Preserving Accuracy in GenBank

GENBANK, THE PUBLIC REPOSITORY FOR nucleotide and protein sequences, is a critical resource for molecular biology, evolutionary biology, and ecology. While some attention has been drawn to sequence errors (*1*), common annotation errors also reduce the value of this database. In fact, for organisms such as fungi, which are notoriously difficult to identify, up to 20% of DNA sequence records may have erroneous lineage designations in GenBank (*2*). Gene function annotation in protein sequence databases is similarly error-prone (*3*, *4*). Because identity and function of new sequences are often determined by bioinformatic analyses, both types of errors are propagated into new accessions, leading to long-term degradation of the quality of the database.

Currently, primary sequence data are annotated by the authors of those data, and can only be reannotated by the same authors. This is inefficient and unsustainable over the long term as authors eventually leave the field. Although it is possible to link third-party databases to GenBank records, this is a short-term solution that has little guarantee of permanence. Similarly, the current third-party annotation option in GenBank (TPA) complicates rather than solves the problem by creating an identical record with a new annotation, while leaving the original record unflagged and unlinked to the new record.

Since the origin of public zoological and botanical specimen collections, an open system of cumulative annotation has evolved, whereby the original name is retained, but additional opinion is directly appended and used for filing and retrieval. This was needed as new specimens and analyses allowed for reevaluation of older specimens and the original depositors became unavailable. The time has come for the public sequence database to incorporate a community-curated, cumulative annotation process that allows third parties to improve the annotations of sequences when warranted by published peer-reviewed analyses (*5*).

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3. W. R. Gilks *et al.*, *Bioinformatics* **18**, 1641 (2002).
4. S. Brenner, *Trends Genet.* **15**, 132 (1999).
5. The names of all 256 authors can be found in the Supporting Online Material (www.sciencemag.org/cgi/content/full/319/5870/1616a/DC1).

TECHNICAL COMMENT ABSTRACTS

COMMENT ON "Physical Model for the Decay and Preservation of Marine Organic Carbon"

Bernard P. Boudreau, Carol Arnosti, Bo Barker Jørgensen, Donald E. Canfield

Rothman and Forney (Reports, 1 June 2007, p. 1325) described a model for the decay of marine organic carbon. However, the enzyme deactivation rates required by their model are too fast compared with available data, and the model fails to explain the similarity in observed decay rate constants from different experiments. Alternative models provide equally good fit to the observed temporal trend in decay rate constants.

Full text at www.sciencemag.org/cgi/content/full/319/5870/1616b

RESPONSE TO COMMENT ON "Physical Model for the Decay and Preservation of Marine Organic Carbon"

Daniel H. Rothman and David C. Forney

Fast enzyme deactivation rates are not required by our physical model of organic matter decay. Instead, low effective diffusivities arising from sorption of enzymes and physical protection by minerals are sufficient. Our model predicts observed temporal trends in organic-matter decay rather than specific rate constants. Existing statistical models of intrinsic reactivity explain observed trends empirically but not theoretically.

Full text at www.sciencemag.org/cgi/content/full/319/5870/1616c

Malaria Eradication in India: A Failure?

IN THE 7 DECEMBER 2007 ISSUE, L. ROBERTS and M. Enserink discuss malaria eradication in the News Focus story "Did they really say … eradication?"

In the mid-1950s, I optimistically promoted malaria eradication by promising the Minister of Finance of India that there would be no need to spend money on malaria control in 10 years' time if India matched the USAID grant for malaria eradication. Subsequently, I felt guilty because total eradication had not been achieved. However, comparison of the statements on malaria in the first and 10th 5-year economic plans of India shows the value of investments in malaria eradication.

The first 5-year plan states, "Malaria is the most important public health problem in India and its control should therefore be assigned topmost priority in any national planning. It has been estimated that about a million deaths are caused in India every year by malaria among the 100 million people who suffer from this disease. The economic loss is estimated at several hundred crores (a crore equals 10 million) of rupees every year. Vast fertile areas remain fallow and natural resources remain unexploited, largely due to the ravages of malaria. Aggregation of labor in irrigation, hydroelectric and industrial projects is attended with severe outbreaks of malaria if special steps are not taken for its control. The use of DDT as a residual insecticide has brought about far-reaching changes in the technique of the control of malaria..." (*1*).

Fifty years later, the 10th 5-year plan reports less than a thousand deaths in a population double the size of that in 1950 (*2*). The drop from a million to a thousand deaths underscores the value of the malaria program.

The fact that malaria has been eliminated in the United States and Western Europe and largely controlled in India does not ensure success of eradication programs in Africa. However, there is cause for some optimism, given that the most effective mosquito vector in Africa, *Anopheles gambiae*, has been eradicated in northeast Brazil.

Information from India's 5-year economic plans shows that even if complete eradication cannot be secured, economic gains and reduced suffering may be worth the effort.

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2. Tenth 5-Year Plan (Planning Commission, Government of India, New Delhi, 2002), chap. 2.8, p. 104 (http://planningcommission.nic.in/plans/planrel/fiveyr/welcome.html).

Letters to the Editor

Letters (~300 words) discuss material published in *Science* in the previous 3 months or issues of general interest. They can be submitted through the Web (www.submit2science.org) or by regular mail (1200 New York Ave., NW, Washington, DC 20005, USA). Letters are not acknowledged upon receipt, nor are authors generally consulted before publication. Whether published in full or in part, letters are subject to editing for clarity and space.