Interview with Martin Blume, Editor-in-chief, American Physical Society

In 1996, **Martin Blume**, a condensed matter physicist at Brookhaven National Laboratory in the US took over as the editor-in-chief of the American Physical Society (APS). Since then Blume has brought about impressive changes in the publishing enterprise of the APS by successfully leading its efforts in electronic publishing. As of 1 July 1997, all of the *Physical Review* (*PR*) and *Physical Review Letters* (*PRL*) became available electronically, and many few features, such as searching and linking, became possible on-line. He was instrumental in building up the APS on-line archive consisting of all the Society's published journals going back to 1893 when *PR* began at Cornell. The task was completed about three years ago. In the context of the ongoing debate on open electronic access to scientific journals, Blume's experience with the APS has enabled him to have a definite perspective on the issue.

Blume was in India in November 2003 as a visitor to S. N. Bose National Centre for Basic Sciences, Kolkata, the Tata Institute of Fundamental Research, Mumbai, and the Indian Academy of Sciences, Bangalore. The following is the wide-ranging interview with him.

What have been the challenges of electronic publishing in the internet era to a scientific publishing organization like the APS?

First of all, we are not-for-profit publishers. On the other hand, as I am fond of saying, we are also not for loss. We try to keep our costs low. In fact, on a per page basis, we are about as low as any of the publishers around. A number of challenges have occurred. First, we had to get everything available on-line. This (effort) goes back six or seven years. That itself was a lot of effort, because it meant we needed additional expertise in our offices to make it possible. We did that by hiring people and we brought our publications on-line. That was at the very beginning. Then, of course, going on-line with just the print version is not enough. You have to provide a lot of ancillary tools. For example, you want to be able to link references so that you simply click on the reference and go to the article. And there are a lot of things like that, which had to be done. Secondly, we wanted to put all of our contents on-line right back to the beginning in 1893. That too was done. In fact, we have had all our back contents on-line for about three years now.

Well, many other publishers said that no one is going to read these. It's turned out to be so popular that most other publishers are doing the same thing now. Altogether it was fairly costly and a lot of the work was actually done in India. I think it was a US corporation called Apex, which has its offices in India. In fact, we spent about $ 15,000 just shipping the contents to India. Altogether, between our own costs and what we paid ran us about $ 2 million. Interestingly, by actual measurement in the Cornell University Library, where *Physical Review* started back in 1893, it turned out to be about 400 ft of shelf space. For institutions that have to provide shelf space for journals, this is quite clearly a saving. But all of these were challenges that had to be met and, I think, that perhaps is just the beginning.

Martin Blume

What special strategies and innovative ideas did you have to evolve to continue to be viable as a print medium in the scientific publishing enterprise? What changes have you brought about in PR and PRL, in particular?

There were changes of two sorts. One is the change as far as the presentation of the material. The other is the change as far as what we would accept ten years ago. Most papers were submitted to us then with paper copies. Now perhaps 95% of the articles submitted to us come in electronically. We had to be prepared to accept different formats. Now we also accept Microsoft Word and a few other formats. This required retooling in our offices. On the other hand, one thing that remains a constant is the peer review. One other thing that I might mention here is a special strategy. Now, when an article is ready, it is immediately posted on-line. And it is given a publication date. The date of the journal, the print copy, is no longer relevant. That saves time in getting it on-line.

You have spoken of changing the entire paradigm of publishing itself. Instead of according primacy to the print version, you want the electronic version to be the primary one and to form the basis for the print version.

That was actually the second point of my answer to the previous question. By publishing on-line we essentially make the on-line version the version of record. And as a result we also have begun offering a discount for institutions that will take on-line only. One of the things we did when we started the on-line version as far as the costs are concerned, was essentially just to say that we will give this to anyone with print subscription. Initially we had been charging for our first on-line version. But, when I became editor-in-chief, I was disturbed by the fact that there were many problems with our on-line version. And I regarded it as the 'beta' version and I said I would rather not argue with people who complained about this because they were paying money for it. I would rather have the 'beta' version include at no extra cost with the print version. So we did that. When you compare prices between now and the past, you have to recognize what additional things are included. And one of them is the electronic version. But now we are prepared to go over to the electronic version.

Do you see a day when e-journals would completely replace the print version?

Yes I do see that. On the other hand, I have seen it perhaps too far in advance. When I became the editor-in-chief, I predicted that we would be out of the print distribution business in five years. I am

still consistent. I now predict that we will be out of print distribution in five years. Though I am completely consistent, unfortunately . . . (laughter). We are probably closer to that because more and more institutions are taking on-line only, because they get a discount in the price.

So how does the economics work now? Is the print subscription base shrinking now if more and more people are opting for the electronic version only?

It has been shrinking at 3% a year going back to 1969. However, that seems to have stopped because we have another mode of pricing, which is the 'consortium', where a group of institutions get together and, if they agree to maintain their subscription, for a modest extra sum, we will provide electronic access either to the journals that they do not subscribe to or to many other institutions that have not subscribed but are part of the consortium. A number of consortia are under way in India, very large ones from the universities which will provide them with relatively low-cost access.

You also have a differential pricing scheme. How do you distinguish between universities and research institutions for this purpose? This seems to be affecting Indian research institutions, I believe. Many institutions, I understand, have been placed in Tier-3 or above, which they feel is somewhat unfair for the charges they have to pay. Do you think there is a need for a separate policy for developing countries?

Well, this pricing is actually based on the usage of on-line journals. In fact, I have a list of all the institutions in India that subscribe and what tier they are in. There are a few that look misplaced to me; some in Tier-3 indeed seem badly misplaced – these are listed as government institutions. We are re-examining that. This was one result of my discussions (during this visit). But most of the institutions in Tier-3 are placed there because of the high number of downloads and a large number of articles they submit to us. We can compare those with the biggest research institutions in the United States. The largest ones that are in the highest tier tend to be in Japan and Korea, where they have a very large number of downloads. But here, for example, if I look at the Bhabha Atomic Research Centre (BARC), which is a Tier-3 institution, they downloaded 5400 articles during the year (2003) which is comparable to an institution in the US like the University of Illinois, a very big research institution. On the other hand, you would expect BARC to be like that. The Tata Institute of Fundamental Research (TIFR), where I was visiting, is in Tier-3 as well. 5329 articles were downloaded. So that is really the basis for a research extensive institution.

However, we do, in fact, make special arrangements with many Third World countries. India is, for many of its institutions, not a Third World country. The research output is high. In fact, Last year we received from India about 800 articles for publication. This is to be compared with the number 200 submitted to (the Indian physics journal) *Pramana*. I had a meeting with its Editorial Board. So there are many more submissions from India and also many downloads at the largest institutions. I do look at some that are listed as government institutions, which are clearly misplaced. We are going to re-examine that. For example, the Indian Institute of Astrophysics (IIA), which is Tier-3, has only 295 downloads – a small institution in other words. The Indian Institute of Science (IISc) may be misplaced in Tier-4 – that is one of the highest ones in India because it has 5000 downloads against BARC, which has 5400 and is in Tier-3. We have to re-examine those.

But, irrespective of the number of downoads, the financial resource that is available to an Indian institution is limited. So a comparison with an American institution may not be a valid one.

I understand that. I believe that BARC is a special case in India. It has a larger resource given the large applied science programmes that it has. So that is one which we will probably not reconsider. On the other hand, (as regards) the TIFR, one point was made to me that concerned me which I am discussing with our treasurer now – the subscription to our journal costs about two and a half times the salary of a full professor there, whereas in the US it would be one-quarter of the salary of a full professor. So I have to look at comparisons like that. There are other places where we have special considerations for the Third World. But it is really true that India is technically a Third World country, but it is really not as far as scientific research is concerned. And what we are trying to do is to make consortium agreements in India. So, for example, the TIFR could be part of a government consortium and that consortium would provide a lot of additional access for smaller institutions which would contribute a small amount that reduces the cost for the Tata Institute. The consortium seems to be a very good way of getting access. Essentially what it says is that the better-off institutions are helping the poorer institutions by maintaining their subscriptions. But because of their agreement to maintain it, we give access to these smaller institutions. So this is something that is important to us. And to answer your question, we do have a separate policy for developing countries. Each one of these consortia is negotiated separately. And that is the place where the separate policy comes in.

What is your reaction to the recently launched open access journal, PLoS Biology, of the Public Library of Science and the basic philosophy of PLoS? Does the APS subscribe to the idea of free access to its archived and current issues of journals?

We would very much like to be able to provide open access to our journals. Again, we are not for loss in this. We have to be able to recover our costs. PLoS – let me characterize it this way – is open access for readers, but is toll access for authors. We are the other way around. We are open access for authors, but toll access for readers. Only one of our journals has page charges or article charges and that is *PRL*, and there it is essentially voluntary. And in discussions in India, people said they have never paid any of the page charges because they cannot really afford it. But if they had to pay, if we went to open access for readers, we have to recover the costs in some other way. We have to charge somebody for it and there would still be a problem.

But the population of readers is much larger than the population of authors. In that sense, when we say open access it addresses a much larger population of the scientific community than what the policy of charging the readers does.

This may be true in the life sciences. In physics, it is not a broad general public that is looking to read our journals. People who need access, who are going to read these technical papers, have access

because they subscirbe. This is what it really amounts to. I don't see that we are going to gain a large number of readers. We would still like to be able to do it. The question is how do we find a way to do this and still recover our costs.

Let me mention one experience that we had ten years ago. Then page charges were a more significant part of the money that we brought in than they are now. At that time there was an experiment where *Physical Review D* (*High Energy Physics*) had no page charges. And at that time there was still this anger in the physics community of the US over the super-collider, and high energy physics and condensed matter physics were at odds with one another. I am a condensed matter physicist and was a member of the super-collider Board of Overseers. I was something of a skunk you see. But the fact is, there was still this hostility. The condensed matter physicists said here are these guys who are trying to get all of the money in the scientific budget and you are not charging them the page charges. At that time we could not afford to do this and so we reinstated page charges. There was a revolution. People did not want to pay. In fact, the big difference between physics publishers and those in life sciences. First of all, the life sciences had other sources of income besides the page charges – advertizing, for example. In physics we have no such sources of revenue. Not many people are interested in advertizing.

Now that you have the on-line edition, are there possibilities of raising revenue through advertizing on the web?

The amount of money we can make this way is trivial compared to subscriptions and compared to our costs. So we have to look at this (open access issue) pretty carefully. A few years ago there was a *Nature* debate on this. I wrote a section in this, where I said that we would like to be able to provide open access and we could do it immediately provided that everyone who now subscribed would agree to continue this contribution as sponsorship instead of a subscription. Then we would be able to open it to everybody. But that would mean that we would have to count on the people who now subscribe not to say 'Oh boy! It's free. We don't have to contribute any more'. We could not afford to do that. We are breaking even with the money that comes in now.

I don't know if you are familiar with public television in the US. Public television is funded by contribution and a couple of times a year they have what is called 'pledge week', where they get pledges from people that they will contribute. It is rather annoying because these replace commercials for the entire week. We would have to do the same thing. Every time you try to download an article, during 'pledge week', you would have to watch for five minutes or so of somebody telling you why you should contribute before you got the article. This was facetious, but it highlighted the problem that we face. If they don't have to pay, they are not going to.

I myself have been in this position with page charges in the past. What happened with *Physical Review D* was that people started boycotting our journal and started publishing in *Nuclear Physics* which did not have page charges, but which costs about ten times as much on a per page basis to the institution. If page charges and article charges have to be paid out of the authors' grants, as it happens in the US, then the authors are faced with a dilemma. Either they pay the page charges or they send a postdoc or a graduate student to a meeting. The cost would be about the same. And they generally are faced with choices like this. It is not going to be easy to convert to that mode of operation (which is the basis of open access journals like *PLoS Biology*). By the way, APS does have one journal which is open access. This is *Physical Review Special Topics: Accelerators and Beams*. We are doing this with money from the large accelerator laboratories.

How is it doing? The costs of an on-line edition are probably much lower . . .

It is the peer review and the composition that cost the most in these things. And we are looking to reduce those costs. But it is going to be minimal. One of the things you have to recognize is that our costs scale with the number of articles that are submitted to us. That number of articles has tripled in the last 20 years. We receive about 25,000 articles in a year. This is more than a hundred every working day. And submissions in 2003 seem to be about 7% above 2002. We find that if we make our internal processes more electronic, we can save money.

The PLoS is charging $ 1500 per article, which is not far off from what we would be able to do provided we got this from every paper. Now, the fact is, only one-third of the papers come from the US; a third from Western Europe and a third from the rest of the world. Papers from the rest of the world are those where people will not be able to afford the charges. So for everyone that we lose we will have to collect it from somebody else. This is part of the problem and the question is whether this is going to be sustainable.

How much does the cost come down by when you have only the on-line edition?

It comes down about 15 or 20% if we are not putting out the print. It always surprises people. But this is a hard number. However, there are other things that we can do for open access like making use of Ginsparg's e-print archive (at www.arXiv.org).

Has the Ginsparg e-print archive impacted the APS journals in any way?

We make use of it. We mirror it as you know. We were the first mirror in the US. We use it for submissions, for example. We link to it so that if people refer to an article (in the e-print archive), we link to the article. Furtheromore, we ask every author to sign a copyright form but we give back all the rights to authors, as if they had the copyright except the right to keep us from doing what we want to do. For example, authors can post their articles in the e-print archive in advance of submission. In fact, we make use of that. We send the referee to the e-print archive (for downloading and refereeing). It saves us money–we save in Federal Express costs, postage, telephone and all sorts of things. And that has been reflected in our costing. In addition, we allow the final (published version) to be posted on it so that whatever is published is there. It is a form of open access. Most of the articles of high energy physics get into the e-print archive. Condensed matter theory and other areas are increasing their use of the e-print archive. Still this does not stop people from submitting because they want the peer review and the peer reviewed version to be read. So to answer your question, Ginsparg's archive has not had a negative impact; rather it provides us with some benefits.

Given that you allow the papers published in the APS journals to be posted on the e-print archive, like arXiv or any other, in the APS format – which means

readers can download papers from there rather than from the journal website – do you think that the revenue model base on the number of downloads makes sense in the long run and can be sustained?

The sustainability of any economic model, however based, is in question. For differential pricing, we now define the tier in terms of downloads and submitted articles, but it can also be done in terms of size of faculty, research staff and student body. The same argument can be made for open access models, which rely on payment by authors as a substitute of subscription fees. Few scientists in India will be in a position to pay author access charges, and they will submit to journals that do not have them. Our approach is to watch the market carefully and to try to find a way to achieve our goals of widespread access and affordability, while still recovering our costs.

But has open access to the e-print archive impacted your subscription base?

Not that we can see. In point, this is a consequence of our collection of articles and a consequence of the fact that the e-print archive has things going back ten years, perhaps growing during that time, but before that it is only the APS archive containing everything that we published since 1893.

What in your opinion are the chief reasons for the culture of preprints (now e-prints) being largely confined to the physics community, without any apparent adverse impact on the publishing institutions such as the APS? Are there some subtle economics working as regards journals in other disciplines that this culture has not caught on?

I don't know exactly what to say here. I am comfortable with it because I grew up with it. Most institutions had preprint libraries alongside their physics journal libraries. There was never a thought that there was anything wrong with it. In fact, it was a mode of communication. What Ginsparg did was to make it electronic. And that was all the more credit to him. He is now a member of our publications overseeing committee. We have a very close relationship. In fact, one of our principal people in our electronic programme was a postdoc with Ginsparg and did much of the work in putting that together. But why it has not taken off in other areas I cannot answer. It seems crazy to me.

Unlike physics journals, why do others, like Nature and Science not accept papers once they are posted on any e-print archive?

I don't see it does them any good. I believe *Nature* no longer has such a policy. *Science* still does. We just had a meeting at the National Academy of Sciences on electronic journals. I asked the *Science* editors whether they still had that policy. They said that they still did. And Paul Ginsparg, who was sitting with me, remarked that they still had the policy, but they had the tendency to ignore it when it was a paper they really wanted to publish. The chemists persist in this and I can't explain it. I think it doesn't make any sense. It doesn't do any harm and, I think, having it posted there does good. It just seems to bring more people back and forth to our side as well.

How do you see the future of electronic distribution of scientific information, in particular progress towards open access?

There is one way in which we can bring our costs way down. I don't know if this is going to happen, but we have to be prepared to think about it. We can become what we call a 'virtual journal' on top of the e-print archive. That is, authors post their articles there and, when we do peer review, essentially all we need to have is a 'Table of Contents' which goes back to the e-print archive. You just link to it. But there is a problem in that very likely we would still have to download the articles ourselves because we have to have, I believe, in our possession, a copy of the article which we have peer reviewed so that it can't be changed after the fact in arbitrary ways. We have to have that which we have peer reviewed so that there is a public record and we maintain the archive ourselves. So that puts you back with more costs and the question is do you do such things as correcting English which would also bring the costs up. Also – here I admit to a romantic view of these things – I still remember how proud I was when I first had an article published in the *PR*. I had written the manuscript and equations by hand and then I got see, it in this format. I still would like to preserve the look and feel of an article. Well, this is a romantic view. If you can't sustain it in the electronic era, you can't sustain it. But for the moment, people seem to appreciate it.

You mentioned that much of your costs are in peer reviewing. And there are these advocates of the self-archiving concept who say that publishers should provide this quality service of peer reviewing and then let the papers be put on the various archive servers.

We allow that ourselves.

Right. In terms of the economics actually working in favour of self-archiving, if what you say is true, it is not going to bring the costs really down.

Peer review is still the most expensive component. But there are costs in distribution and, if people dropped the print subscription, we pass those savings back to them. It would actually be a 15% discount. But in addition to that, if you are overseas, the postage is removed if you were taking an airmail copy. That gives you a greater reduction in the costs. There is one point that I should address here. People say that 'well, if we take print and we stop our subscription in the future, we still have the print. But if we have only electronic and we stop our subscription, we no longer have access to it'. What we provide is that people can either download at the end of the year the entire year's issues or we can send them CDs of the entire year. It will just include the pdf files and the table of contents that links to them and with this comes the licence to post this on your own intranet so that you still will have the equivalent of what you would in print.

What is your reaction to the recent developments in various fora – the Budapest Open Access Initiative, the Berlin Declaration, the Bethesda Statement, the Principles and Plan of Action at the World Summit on Information Society (WSIS), the ICSU documents, the CERN-RSIS Conference submission to the WSIS, etc. – all of which urge a movement towards an open access publishing. Do you see any impact of these on journal access policies of APS, at least in the medium or the long-term?

All of these statements have to be proven practical by a long-term, economically sustainable example, which at present does not exist. One publication, *JHEP* (*Journal of High Energy Physics*) was initially open access. This proved to be unsustainable, and JHEP has now gone to a subscription model, managed by the British Institute of Physics (www.iop.org). We maintain open access, and as I discussed earlier, at the discretion of the author, who is permitted to post the final peer-reviewed version of his/her manu-

script on the arXiv or on the author's or institution's own web-page.

However, the use of the word 'principles' in the 'Principles and Plan of Action at the WSIS' is improper, in my view. This is often used by librarians in stating that information should be free, and they are making a self-serving economic statement rather than putting forward a principle. A principle is a fundamental truth, and to violate principle is to be 'un-principled'. The principles should really be called 'desires'!

On a different note . . . have you had to face additional controls in publishing what might be deemed to be sensitive research, particularly the kind that comes out of Department of Energy labs in the wake of the changing security environment and the US government's increasingly stringent policy with regard to science communication and national security?

We have looked at this. This is something that has hit the life sciences. First of all, it is very hard to think of things that are of potential security interests that are not already classified in physics. Things that have to do with weapons and so forth. I actually asked some officials in the Department of Energy and the Office of the Science Adviser if they could think of anything in physics that is not presently classified and would be of potential benefit to a terrorist. And the answer was no. Beyond that I would have argued as follows.

The example that is often given in these cases is the embargo on publications having to do with nuclear fission back around 1940 and 1941. Let's look at the situation at that time. First of all, almost all the articles that were published in *PR* came from the United States. Secondly, this was a very narrowly drawn field of physics that was easily identified. It was not a general thing like anything that is of use to a terrorist or any thing that would be of use to the Nazis, for example. It was this narrow area that was put down. Thirdly, it was still a voluntary boycott and it was looked at that way. Papers could be submitted but authors know they would be placed in repository and it was safe to publish them after the war. Even then there were objections to it, but on the whole, most people went along with it out of fear that the Germans would get the nuclear weapon and that this would be harmful. Further *PR* was about the principal way of distributing science.

Now let's fast forward to the present. We are not looking at a narrowly drawn field of physics. Just this general statement of 'potential use to a terrorist'. Secondly, by the time we get it, most things are posted on the e-print archive and already out in the public. The place to book is the e-print archive physics articles. Thirdly, two-thirds of the articles submitted to us come form outside the United States. You put all of this together, and there is really no chance for us to do anything. But to me these are all practical arguments. I don't like the idea of an embargo anyway. But I would prefer to have practical arguments so that I don't have to argue the case with the state machinery.

Why I asked was because there seem to be some restrictions with regard to communicating data, collaborating with scientists with certain countries and so on. For example, Indian scientists who were working at Fermilab on the D-zero experiment were asked to leave because of the embargoes following the Indian nuclear tests . . . things like that, which have to do with research coming out of international collaborative experiments. I wondered if such screening went on to affect the publication area as well.

Absolutely not. At the moment there is a big fuss over papers coming out particularly from Iran. We have in the past and continue to accept papers based only on their scientific content. And we expect to continue this. We have also maintained close relations with the Iranian Physical Society and we expect to continue this as well.

That brings me to ask you about your episode with the physicist Daniel Amit.

Yes. Let me just first express . . . I can either call it disappointment or exasperation with people who cannot distinguish between a plea for scientific cooperation and support of a war. And the things that I have just said, were in fact said to Amit in a letter – that was copied to me – from an Iranian physicist. He said he might agree with Amit on the war – and so might some of us for that matter, although I don't regard that as something that we have to do. We have maintained relations and we publish papers from countries with whose governance we may have strong disagreement, to put it mildly. Nevertheless, with scientists, if they are doing good scientific work and want to publish it, we are not going to make a distinction based on which country they come from. Now I should mention that Amit himself is in danger of falling a victim to boycotts of this sort, because he is an Israeli. And I would oppose boycotting him at the same time. I respect his point of view as a referee who worked for us . . . That's fine. But to make this into the case that he did, I say, is disturbing and unwarranted.

You mentioned Iran. Do you regularly receive papers from Iraq? Was there any specific problem during the war time?

We have such a list but we do not publish the individual country data. I mentioned 800 from India. But I can tell you that we have had only a few papers from Iraq during the last ten years. From Iran we had about 90, which is not insignificant. We just consider them on the same basis as papers from anywhere else.

On a broader note, what is your view on the question that Amit had posed: whether organizations such as APS should take a stand on the use and abuse of science by the state. . . .

Well, he didn't pose the question that way; his only concern was with the war. But let's think about whether we should take a stand on use or misuse of science by the state. You yourself mentioned the Indian bomb. I believe we should not have boycotted people from Indian institutions. I don't think that was right. This was not done by the APS. It was done by the American government. To think that we should say that anyone who works on nuclear weapons is beyond the pale. Well, in India, this can be viewed as defence against Pakistan. In Pakistan, this would be viewed as defence against India. And to each, theirs is the noble cause and the other one is the unethical one. I don't see that we can manage this ourselves. This is my personal view. Essentially, we have not done anything along these lines.

R. Ramachandran, Frontline, 203, Ansal Bhavan, New Delhi 110 001, India. e-mail: bajji@vsnl.com