Disputed inquiry clears bubble-fusion engineer

An inquiry has exonerated nuclear engineer Rusi Taleyarkhan of misconduct with respect to allegations made internally at Purdue University in West Lafayette, Indiana, officials announced last week. But the announcement may raise more questions than it answers: researchers in the field have criticized the university for failing to say whether the inquiry considered their concerns that the work may be fraudulent.

Taleyarkhan claims to be able to produce fusion by collapsing bubbles in deuterated liquids. His work promised to improve prospects for developing a clean source of energy, but independent scientists have not been able to replicate the result. The work had been subject to several internal allegations of misconduct, including the fact that Taleyarkhan cited a paper by his student and postdoc as "independent" confirmation of his findings[1,2].

Purdue announced on 7 February that "the committee determined that the evidence does not support the allegations of research misconduct and that no further investigation of the allegations is warranted". It has refused to specify the content of the allegations that it considered, except to say that they were "internal".

Institutional proceedings involving Taleyarkhan began in March 2006, after concerns about his work were reported by *Nature*[3]. Purdue's provost, Sally Mason, responded by saying that the university would undertake an objective review. In June 2006, the university said that the review was complete, but declined to make its findings public. Last week's announcement referred to the findings of a second internal inquiry subsequently appointed by Purdue's dean of engineering, Leah Jamieson.

Taleyarkhan has told several news outlets that he feels "vindicated". But critics have questioned the validity of Purdue's proceedings, and in particular, the apparent decision to limit its inquiry to internal allegations, yet possibly ignoring the concerns, including fraud, communicated by external researchers in the field.

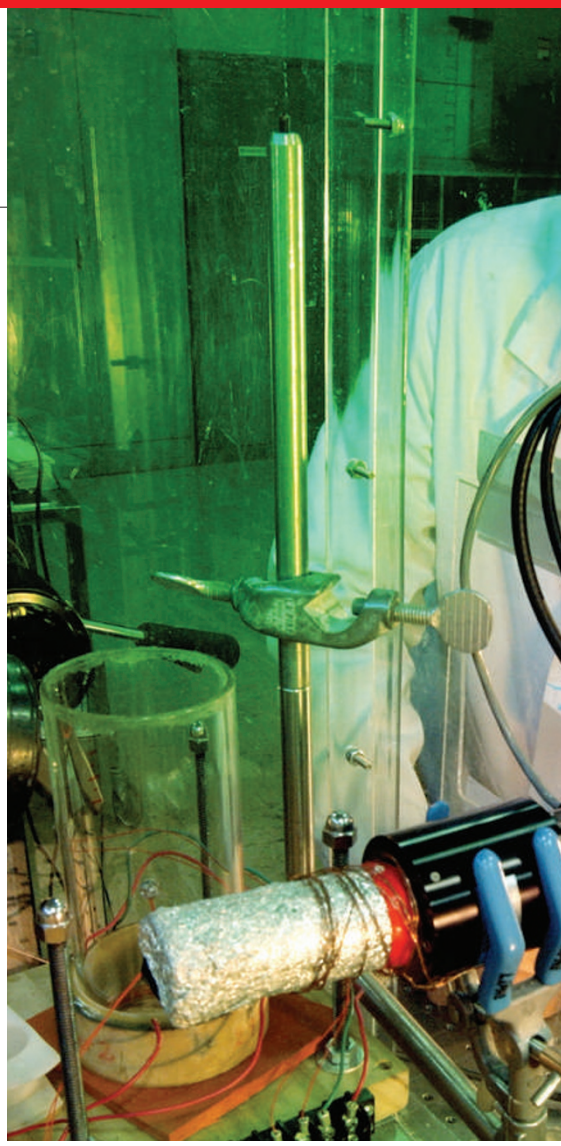
"They apparently narrowly focused the charge and avoided the question of whether the research was doctored," says Ken Suslick, a chemist at the University of Illinois at Urbana-Champaign who has been attempting to replicate Taleyarkhan's claims. Suslick is one of several researchers worried that Taleyarkhan's work may be fraudulent, and he wrote to Purdue about his concerns in June 2006. These include the apparent duplication of data between reports of supposedly independent experiments[4] (first raised by *Nature*), and a report[5] that the spectrum of neutrons that Taleyarkhan claims to have detected from bubble fusion exactly matches that of a standard radioactive source called californium. Taleyarkhan has since replied that when he measures neutrons emitted by californium in his lab, he finds something quite unlike what he sees from his fusion experiments[6]. But a recent preprint points out that Taleyarkhan omitted some of the original spectral data in his reply, and that the full data set still looks like californium[7].

The university never responded to Suslick's concerns. Peter Dunn, Purdue's associate vice-president for research, told *Nature* that he believes the university followed its procedures. He declined to comment on why he never replied to Suslick, or on whether evidence related to Suslick's concerns was forwarded to either inquiry. Purdue hasn't revealed the identities of the members of the second inquiry panel, but Dale Compton, a professor of industrial engineering at Purdue and a member of the first panel, says he has no recollection of being asked to consider the questions about Taleyarkhan's data.

"Purdue's finding is as mysterious as bubble fusion itself."

Lefteri Tsoukalas, who asked Purdue to investigate Taleyarkhan in February 2006, has called the announcement "an outrage". Tsoukalas was head of Purdue's nuclear-engineering school until he resigned in October 2006 in protest at the way the university was handling the concerns. He notes that the usual procedure for handling allegations of scientific misconduct is to hold a preliminary inquiry, then either proceed with an investigation or close the matter. That did not happen in this case; instead, the university ran a second preliminary inquiry. Apart from Tsoukalas, calls by *Nature* have failed to locate anyone who raised concerns about Taleyarkhan's work who was interviewed during either inquiry. "Purdue's finding is as mysterious as bubble fusion itself," says Tsoukalas.

Taleyarkhan, however, strongly defends the university's process. "Purdue University in my opinion and experience has conducted an extremely thorough review and with my full cooperation," he told *Nature*. "Allegations made in the press have been known to Purdue, and the administration's thoughtful conclusions have been well-articulated in their statements."

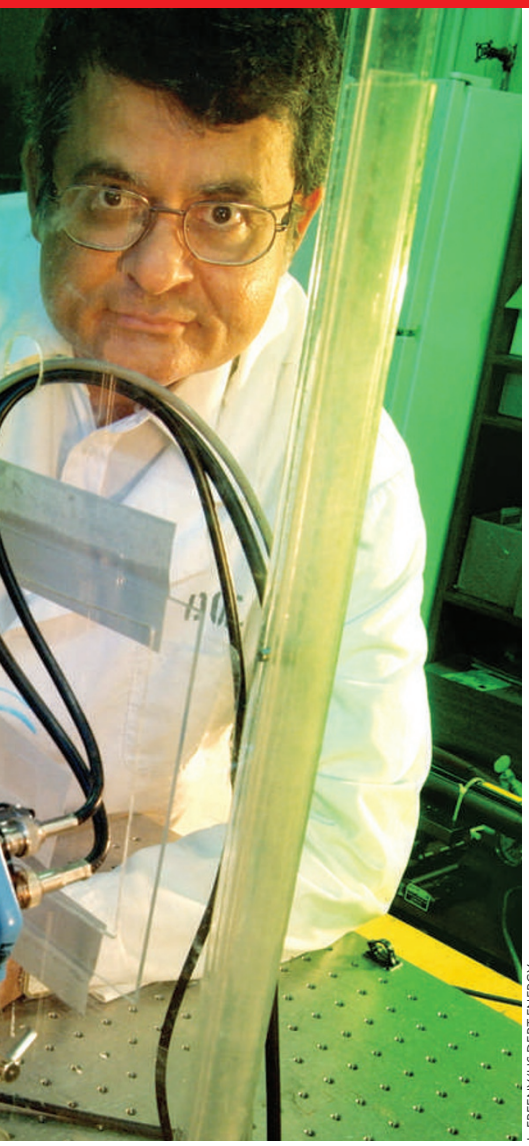


Rusi Taleyarkhan's controversial bubble-fusion findings have been upheld by his university.

Beyond the issue of misconduct, Purdue also makes clear that it endorses the scientific value of Taleyarkhan's work. In last week's press release, vice-president for university relations Joe Bennett stated: "Professor Taleyarkhan is engaged in very promising, significant research, and we hope he will now be able to give his full attention to this important work."

Seth Putterman of the University of California, Los Angeles, who has also been trying to replicate bubble fusion, thinks that Taleyarkhan's work is invalid. "Purdue's defence of Taleyarkhan's approach to scientific research taints their reputation," he says. "If Purdue were interested in maintaining their credibility they should have appointed external members to their panel." Mason, who is ultimately responsible for academic affairs at Purdue, did not respond to *Nature*'s requests for comment.

Purdue's announcement appeared on the



L. FREENY/US DEPT ENERGY

same day as Suslick, Putterman and others reported their attempt to replicate Taleyarkhan's claims in an experiment built to his specifications[8]. They did not find any evidence that fusion was occurring.

Suslick, Putterman and Taleyarkhan had received funding from the US Department of Defense's Advanced Research Projects Agency (DARPA) for a project to test Taleyarkhan's original claims. Taleyarkhan has spent around US$200,000 of this money on his bubble-fusion experiments. A spokeswoman for DARPA, Jan Walker, told *Nature* that although Purdue has not formally notified the agency of the inquiry or its results: "We are aware that an inquiry has taken place and are currently reviewing what, if any, action is required on our part." ■

Eugenie Samuel Reich

1. Xu, Y. & Butt, A. *Nucl. Eng. Des.* **235,** 1317–1324 (2005).
2. Taleyarkhan, R. P. *et al. Phys. Rev. Lett.* **96,** 034301 (2006) .
3. Reich, E. S. *Nature* doi:10.1038/news060306-1 (2006).
4. Reich, E. S. *Nature* **444,** 664–665 (2006).
5. Naranjo, B. *Phys. Rev. Lett.* **97,** 149403 (2006).
6. Taleyarkhan, R. P. *et al. Phys. Rev. Lett.* **97,** 149404 (2006).
7. Naranjo, B. Preprint at http://arXiv.org/physics/0702009 (2007).
8. Camara, C. G. *et al. Phys. Rev. Lett.* **98,** 064301 (2007).

BUBBLE FUSION
Find *Nature*'s March 2006 investigation into bubble fusion online.
www.nature.com/news/bubblefusion

Key biology databases go wiki

Barend Mons's first objective would be ambitious enough for most people: to meld some of the most important biomedical databases into a single information resource. But that's just the beginning. Mons, a bioinformatician at the Erasmus Medical Centre in Rotterdam, the Netherlands, also wants to apply the Wikipedia philosophy. He's inviting the whole research community to help update a vast store of interlinked data. If he and his colleagues can pull it off — and even the project's advocates are not sure they can — they could transform the databases that are central to the work of many life scientists.

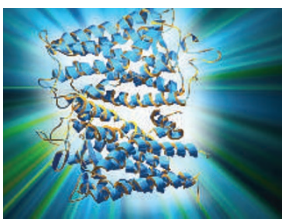
A test version of the project, provisionally dubbed Wiki for Professionals (www.wikiprofessional.info), is due to launch in the next month. It already contains data from key sources, such as protein information from Swiss-Prot and gene descriptions from Gene Ontology. Over the past year, Mons's team has woven together these and other archives to create what, from a user's point of view, seems to be a single database. The page on the muscular-dystrophy protein dystrophin, for example, contains data from Swiss-Prot together with links to disease information from the US National Library of Medicine, as well as explanatory text. Links to relevant publications in PubMed are also available.

Existing databases interlink to an extent, although the new resource is more comprehensive. But the next stage is the really radical bit. Biomedical research produces hundreds of thousands of papers a year, overwhelming database curators. To clear this bottleneck, Mons and his colleagues are allowing anyone to edit the entries, modifying and adding text and links as new work is published.

That's an attractive proposition, say database administrators. Michael Ashburner, a geneticist at the University of Cambridge, UK, helps run FlyBase, a collection of gene data on the model organism *Drosophila melanogaster*. The database receives around US$4 million a year from the US National Institutes of Health and employs up to five full-time curators, but still can't keep up with the relevant literature, says Ashburner, who is working with Mons on the new project. "We have a list of around 12 journals that we try to cover. Even that's tough."

"This will be a revolution."

Anyone motivated to register can curate Wiki for Professionals. Visitors to the dystrophin entry, for example, can update almost any of the information on the page, such as statements about the role of the protein in disease. Users can also start new pages, and from later this year will be given the option of creating pages for themselves, with links to relevant publications. A final function, and the one that most excites Mons, is the availability of text-mining software. This will allow users to probe links between proteins, genes and disease that may be revealed only by comparing a large number of papers and other data.



A. PASIEKA/SPL

Protein databases could be transformed by extra features.

"Mons is a visionary," says Amos Bairoch at the Swiss Institute of Bioinformatics in Geneva, a collaborator on the project and the creator of Swiss-Prot. "This will be a revolution."

Yet realizing the vision will be difficult. Top of the list of challenges is persuading the community to get involved. Adding one's own data is likely to be the biggest motivator — Bairoch and Ashburner say they get several calls a week asking for updates to databases, usually from researchers who want their own papers added. Whether this will be enough to keep the database fresh remains to be seen, given that employers and funders tend not to value updating information highly.

Wiki for Professionals will also have to ensure that additions don't just reflect individual researchers' pet theories. Mons hopes scientists will adopt entries relevant to their work and use automated systems to alert them to changes, which they can then amend if necessary. The original data in Swiss-Prot and other databases will also be protected.

The resource has been set up by Knewco, a scientific computing company based in Rockville, Maryland, and co-founded by Mons. The firm raised around $2 million in private funding to pay for the initial effort, and says basic access will be free. Revenue will be generated by charging drug firms and other users for premium services, such as the option to run a private version of the system incorporating proprietary data. ■

Jim Giles