



LETTERS

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Putting GenBank Data on the Map

IN AN EARLY PAPER, ALFRED RUSSEL WALLACE (1) LAMENTED THE LACK of geographical precision of naturalists when describing where their specimens were collected: “In the various works on natural history and in our museums, we have generally but the vaguest statements of locality.... [O]n [the] accurate determination of an animal’s range many interesting questions depend.” No modern biologist would disagree, and substantial efforts have established the well-known Darwin Core Standard for biological specimen data (2). Nevertheless, deficiencies in the most basic information associated with biological materials persist, particularly in our modern museum of genetic sequences, GenBank. Researchers deposit sequences in GenBank, either routinely or by journal rules, but an extremely high proportion fail to include the precious information of latitude and longitude at which the specimens sequenced (just 4% of 5000+ for the animals we know best, medusozoan cnidarians) were found (3).

Readers who recall a relatively recent call for minimal information to be associated



with genetic markers (4) might think that the situation has improved. However, even for markers whose variation is commonly used to examine species boundaries and geographic structuring—mitochondrial cytochrome oxidase I gene (COI) and 16S rRNA gene—only 7% of 1000+ deposited since mid-2011 have latitude and longitude (18% list a museum catalog number associated with the original specimen) (3).

There is no excuse for omitting this most basic and valuable information, easily obtainable by GPS or Google Earth. This deficiency wastes money, effort, and opportunities, and hinders scientific precision. Because geographic information and date of collection—easily derived from any device with a clock—are fundamental for biodiversity inferences, GenBank should adopt a mandatory, so-called “Wallace Core” of data necessary for submission: latitude, longitude, and date.

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Beware Side Effects of Research Ethics Revision

THE WORLD MEDICAL ASSOCIATION’S Declaration of Helsinki is one of the most important ethical guidelines pertaining to biomedical research. It was originally adopted in 1964 as a statement of ethical principles in research involving human subjects, addressed primarily to physicians. The Declaration’s roots are in the Nuremberg code, which grew out of the trials against Nazi doctors. Since the first revision of the document in 1975, it has explicitly stated that the interests of the research subject should prevail over those of science and society. It has been modified six times, most recently in 2008 (1). Although it

is not legally binding, it has influenced legislation in many countries and become a cornerstone in research ethics. In October 2011, the General Assembly of the World Medical Association decided to initiate a new revision of the Declaration (2). In the current version, the Declaration states that consent should be required for all research that uses identifiable tissue samples and data. It then adds, “There may be situations where consent would be impossible or impractical to obtain for such research or would pose a threat to the validity of the research.” The proposed revision would strike the phrase “or would pose a threat to the validity of the research” (3). We question this change and believe that further discussion on the issue is needed.

In medical research, the risks must always be weighed against the benefits. When the risks are significant, the interests of the individual should obviously prevail over the interests of society. It is uncontroversial that one person should not be sacrificed for the benefit of the many, a principle reflected in the declaration since 1975. But when the risks are minimal, it is not clear that the individual’s interest in having a say should automatically outweigh the good that can result from robust research. For example, many countries have cancer registries that collect data without consent, because universal inclusion is deemed more important than respecting the preferences of each individual. The proposed change suggests that no research on samples and data is important enough to be conducted

without consent, if it is practically possible to ask for it. From such a perspective, not even major challenges to people's health (e.g., cancer) would be sufficient to outweigh the right of individuals to decide whether their material can be used. Although we acknowledge the value of self-determination, this is a narrow interpretation of research ethics that can affect a wide range of research activities using public health data and sample collections.

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Protecting Privacy for Dual-Use Researchers

WITH THE RECENT REVELATION THAT U.S. intelligence agencies have been broadly tracking electronic communications for years (1, 2), a public discussion regarding the appropriate balance between privacy and security is overdue. The science community, especially those involved in dual-use research, should pay particular attention to how this conversation proceeds.

Historically, dual-use research (such as the nuclear sciences) has been controlled by limiting access, primarily through security clearances and classifying research. However, more recent dual-use research, particularly in the biological sciences, is more difficult to regulate because the knowledge and materials involved are already widely available (3). Thus, self-regulation in the form of educational outreach, professional codes of conduct, and internal review boards is often advocated as the appropriate governance method. These self-governance measures can appear to be grossly insufficient considering the public perception of potential catastrophe if biological dual-use research were to start a pandemic.

In the absence of more active and reassuring oversight, I believe that it is increasingly possible that state intelligence agencies will add monitoring of dual-use research to their counterterrorist activities. The history of dual-use research oversight in the nuclear sciences suggests that policy-makers do not

trust scientific self-governance (4). However, instead of a small group of scientists voluntarily giving up their privacy and some autonomy in order to work in their chosen field, modern surveillance technologies may facilitate the involuntary and unwitting loss of privacy for many scientists working in dual-use research fields.

The U.S. Privacy and Civil Liberties Oversight Board, the primary mission of which is reviewing executive branch counterterrorism activities, has received renewed attention after languishing since its inception in 2004 (5). However, given that none of the board's five members has a connection to the sciences (6), the science community should proactively discuss the effectiveness and desirability of dual-use research surveillance. This important topic should not be left out of the policy debate about acceptable methods of ensuring public safety and privacy.

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TECHNICAL COMMENT ABSTRACTS

Comment on "Invasive Harlequin Ladybird Carries Biological Weapons Against Native Competitors"

Peter W. de Jong, Joop C. van Lenteren, C. Lidwien Raak-van den Berg

We comment on the implications that Vilcinskas *et al.* (Reports, 17 May 2013, p. 862) attach to the finding that the exotic, invasive ladybird *Harmonia axyridis* car-

ries microsporidia to which this species is insensitive but that is lethal to species that are native to the invaded areas. The authors suggest that these microsporidia might serve as "biological weapons" against the native competitors, but we cast doubt on the importance of this suggestion in the field.

Full text at <http://dx.doi.org/10.1126/science.1241745>

Comment on "Invasive Harlequin Ladybird Carries Biological Weapons Against Native Competitors"

Leellen F. Solter, George K. Kyei-Poku, Shajahan Johny

Conclusions about the nontarget effects of putatively invasive pathogens should be based on biologically relevant data. We disagree that the research experiments on a microsporidium isolated from *Harmonia axyridis* conducted by Vilcinskas *et al.* (Reports, 17 May 2013, p. 862) can explain the decline of native coccinellid species in the absence of such data.

Full text at <http://dx.doi.org/10.1126/science.1241600>

Comment on "Invasive Harlequin Ladybird Carries Biological Weapons Against Native Competitors"

John J. Sloggett

Vilcinskas *et al.* (Reports, 17 May 2013, p. 862) proposed that infectious microsporidia of the invasive ladybird *Harmonia axyridis* act against intraguild predators rather than ladybird alkaloid defenses. However, as both microsporidia and the harmonine defense alkaloid were administered to predators by microinjection rather than into the gut, such a conclusion is premature. Alkaloids also provide defense when predation occurs, whereas microsporidia act much later.

Full text at <http://dx.doi.org/10.1126/science.1241827>

Response to Comments on "Invasive Harlequin Ladybird Carries Biological Weapons Against Native Competitors"

Andreas Vilcinskas, Kilian Stoecker, Henrike Schmidtberg, Christian R. Röhrich, Heiko Vogel

Comments by de Jong *et al.*, Solter *et al.*, and Sloggett question the ecological relevance of the abundant microsporidia found in the invasive ladybird *Harmonia axyridis*. We contend that there is abundant evidence that native ladybirds feed on *H. axyridis* eggs and that interspecific microsporidial transfer is a common phenomenon, supporting the proposed role of these parasites as biological weapons.

Full text at <http://dx.doi.org/10.1126/science.1242484>

Letters to the Editor

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