera paid for it. can't they set their own access terms?

Absolutely. We have no issue with Celera's commercial data gathering, and their right to set their own access terms to their data. We do feel, though, that scientific publications carry a certain ethical responsibility. The purpose of a paper is to enable the community to efficiently build on your work. There is always a tension between disclosing your work to your competitors (this is not unique to private companies!) and receiving scientific credit for your work via publication. This tension is natural, and maintaining a consistent and acceptable balance is the reason that scientist and journals establish community standards that dictate how data are required to be disclosed. In this case, the clearly accepted community standard is that DNA sequence data are deposited in Genbank/EMBL/DDBJ upon publication.

We certainly do not blame Celera (much) for seeking a special deal that lets them have their cake and eat it too -- they would understandably like scientific credit for their terrific and important work in human sequencing, and they would also like a profitable business model.

We do blame Science for failing to take a strong stand in upholding accepted scientific publication practices. We cannot accept that it is necessary to sacrifice ethics for expediency. Scientific journals have a lot of leverage. They can help get authors to Do the Right Thing. Scientists generally expect journals to help in enforcing community standards.

Science claims they are honouring their own policy. what gives?

Science now claims that all their policy really requires is that archival data be available via a publicly accessible database. We think this is a conveniently revisionist view of their own policy, which states (in Instructions to Authors):

> "archival data sets (such as sequence and structural data) must be deposited with the appropriate data bank and the identifier code should be sent to Science for inclusion in the published manuscript (coordinates must be released at the time of publication)"

Notice the use of the definitive article "THE appropriate data bank", the notion of "deposition", and the additional rider that the identifier code should be sent.

The spirit of this statement seems clear to us. Science's statement anticipates that there is an appropriate, single, aggregrate community database for each sort of archival data, whether DNA sequence, protein structure coordinates, or something else. Sensibly, they don't name every possible database for every possible archival data set. They expect that recognized community standards exist. In no way does Science's statement seem consistent with the view that an individual lab could start its own "public" DNA sequence database and send a meaningless internal database identifier; to try to read it that way is a post hoc rationalisation.

What can science do? this is a done deal.

It's true that this is a done deal. Science and Celera have mutually agreed to the general terms of data release. But there are two ways that we can minimize the damage.

First, the details of the agreement are not set. In particular, there is no definition of allowed "publication" versus prohibited "redistribution". Science could specify definitions that did not interfere with noncommercial uses of the data in bioinformatics, allowing us redistribution rights if it made sense in the context of our project (for example, a genome annotation project like Ensembl).

Second, and preferably, Science -- or even the peer reviewers -- can uphold Science's own data access policy, and reject the paper.

What can i do?

Agitate. Let Science know that you care. They consider this deal to be a trial balloon for future genome papers. Even if we can't change the deal with Celera, we can try to make sure it's a one-time-only deal that's viewed as a Big Mistake. Write a letter to Science and tell them how their actions would impact your research, both in the long term and in the short term. Also, you can pass on this open letter to other bioinformatics researchers you know.

Dr Sean Eddy,
Alvin Goldfarb Professor
of Computational Biology,
Howard Hughes Medical Institute,
Washington University in St. Louis, USA

Dr Ewan Birney
Team Leader, Genomic Annotation
European Bioinformatics Institute, UK

from the sister sciences...

Observations on the counting of ballots and

Normally Americans celebrate the end of an election by punching little holes in paper; they collect the punched-out bits and throw them on the winning candidate, usually from a high window, as he rides down the street in some sort of bulletproof container during a victory parade. This year U.S. Presidential candidates Bush and Gore preferred to spend a lot of time quibbling about whether holes may or may not have been punched in ballots, and if so, where the holes were, rather than riding around in a bulletproof container. Meanwhile, here at EMBL, Stephan Grill and Stefania Castagnetti had to endure endless bad jokes as they watched students elect new representatives to the PhD Programme Advisory Committee. The side of their ballot box was marked "There will be NO recounts," and a cartoon mocking the infamous Florida Presidential "Butterfly ballot" was taped to the table. As the polls closed and the votes were counted, Stephan and Stefania made the terrifying discovery that the two leading candidates had received precisely the same number of votes! Fortunately, it was an election for two representatives (whew).

The American fiasco shows even elections can be postmodern. Prior to this year, most of us probably believed that 1) in an election, there exists a specific number of ballots and this number can be determined by objective means; 2) ballots record votes for one candidate or the other, and 3) it is possible to determine who got more votes by a process of counting. How could we have been so naive?

It turns out that none of these things can be determined outside of some sort of political, social, or economic agenda. 1) People give you wildly different figures as to how many ballots exist because you can find so many creative reasons for throwing them out: if a Republican helped you to apply to vote; if you live overseas and your post office didn't stamp the date on the ballot; if you live in a privileged area with a smart machine that spits an ambiguous ballot back at you, as opposed to ethnically-challenged areas where they have ballot-challenged machines; and some ballots, like trees falling in forests, seem to be locked up in boxes where they will never see the light of day, unless they get fed to somebody's cat, which will also make them hard to count. 2) Ballots may record a vote for one candidate, for two or more candidates, or for none. Can a normal, intelligent person look at such a ballot and decide who got the vote? Nope - what you see depends on what political party you belong to. And 3) machines and humans count ballots differently. Republicans believe that machines can count ballots better than humans, whereas Democrats feel that people are better counters.

Stephan Grill and Stefania Castagnetti count predoc ballots. Photo: Russ Hodge

Because quantitation is becoming more and more important in biology, it seems like this issue should be rapidly resolved. Maybe there are distinct Democrat and Republican ways to interpret smears on gels, or the results of a chip experiment, or whether two sequences are really homologous.

Do machines count better than humans? The problem is complex because there is an evaluation step where a ballot has to be read, a sorting step which puts it into the right pile, and then a process of counting. Presumably the real difficulty comes at the first step, but how can you be sure, if all you get is a number at the end?

If the machine and human counters reach the same conclusion, there is no information, and you have to assume that they count equally well. But what happens if a machine count disagrees with the human count? If successive machine recounts give different answers, you might suppose that there was something wrong with the algorithms that evaluate the ballots, or sort them, or count them. (Or that the paper deteriorates every time it goes through the machine - sort of a Heisenberg Uncertainty Principle for ballots, where you can't measure a vote without destroying it with either a Republican or Democratic methodology...) In any case, your response would be to reprogram the machine to try to make it behave.

But what if each machine recount gives the same answer? And human recounts give different answers? Who's right? Maybe the machine is simply making the same mistake each time, whereas humans make different mistakes each time. If it's impossible to compare the machine evaluation with that of a human for each single ballot, is it a good thing to assume that the machine is right? Humans wrote the evaluation and counting programs, so aren't humans really doing the counting after all (by proxy)?

Bioinformaticians like to tell us that the virtue of big machines doing automatic genome annotation - rather than having it done by hand - is the fact that the same machine applies the same criteria to every case. Thus if a mistake is made, it will be a consistent mistake that can be fixed if it turns out to be wrong. But this assumes clean data which lends itself to a consistent methodology. Maybe ballots (and most other things in the world) aren't like that. Maybe they are inherently fuzzy, and it isn't such a bad thing that recounts yield different answers. (Just so long as in the end, the right person gets elected.)

Well, now the machines have won, and so for the next four years, the U.S. is stuck with an official policy stating that machines are better counters than humans - any other policy would illigitemize the administration. This may have all sorts of unexpected implications. No one will be able to complain, for example, that he hasn't gotten a big enough tax cut, since government computers can presumably count money better than a person can.

other things

It also seems to imply a setback in the evolution of human cognition. In 1930, in a book called "Number, the language of science," Mathmetician Tobias Dantzig wrote, *"Man, even in the lower stages of development, possesses a faculty which, for want of a better name, I shall call "number sense." This faculty permits him to recognize that something has changed in a small collec - tion when, without his direct knowledge, an object has been removed from or added to the collection."*

(As when somebody has made off with a box of ballots. People should be able to notice this, but would a machine? Dantzig goes on to say:)

"Number sense should not be confused with counting, which is probably of a much later vintage and involves, as we shall see, a rather intricate mental process. Counting, so far as we know, is an attribute exclusively human, whereas some brute species seem to possess a rudimentary number sense akin to our own."

He goes on to cite the famous example of a squire who wished to shoot a crow. The crow spent his days high in a tree, too far up to shoot, and only came down when there was no one around. The squire hid in a hut but the crow knew he was there and only came down when he had left. The next day the squire returned with a friend; the friend left and the squire stayed, but the bird knew that the math didn't add up and stayed up in the tree. The following day the squire came with two friends, then three, then four. It wasn't until six men crammed themselves into the tiny hut that the bird lost track and couldn't count them any more; five men left; the bird flew down, and the squire finally got his crow.

By accepting the verdict of counting machines, the Republicans seem to be implying that men have lost their number sense, maybe due to the fact that you have to rely on a sophisticated pocket Texas Instrument calculator to figure out complicated things like oil prices. Maybe they would agree to have a recount done by crows. Wait a minute - that won't work. In Texas, there aren't any crows. They've shot them all. And now the Democrats have to eat them.

--Russ Hodge

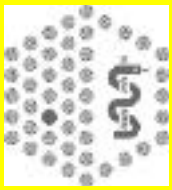
the EMBO corner

As part of the growing range of activities of EMBO we are happy to announce the launch of a new initiative, the EMBO Young Investigator Programme which has its first deadline for applications on December 15, 2000 and in subsequent years` will have an annual deadline of May 1. The aim of the Young Investigator Programme is to target a very important but potentially vulnerable sector of the scientific community, namely those at the early stage of their independent career. The European science system is not well disposed towards this group. The example of EMBL Group Leaders is unusual and yet the wonderful success of the EMBLmodel argues very powerfully that it should be a component of national plans everywhere. Scientists working in the United States of America much more frequently have independence at this early stage in their career. Some believe that this is one aspect that contributes to the dynamism of research in the USAand the attractiveness of working there.

Discussions on the EMBO Young Investigator Programme started over two years ago and the plan has received tremendous support from Fotis Kafatos of EMBL. One aspect of the programme is an annual meeting of the EMBO Young Investigators with the EMBL group leaders which will be held in Heidelberg. The Member States of the European Molecular Biology Conference (EMBC) have also shown their enthusiasm for the programme and contributed very significantly to its creation. The EMBC also provide the funding for the administration and networking aspects of the programme. The financial rewards to those that will be selected as Investigators by an elite EMBO Committee will be few and in some instances the national response to the financial aspect remains to be clarified. This, however, helps to focus on the real value of being selected as an EMBO Young Investigator, i.e., it is a way of distinguishing a particularly talented group of young researchers in Europe and this stamp of approval can be used by them subsequently to leverage other grants and to allow funding agencies to rapidly identify them as being very high quality scientists irrespective of their location in Europe.

The response of the scientific community has been most enthusiastic. When starting any new programme, there are always questions as to whether it corresponds to a need. The applications which have been received to date have been both numerous and of high quality. Current predictions are that approximately 350 applications will be received. This is indeed a strong and rapid reaction from the relevant scientists and one which will keep Gerlind Wallon, the Manager of the programme for EMBO, extremely busy for the months to come.

--Frank Gannon



Molecular medicine minisymposium

Structural and Bioinformatic Approaches to Disease

organized by Christoph W. Müller, Stephen Cusack, Matthias Wilmanns, and Peer Bork

EMBL Heidelberg, March 19-21, 2001

for more information see
www.EMBL-Heidelberg.DE/conferences/MolMed3/index.html

Paving the way for a new dialogue between science and society

Is science dangerous? "Of course not!" proclaimed molecular biologist Lewis Wolpert boldly, igniting a session of talks and discussions on the public perceptions of risk in science. For Wolpert, there is a very clear line between science – which he defined as the pure pursuit of knowledge – and its expression in practical technology to create tools or know-how which might be exported from the laboratory and result in social or environmental change.


Lewis Wolpert and Sheila Jasanoff

Wolpert's statement was immediately challenged by other speakers and members of the audience at the conference *Science and Society: Developing a new Dialogue*, held at EMBL Heidelberg, Nov. 10-12. Sponsored by EMBL and its partner organization, the European Molecular Biology Organization (EMBO), the conference brought together natural and social scientists, journalists, and members of the broader public for a weekend of talks and intensive discussions.

Issues at the conference ranged from risk in science to the social impact of biotechnology and the myriad problems that arise as scientific culture(s) and other segments of society interact. While Wolpert's statement is only a single controversial point raised during three days of intensive discussion, it does underline the fact that technology and scientific applications have moved to center stage in debates between science and the public. Although the basic problems in such discussions may be age-old, the concrete themes and case studies presented over the weekend reflected urgent, current social concerns which would have been completely different just a few years ago. Specific themes included the uses and abuses of genomic information, the risks and ethical issues involved in new biotechnologies, how science is being promoted by business as a way to improve the quality of life, and how scientific information has been promulgated in cases like BSE and the AIDS epidemic.

Maynard Olson, director of the University of Washington Genome Center in the U.S., said that the turnaround time between discoveries and the development of applications has become so rapid that the distinction between basic and applied science may be losing its meaning. For better or worse, scientists are often regarded as authority figures in debates about the social impact of what is done with discoveries from their laboratories. Yet what they say often gets "lost in translation" as scientific ideas leave the rigorously-controlled arena of scientific debate and become the subject of newspaper articles, advertising, political policy and everyday conversation.

Researchers like Carl Djerassi, considered the "father" of oral contraceptives, stepped into this spotlight to raise ethical concerns about the future. "*In vitro* fertilization has truly divorced sex from reproduction for the first time in history," Djerassi pointed out in the conference keynote speech. He went on to paint a picture of the dilemmas that this could raise for ethicists and lawmakers in the future: women could freeze their own egg cells for use at a later date, making the decision on when to begin a family a purely social or economic one; it will be possible to select which sperm (out of hundreds of millions) fertilizes an egg, raising all sorts of concerns about giving parents active control over the genetic makeup of their children; people might engage in "reproductive tourism" to evade local restrictions on the use of reproductive technologies.


Maynard Olson and Beate Weber

One theme that arose time and time again was that in a world where science and even the human genome itself have become big business, researchers are no longer regarded as impartial and objective. The line between scientific facts, political positions, and advertising has become blurred. It is not only scientific statements which are misunderstood – but the process of doing science. There are no clear answers to some of the questions that scientists are asked (for example, "Are genetically-modified crops completely safe?") because science is a process of putting forth ideas which have to be tested, debated and reviewed before (hopefully) a consensus is reached. And well-established conclusions may be overturned a few years down the road. If schools leave the impression that science is an incubator for hard facts, which somehow spring fully-formed from the womb, then people will obviously be confused when they witness the type of heated debates which are often necessary before such facts are produced. So at what point should non-scientists become involved in debates about scientific applications? Some participants argued that even scientists depend on a first round of "peer review" – scrutiny by experts – before they can interpret the results of research; others presented evidence that letting the public in on debates early tends to allay their fears.

Bridging the culture gap requires an understanding of how scientists and other groups perceive each other, and how preconceptions can disrupt attempts at communication. If non-scientists often don't make the distinction between basic research and applied science, points out social scientist Brian Wynne from Lancaster University, they may well think that simply by doing research, scientists are automatically promoting the use of techniques such as cloning or genetically-modified organisms (GMOs). Organizations such as Greenpeace have experienced the flip side of the coin. "Because we object to certain applications, people may think that we object to science, and that's simply not true," says Stephan Flothmann, head of Greenpeace Germany's Genetic

Engineering Department. "What we oppose is applications which may have an irreversible impact on the environment and where there are unknown risk factors – such as the release of genetically-modified plants or organisms that can't be retrieved again."

While non-scientists may have an oversimplified idea of science, researchers such as Wynne are quick to point out that scientists often underestimate the diversity and intelligence of the public. Some of the popular objections that have been raised against applications such as genetically-modified crops and foods sound like scientific questions which have simply been phrased in common language, Wynne says. "Is it really possible to design controlled studies to estimate the risks that these applications will have on the environment? Ordinary people, just like scientists, have reasonable doubts about this." And establishing a dialogue requires that both sides be prepared to listen.

Information issues have played a key role in debates on the AIDS epidemic and the political response to BSE ("Mad Cow Disease"). Case studies by Robin Weiss (University College London) and John Collinge (Imperial College, London) showed how scientific information had been digested by the public and politicians and used – sometimes in rather startling ways – with dramatic consequences on how these diseases have been dealt with. The recent World Conference on AIDS held in South Africa, for example, was troubled by rumors and misconceptions about the disease's origins. Scientific information is often interpreted within the context of complex social situations that scientists need to be aware of.

Another thorny issue was genome projects and the way that businesses hope to capitalize on this information to develop new drugs, therapies for genetic diseases, and a host of other applications. Ethical issues have continually cropped up along the way, such as questions about the right to privacy, the ownership of genetic information, and how a society might cope with the ability to control the genetic makeup of its members. A variety of speakers, including Alexandre Mauron (University of Geneva), Maynard Olson and Benno Müller-Hill (University of Cologne) addressed these questions. Kari Stefánsson has faced these issues on a very concrete level: his company deCODE Genetics is attempting to create a health-care database and to link it to extensive genealogical records that have been collected on Icelandic families, with the declared aim to help cure complex diseases that result from the combined activity of many genes.


Alastair Kent leads panel discussion

When scientists discuss the great potential of this information, how realistic are they being? How do scientists prognosticate while maintaining integrity, without crossing the line into advertising, the line between science and business? How should governments respond to the dramatic growth of the biotech industry, and how should they support science? How should the benefits of specific products be weighed against potential risks? These were some of the questions addressed by Friedrich von Bohlen, CEO of the new company LION Biosciences, Manfred Kern of Aventis CropScience, and Julian Davies, University of British Columbia, Canada.

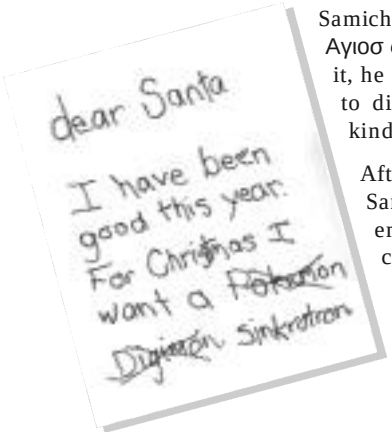
There was also concrete advice from people who have to bridge the communication gap on a daily basis. Vivienne Parry, who brings science down to earth as a freelance journalist, broadcaster and columnist in the UK, was pummeled with practical questions about how to translate the complexities of science for a general public. Beate Weber, mayor of Heidelberg and former President of the European Parliament's Committee on Environment, Public Health and Consumer Protection, talked about things that can be done on a local level to break down communication barriers and promote science education. A special session was devoted to theater, fiction, and art as a means of conveying both the process and content of science to the public.

This particular conference is over, but a range of debate goes on; feedback from the participants has been lively and is being channeled onto the EMBL website. Abstracts of the conference talks can be found under the links to "Science and society" and EMBL will post any comments that it receives to keep the discussion rolling. The web address is www.embl-heidelberg.de/ExternalInfo/stefanss/scisocpostconf.html

--Russ Hodge

photos: Marietta Schupp and Kostas Margitudis

Yes Virginia...there is a Αγιοσ ςασιλισ



Whether you call him Santa Claus, Father Christmas, Samichlaus, Christkind, Père Noël, Babbo Natale, Papa Noel, or Αγιοσ ςασιλισ , well, yes Virginia, he really does exist. To prove it, he showed up at the EMBL canteen on Friday, December 8 to distribute gifts and good cheer to kids from the EMBL kindergarten.

After a few pain-stakingly performed Christmas carols, Santa and the kids got down to the dirty business of emptying the big red sack, and devouring the Christmas cookies.

Special thanks go to Fatima Gebauer, Conchi Martinez and Kevin Czaplinski for convincing Santa to take some time out of his busy schedule to visit the kids.

--Sarah Sherwood

photo:Marietta Schupp

From Genes to Thoughts

photos:Marietta Schupp

On October 20-21, an exciting new event took place within the PhD student community in Europe: the First European PhD Student Symposium on Neurobiology, "From Genes to Thoughts", was held at EMBL Heidelberg. Ten EMBL PhD students spearheaded the initiative and took conference organization to task. Their aim was to choose a topic in current biology with a strong impact on society and to integrate its various lines of research for a wide audience. They decided that neurobiology fit the bill, and asked speakers -- both leading scientists and young researchers -- to give a broad overview of their field of study before presenting their own research. Thanks to the strong support of the Director General of EMBL, Fotis Kafatos, and the sponsorship of several biotechnology companies, the organizers attracted speakers from North America and Europe, and kept the registration fee to a minimum. More than 200 participants attended the lectures and contributed to stimulating discussions both inside the lecture hall and during the informal evening gatherings.

The conference explored key topics in neurobiology, ranging from the basic molecular mechanisms of neuronal function through the complex interplay underlying neural networks all the way to the disorders of the nervous system.

Interpreting the spirit of the meeting in his opening lecture, Jean-Pierre Changeux took the audience on an virtual journey from the molecular characterisation of the acetylcholin receptor to its role in higher cortical functions. Josep Rizo took a structural biology perspective to define the central feature of neuronal activity -- synaptic transmission or communication between neurons.

Jonas Frisen highlighted the amazing plasticity of mammalian brains, and their ability to regenerate due to the presence of neural stem cells. These developments have recently gained a lot of attention as a source of hope for the cure of many neurological diseases. But how would a regenerating neuron find its final destination in the damaged brain? Although researchers cannot yet answer this question, Joe Culotti explored the ability of neurons to migrate in the developing nervous system of C. elegans showing worms and men might not be so different after all. Then, moving from the basic properties of single neurons to the complexity of whole brains, Detlev Arendt provided an important overview of the unifying themes in the evolution of nervous systems.

One of the most recent and exciting developments within neurobiology is "Neurocomputing", the attempt to model neuronal networks *in silico*. Giorgio Ascoli convinced the audience that in such networks, neurons should not be represented by the usual simple balls, but by trees. He proposed establishing a database of all observed shapes of dendritic trees, with the ultimate goal of assembling a virtual brain!

Tapping his fingers on a table to simulate the electric activity of the brain, Ad Aertsen made neurons speak. He integrated several experimental observations into a mathematical model of "neuron firing" to highlight the concept of team-work in the brain, as neurons form groups to propagate signals.

The final session dealt with neurological disorders, such as Williams Syndrome and Huntington's and Parkinson's Diseases. Examining patients with Williams Syndrome, Ursula analysed the molecular defects that underlie complex cognitive functions like language acquisition and development.

In his concluding remarks, Fotis Kafatos pledged his support to help EMBL students establish the "European PhD Student Symposium" as a yearly conference series. Next year's conference is already in the works, and will focus on Evolution. In the wake of the success of this conference, students across Europe have already started to plan similar initiatives in their home universities bringing into life a new idea for European PhD programmes.

--Giuseppe Testa

Who killed Nosey Parker?

On November 18 and 25, high school students from the *Deutsche Schülerakademie* and the Heidelberg Life Science Lab initiative visited the EMBLto get insights into the everyday life of a scientist.

The Heidelberg Life Science Lab is an initiative that supports the training of gifted high school students with interests in sciences and technology. The extracurricular program consists of weekly talks, weekend seminars and long-term research projects. Practical experience can be gained in a partner institution of the initiative, of which EMBLis one.

The 15-to-18-year-old students that visited Frank Gannon's lab at EMBLhelped to solve a staged murder. The police, so the story goes, managed to retrieve a hair from the killer of Mr. Nosey Parker at the crime scene. The students, with the help of postdoctoral fellow George Reid, had to identify the guilty party using the PCR method. They also participated in real experiments currently being conducted in the lab on tissue-specific functions of estrogen receptors, and attended a lecture about the discovery of penicillin by Gerlind Wallon.

Stefanie Denger, a postdoctoral fellow in the Gannon Lab, together with Andrew Moore from EMBO, have been actively promoting the Heidelberg Life Science Lab's activities at EMBL. "The rapid development of biotechnology and molecular medicine will have a strong impact on our future," says Steffi, "It is becoming essential to keep society informed on these topics so that people can make informed decisions on developments that increasingly affect their lives. The initiative provides an excellent platform for the students to experience the philosophy and reality of the science discovery process". The entire Gannon lab made an enormous commitment, enthusiastically spending their weekends in the lab with the students.

The Heidelberg Life Science Lab's initiative is headed by Thomas Schutz (DKFZ), and funded by major companies and publishing houses, like BASF, LION Bioscience, Springer-Verlag and Merck, which have an interest in bringing science to the public.

--Katrin Weigmann

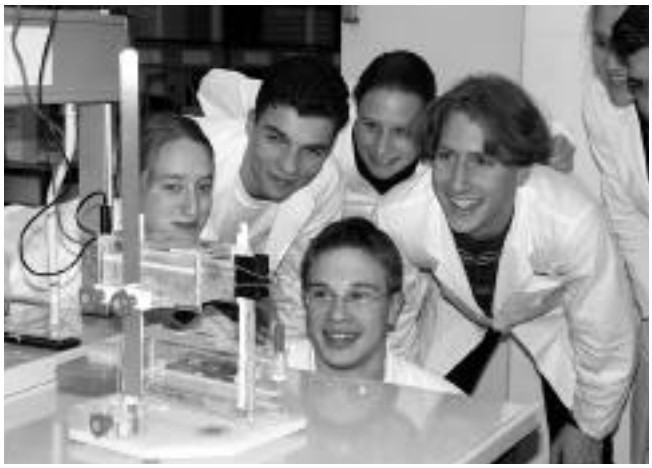


photo: Marietta Schupp

Putting E-BioSci on the virtual map

After some 20 years as Professor of Molecular Biology at the University of Amsterdam, where his group's research focused on aspects of gene regulation and the assembly and function of mitochondria in yeast, **Les Grivell** joins EMBO as Manager of the E-BioSci electronic publishing initiative. Les is no newcomer to EMBO, having successively been a member and chair of the Long Term Fellowship Committee, member and vice-chair of EMBO Council and, more recently Netherlands delegate to EMBC and EMBL Council and Chair of the E-BioSci Technical Committee.

E-BioSci will be a networked platform of Europe-based websites providing access to digital collections of full-text literature and data in the life sciences and Les will undertake the challenging task of coordinating the integration of many of Europe's key biological literature collections and data resources into a network that will provide life scientists with seamless access to a wide range of electronic services. Establishment of a prototype E-BioSci platform is high on his list of priorities for the coming months, but is only the first of a number of steps in a series of planned longer-term E-BioSci activities. These will include the hosting of peer-reviewed electronic journals and the development of improved tools to aid researchers in their navigation of digital text, image and sequence, or sequence-related sources and the integration of the resulting information.

people @EMBL

Damian Brunner joined EMBL in December as a Group Leader in the Cell Biology and Biophysics Programme. Damian did his PhD at the University of Zürich and post-doctoral research in the lab of Paul Nurse at the Imperial Cancer Research Fund in London. At EMBL, he plans to continue his work on cellular morphogenesis.

Manuela Brunner-Markl (lower left) and **Mary D'Lazarus** (upper left) are two new faces in the Director-General's office. Manuela has taken over from Susanne Lønstrup, who is on maternity leave, and Mary will be working alongside Sonja Hoefurtner for Barton Dodd until Sonja leaves EMBLfor her native Austria in the new year.

In November, **Hans Flösser** bid farewell to EMBL friends and headed off into retirement after 26 years of service as the Laboratory's Mechanical Workshop. Flösser was one of EMBL's very first employees. "I came so early that my personnel number was 'two'," he says, "and number one belonged to John Kendrew." The Workshop has thrived and made extremely important contributions to EMBL's scientific accomplishments under Hans' leadership.

Who's new?

In the Biochemical Instrumentation Programme: Xingping Lil (Wilm). In the Cell Biology and Cell Biophysics Programme: Damian Brunner (Brunner). In the Developmental Biology Programme: Tomoko Iwata (Klein), Guido Panté (Klein). In the Gene Expression Programme: In the Structural and Computational Biology Programme: Teresa Babia (Griffiths), Fabien Bonneau (Saraste), Anna Westlund (Saraste). Elsewhere at EMBL, Heidelberg: Manuela Brunner-Markl (Director-General's office), Beverly Carass (LAR), Angela Chong (Finance), Agnes de Matteis (Major Scientific Facilities), Leslie Grivell (EMBO), Maria Gracia Hauck (Finance), Mari Kawaguchi (Conference Office), Nanette Keppens (Finance), Nicole Norris (Personnel), Mjela Prill (Kindergarten), Silvia-Beate Rottschäffer (EMBO), Yves Soersensen (Scientific Instrumentation)

awards, honors &cetera

Martina Muckenthaler from Matthias Hentze's group was awarded the Fondsbroker AG Heidelberg Förderpreis for her contributions to the understanding of the regulation of iron metabolism in cells. Martina received the 3,000 DM prize in a ceremony that took place on November 26 in Heidelberg.

EMBL alumnus **Ed Hurt**, now at the Biochemistry Center at the University of Heidelberg, is one of this year's recipients of the *Deutsche Forschungs Gemeinschaft's* (DFG) Gottfried Wilhelm Leibniz Prize. The prestigious research award with a value of three million German marks, is given for outstanding achievements in science, and the funds are given to support the work of a researcher's group, to assist in forming collaborations particularly in the international sphere, and to allow a researcher to explore ideas which might otherwise lie dormant because of a lack of funds. Past winners include Matthias Hentze, a Group Leader in EMBL's Gene Expression Programme.

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False Positives

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