

ZooBank: the open-access register for zoological taxonomy:

Technical Discussion Paper

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Introduction

A proposal for the International Commission on Zoological Nomenclature (ICZN) to establish ZooBank, an open-access, mandatory registration system for descriptions of all new taxa and nomenclatural acts in animal taxonomy was published recently (Polaszek *et al.*, 2005). That paper is effectively an argument for the establishment of a registration system, proposed by 29 currently active zoologists from a variety of backgrounds. The purpose of the present paper is to describe the technical details and possible obstacles to implementing such a system, and to attract comments and discussion from potential contributors and users.

ZooBank - Summary

The widely dispersed nature of taxonomic publications that affect the scientific names of animals is an obstacle to progress in zoology. For example, in entomology alone, there are more than 1100 specialised journals that might contain taxonomically relevant information, and many of these are extremely difficult to access. With advances in bioinformatics answering the need for the more rapid description and cataloguing of our disappearing biodiversity, the necessity for an authoritative name registry is ever greater. *Zoological Record* has been the resource that until now has come closest to answering that need by its annual publication of all those new animal names and taxonomic acts in zoology that come to its attention. The producers of *Zoological Record* are therefore the ideal collaborators, with the International Commission on

Zoological Nomenclature (ICZN), for the development and implementation of ZooBank. *Zoological Record* will act as the primary data collector with ICZN as the independent archiver of the database. The mechanism for doing this is described below.

The scope of ZooBank

It must be emphasised that assessment or judgement of the taxonomic content of a piece of published work, i.e. any form of peer-review, is not part of the function of ZooBank. ZooBank will function as an archived index of zoological names and nomenclatural acts. A statement regarding the availability or unavailability of names will be provided. The full scope of nomenclatural acts indexed by ZooBank remains to be established, but should minimally include newly proposed names, and new nomenclatural acts that affect existing names (as established in the International Code of Zoological Nomenclature).

Registration of Existing Names

Retrospective registration of all existing names is clearly a major attraction of ZooBank, and one for which the collaboration with *Zoological Record* will prove indispensable. *Zoological Record* staff, during routine scanning and databasing of published articles, will supply ZooBank with all the data needed for registration, enabling the ICZN Secretariat to alert authors that their data are being registered. Similarly, *Zoological Record* will be alerted to any overlooked animal names and taxonomic acts via ZooBank. Free access to *Zoological Record's Index of Organism Names* (ION) will enable ZooBank to eventually become a complete database of all animal species. Such a complete list will serve many valuable functions that contribute to increased stability of zoological nomenclature.

Mandatory Registration

In order for ZooBank to be a complete register of animal names and the nomenclatural acts that affect them, registration must be a mandatory requirement for availability according to the Code. A voluntary system, while potentially of some use, would negate the final aim of complete coverage. In the long term, mandatory registration should eventually apply to *all* zoological names and nomenclatural acts. A more practical approach for the short term, however, would be to require registration for all newly proposed names and nomenclatural

acts, while accommodating voluntary registration of previously existing names and acts. Mandatory registration has the added advantage of ensuring that all new names and taxonomic acts are checked for compliance with the Code before they are made available.

Registration as Publication

Several recent initiatives, particularly the NSF-funded Planetary Biodiversity Inventories (PBIs), are attempting to promote taxonomy as a largely web-based discipline (e.g., <http://www.nhm.ac.uk/research-curation/projects/solanum/>). It seems inevitable that in the near future the Code will have to cover solely web-published taxonomic descriptions and nomenclatural acts. One possible response would be the development of a system whereby successful registration on the ZooBank database would be equivalent to publication. However, the implications of equating the act of registration in ZooBank as equivalent to publication via more traditional means (as prescribed in the current edition of the ICZN Code) are substantial, and demand careful consideration by a broad spectrum of the zoological research community.

Paramount among the implications of a "registration=publication" scenario is the issue of peer review. While current provisions for peer review of taxonomic papers are often far from ideal, standards in taxonomy continue to be maintained largely by consensus. The fact that a carefully enforced peer review system would be an essential component of any "registration=publication" initiative provides an opportunity to reform current procedures. International editorial boards appointed for peer review of solely web-based taxonomic publications would need to be appointed to deal with web taxonomic publications in a systematic way. Collaboration with taxon-focussed learned societies could be a first step to the development of such review boards (e.g. International Society of Hymenopterists for Hymenoptera papers; etc), perhaps via the International Union of Biological Sciences (IUBS).

Changing the ICZN Code

Mandatory registration as an additional criterion of availability under the ICZN Code will require substantial changes to several Code Articles. Changes to the Code can be implemented in one of two ways: as amendments to the existing

(4th) edition, or in the context of a new (5th) edition. Introducing registration as a mandatory requirement for all newly established names and nomenclatural acts, while maintaining the current requirement for publication of such names and acts, could be established through amendments to the existing edition of the Code. More sweeping changes, such as equating the act of registration (with peer review) to publication, would probably best be introduced with a new (5th) edition of the Code.

Article 16 of the ICZN constitution provides a clear protocol for introducing amendments that are major changes to the Code. In summary, the proposed amendments (as detailed below) need to be published (e.g. in *Bulletin of Zoological Nomenclature*, and possibly elsewhere) and comments from zoologists received within one year of publication. The International Union of Biological Sciences must be informed, and asked to approve the major changes. The Commission votes on the proposed amendments, and if approved by a two-thirds majority, requests IUBS to ratify the amendments. Alternatively, provisional ratification by IUBS can be requested at the same time as requesting approval (i.e. in advance of voting), in which case ratification becomes effective after the Commission's positive vote. After ratification, the Commission will publish the decision and date on which the ratified amendments come in to force. The entire procedure takes a minimum of 15 months.

The process of drafting the 5th Edition Code has already started, with several aspects of the current edition in need of clarification or alteration. As with previous editions, extensive discussion with the Code's users is essential, but the completion of a 5th edition is targeted for 2008.

Herein we describe two alternative approaches to revising the ICZN Code. The first approach assumes that new names and nomenclatural acts must be published according to rules that are already established in the current edition of the Code, and adds provisions for mandatory registration of new names and nomenclatural acts. These proposed changes are presented in the form of amendments to the existing (4th Edition) of the Code. The other approach represents changes that would not only require mandatory registration of new names and nomenclatural acts, but simultaneously establish a procedure where

the act of registration itself constitutes an accepted form of publication alongside traditional publication of new names and nomenclatural acts. This second approach is presented in the form of changes to the ICZN Code as they would be implemented in a new 5th Edition of the Code. It would be premature in the context of this article to propose changes to the Code that would establish mandatory registration of all existing names; however, mandatory registration of certain existing names would be necessary in some cases, as described below.

Amendments to the current Code to accommodate mandatory registration

The following amendments to the existing (4th Edition) Code would be necessary to minimally establish mandatory registration of new names and nomenclatural acts.

Add Article 16a. Mandatory registration of names published after 2007.

16a.1. All new names and nomenclatural acts published after 2007 must be registered with the Commission within a period of two years from the date of publication to become available (in the case of names) or effective (in the case of nomenclatural acts).

16a.2. If Art. 16a.1. is met, the date of publication is determined according to Art. 21, i.e. the date to be adopted is the date of publication and not the date of registration.

16a.3. If a name is registered more than two years after its publication, the date of publication is the date of registration as determined by ICZN. An author who has missed the two-year registration period can apply to the Commission for backdating the names published to the original date of publication. Lost mail, force majeure, death of author, failings of publishers and similar hardships will be considered for accepting the original date of publication by the Commission.

16a.4. Within a period of two years from the date of publication, a name cannot be declared to be unavailable solely because it is not registered. It has to be assumed that it is available.

Add **Recommendation 16aA. Registration by authors.** Registration is an integral component of the process of publishing new names. Authors must register new names immediately after publication or ensure registration by another person if they are not able to do it themselves.

Add **Recommendation 16aB. Posthumous registration.** If an author dies before registration, or in the case of posthumous publications, editors are requested to register new names with the Commission immediately after publication.

Add **Recommendation 16aC. Late registration by the Commission.** If a name has not been registered two years after its publication, the Commission must be informed. The Commission Secretariat will then register the name.

Amendment to **Article 21.1.:** *Replace* 'Except as provided in Article 3' by: Except as provided in Articles 3 and 16a.3'. *Add:* For names published after 2007 the date to be adopted is stated in the database of registered names.

Add **Article 32.2.3.** The spelling of names published after 2007 that are registered with the Commission can only be changed by use of the Commission's plenary power.

Add **Article 52.8. Homonymy of registered names.** Names registered after 2007 have no precedence over still unregistered older homonyms (regardless of whether the older homonym was published before 2008 or after 2007). If a registered name is a junior homonym, the Commission must be informed immediately.

Add **Article 78.4.6.** register all new names published after 2007, provide an open access database of these names and their original descriptions through the World Wide Web and maintain a paper archive of all original descriptions.

Add **Article 80.10. Database of registered names published after 2007.**

New names published after 2007 must be registered by the Commission with the ZooBank database to be available for nomenclatural purposes. The status of registered names does not differ from the status of names published before 2007. They have no precedence over names published before 2007. The Commission will provide an open-access database, ZooBank, of registered names via the World Wide Web. If the open access or maintenance of this database cannot be provided for longer than 12 months, Article 16a will become inoperative until it is reinstated by plenary power.

Amendment to **Article 83.** Replace 'The Commission is under no obligation...' by: "Apart from the mandatory check for Code-compliance during registration, the Commission is under no obligation....."

The protocol that would be established through ZooBank for registering new names and nomenclatural acts under this procedure is described below, and summarised in Fig. 1.

1. Either prior to or after publication of a new name or nomenclatural act the author (or third party, see below) will log on to the ICZN website (www.iczn.org), or alternative approved site as listed on the ICZN website, and fill in the form provided. This form requests all details of the new name or nomenclatural act required for Code-compliance and to maintain completeness of ZooBank (a postal service will also be available for those without internet access).

2. A "nomenclatural act" includes the following: (i) the suppression of a name; (ii) the proposal of a replacement name; (iii) fixation of a spelling of a name; (iv) an emendation of a name; (v) fixation of a type species; (vi) first inclusion of nominal species in a genus-group taxon; (vii) designation of a lectotype; (viii) designation of a neotype; (ix) citation of the type genus of a family-group name published after 1999.

3. ZooBank will check the submitted details automatically, and the author will receive a response stating whether or not the name or act meets the provisions of the Code, and if a proposed name is a junior homonym. The author will be provided with a unique identifier (reference code: e.g. DOI/GUID/LSID) for each name or nomenclatural act. This identifier will be deposited in ZooBank but inaccessible to the general public until completion of the registration procedure. The identifier will be published in the subsequent paper.

4. After publication, and if available, the author will upload a facsimile file (currently pdf), or submit a reprint or good quality photocopy to the Commission Secretariat, for verification and archiving. Alternatively, the author can provide the registration details by post on a form downloadable from the ICZN website or available from the ICZN Secretariat. These electronic documents, although not mandatory, will become an integral part of ZooBank, and authors, editors and publishers will be strongly encouraged to supply them during the registration process. Copyright issues will need to be negotiated between publishers and ICZN.

5. When the Commission Secretariat has received a copy of the original description or published nomenclatural act, this will be cross-checked with the registration form, checked for Code-compliance, and finally registered. In cases of non Code-compliance, the Commission will contact the author and withhold the registration process until a correction is published.

6. At the point of registration with ZooBank the submitting author will receive confirmation and details of the registration by e-mail or post. The name is now registered and available.

7. Copyright issues allowing, the complete original description will be linked to the registered name in the database immediately, and a paper copy archived in the archive of the Commission.

The proposed registration procedure described above has a number of parallels with the current system for deposition of gene sequence data with GenBank (<http://www.ncbi.nlm.nih.gov/Genbank/index.html>).

Changes to the ICZN for Establishing Registration as Publication

A somewhat more ambitious revision to the ICZN Code, which would both require registration for new names and nomenclatural acts, and simultaneously establish the act of registration as an alternative to, but running concurrently with, current publication requirements, could be implemented in the next (5th) Edition of the Code. Such a scenario would require at least the following changes to the current Code:

*Change to **Article 8.3.** Replace “see Article 8.7.1” by: “see Article 8.8.1”.*

*Change to **Article 8.5.** Add “it” to the end of the sentence*

*Change to **Article 8.5.1** Remove “it” from the beginning of the sentence*

*Add **Article 8.5.2.** is published on durable media, and*

*Change to **Article 8.5.2.** Replace “8.5.2” with “8.5.3”.*

*Change to **Article 8.5.3.** Replace “8.5.3” with “8.5.4”.*

*Change to **Article 8.6.** Add “**and before 2008**” to the first sentence, after “produced after 1999”. Replace “For a work produced after 1999” in the second sentence with “For a work produced between 1999 and 2008”.*

*Add **Article 8.7. Names and nomenclatural acts after 2007.** All new names and nomenclatural acts proposed after 2007 must be properly registered with the official ICZN registry of zoological nomenclature [Article 17]. All such registrations entered after 2007 shall themselves constitute the equivalent of a “published work” as defined in this Chapter, and referenced elsewhere throughout this Code.*

*Change to **Article 8.7.** Replace “8.7” with “8.8”.*

*Change to **Article 8.7.1.** Replace “8.7.1” with “8.8.1”.*

*Change to **Recommendation 8C.** Replace "after 1999" with "between 1999 and 2008".*

*Change to **Article 9.8.** Add "before 2008" after parenthetical.*

*Change to **Article 9.9.** Replace full-stop (period mark) at end with "; or"*

*Add **Article 9.10.** after 2008 any form of information dissemination other than the official ICZN registry of zoological nomenclature [Art. 17].*

*Add **Article 17. Mandatory registration of names and nomenclatural acts published after 2007.***

17.1. Requirements for all names and nomenclatural acts. To be available, every new name and nomenclatural act proposed after 2007 must satisfy the provisions of Article 11 and Articles 13 through 16, and must also be established for nomenclatural purposes via proper registration with the official ICZN registry of zoological nomenclature. Full requirements for proper registration are to be provided at the official registry web site, but shall minimally include items described herein. Items required for both new names and nomenclatural acts include:

17.1.1. indication of the Rank [Art. 1.2.2] to which the newly registered name or nomenclatural act applies;

17.1.2. indication of authorship [Arts. 50, 51] to which the newly registered name or nomenclatural act is attributed;

17.1.3. cross-reference to registration entry for name of family-group taxon in which a registered genus-group name is placed, where that family-group name is known;

17.1.4. cross-reference to registration entry for name of genus-group taxon in which a registered genus-group name established at a subgeneric rank or species-group name is placed;

17.1.5. cross-reference to registration entry for name of species-group taxon in which a registered name established at the rank of subgenus is placed.

17.2. Requirements for registration of names. Registration entries for all names, whether published before 2008 and retrospectively registered

[Arts. 17.4, 17.5], or newly proposed after 2007 shall include, in addition to the items listed in Article 17.1, the following:

- 17.2.1. complete spelling of the name, in accordance with rules established in Articles 25 through 49;
- 17.2.2. cross-reference to registration entry for name-bearing type genus [Art. 63] for new names proposed or published as family-group taxa, name-bearing type species [Art. 67] for new names proposed or published as genus-group taxa, or name-bearing type specimen [Art. 72] for new names proposed or published as species-group taxa [see Article 61.5];
- 17.2.3. cross-reference to registration entry or entries for names of one or more taxa from which the newly proposed taxon is distinguished;
- 17.2.4. description or diagnosis that states in words the characters that are purported to differentiate the taxon [Art. 13.1.1].
- 17.3. **Requirements for registration of nomenclatural acts.** Registration entries for all nomenclatural acts, whether published before 2008 and retrospectively registered [Arts. 17.4, 17.5], or newly proposed after 2007 shall include, in addition to the items listed in Article 17.1, the following:
 - 17.3.1. cross-reference to registration entries of affected names or associated nomenclatural acts;
 - 17.3.2. indication of the particular Code Edition and Article number(s) associated with the proposed nomenclatural act.
- 17.4. **Retrospective registration of names and nomenclatural acts published before 2008.** Except as indicated in Article 17.5, registration is not required for names or nomenclatural acts published before 2008. However, the official ICZN registry of zoological nomenclature accommodates voluntary retrospective registration of names and nomenclatural acts published before 2008. Such retrospective registration shall include, in addition to the items listed in Articles 17.1 through 17.3 (as applicable), the following:
 - 17.4.1. Indication of person(s) and/or organization(s) responsible for providing the information entered into the registry (whether by the original author or authors, or by a third party or parties);
 - 17.4.2. Complete citation details of the publication in which the name or nomenclatural act appeared

- 17.5. **Mandatory retrospective registration of names and nomenclatural acts published before 2008.** Any name or nomenclatural act published before 2008 that is cross-referenced by another registered name, or by another registered nomenclatural act, must itself be retrospectively registered with the official ICZN registry of zoological nomenclature in accordance with Article 17.4.
- 17.6. **Unavailability of unregistered names and nomenclatural acts proposed after 2007.** As established in this Article, all new names and nomenclatural acts must be registered with the official ICZN registry of zoological nomenclature in order to be available. Thus, all scientific names of animals [Art. 1] and all nomenclatural acts relating to such names as governed by this Code that appear in any published or unpublished work after 2007, that are not represented by a corresponding entry in official ICZN registry of zoological nomenclature, are to be considered unavailable.

Add **Recommendation 17A. Cross-reference to registration entry for name of family-group taxon in which a registered subgeneric name is placed.** Whenever possible, a cross-reference to the registration entry for the name of the original family-group taxon in which a genus-group name established at a subgeneric rank or species-group name is placed, should be provided.

Add **Recommendation 17B. Retrospective registration by original authors.** Voluntary or mandatory retroactive registration of names or nomenclatural acts should, whenever feasible, be performed by the original authors of said names and nomenclatural acts.

Add **Recommendation 17C. Retrospective registration of related taxa.** Authors who register names or nomenclatural acts are strongly encouraged to retrospectively register [Art. 17.4] names of all other closely related taxa, when feasible, even if not required by Article 17.5.

Change to **Articles 17-90**, including cross-references thereto. Increase Article number by 1.

Change to Article 22.1. [=21.1] *Replace* "Except as provided in Article 3" with "Except as provided in Articles 3 and 21.9".

Add Article 22.9. [=21.9] **Date of publication for names and nomenclatural acts subject to mandatory registration.**

22.9.1. The publication date of all names and nomenclatural acts proposed after 2007 shall be fixed as the moment at which the complete registration entry for the name or act was submitted to the official ICZN registry of zoological nomenclature [Art. 17].

22.9.2. This date shall be included as part of the registration entry, and established by the ICZN registration service at the time of registration.

22.9.3. If two (or more) new names or nomenclatural acts with mutual cross references [Art. 17] are simultaneously registered, the publication date for both (or all) such names will be identical, and will be set as the moment at which all mutually cross-referencing names have been completely and properly registered.

Example. After 2007, if a new genus-group name and a new species-group name that represents the name-bearing type of the new genus-group name are concurrently registered, each would need to cross-reference the other (the genus-group name would need to cross-reference the new species-group name as its name-bearing type [Art. 17.2.2]; and the new species-group name would need to cross-reference the new genus-group name in which it is originally placed [Art. 17.1.4]). The publication date for both new names would be identical, and would be established by the ICZN registration service as the moment at which the complete registration entry for both names were completed and submitted to the official ICZN registry of zoological nomenclature [Art. 22.9.1, 22.9.2].

22.9.4. Article 22.9 does not apply to names and nomenclatural acts published prior to 2008 that are retrospectively registered [Art. 17.4, 17.5], which retain the original publication date as established in Articles 22.1 through 22.8 above.

Add Article 33.2.3. [=32.2.3]. The original spelling of names proposed after 2007 as registered with the official ICZN registry of zoological

nomenclature [Art. 17] can only be changed by use of the Commission's plenary power.

Add **Article 53.8.** [=52.8] **Homonymy of registered names.** Names registered with the official ICZN registry of zoological nomenclature after 2007 have no precedence over unregistered older homonyms. If a registered name is determined to be a junior homonym, an appropriate nomenclatural act indicating such should be registered.

Add **Article 62.5.** [=61.5] **Registration requirement for name-bearing types established after 2007.** All genus-group names designated as name-bearing types of family-group taxa after 2007, and all species-group names designated as name-bearing types of genus-group taxa after 2007, must themselves be properly registered with the official ICZN registry of zoological nomenclature before they can serve as name-bearing types. This applies equally to name-bearing types published before 2008 and retrospectively registered [Arts. 17.4, 17.5], as well as name-bearing types proposed after 2007 [Art. 17].

Change to **Article 79.4.5.** [=78.4.5] *Replace* full-stop (period mark) at end of sentence with “; and”

Add **Article 79.4.6.** [=78.4.6] maintain a registry to accommodate all new names and nomenclatural acts proposed after 2007, and any names or acts published before 2008 that are voluntarily submitted, and provide an open access database of these names and acts through the World Wide Web.

Add **Article 81.10.** [=80.10] **Database of registered names and nomenclatural acts proposed after 2007.** New names and nomenclatural acts proposed after 2007 must be registered with the official ICZN registry of zoological nomenclature, maintained and administered by the Commission. The status of registered names does not differ from the status of names published before 2007. They have no precedence over names published before 2007. The Commission will

provide an open-access database, ZooBank, of registered names via the World Wide Web. A series of continuously synchronized replicate copies of this database will be distributed among designated institutions throughout the world, with an established ranking such that if the master ZooBank service (located at ICZN) is interrupted, the official registry designation is transferred to the highest-ranking replicate copy that is online and active. Transfer of the active ZooBank registry will be returned to the master ZooBank server after its online access has been fully restored, and it has been re-synchronized with current registry content.

The procedure that would be established through ZooBank for registering new names and nomenclatural acts under this procedure is described below, and summarised in Fig. 2.

1. A taxonomist wishing to register a new name or nomenclatural act would visit the ZooBank service located on the ICZN web site. A dynamic, interactive registration form would guide the taxonomist through the process of entering the necessary information (as specified in Article 17, and/or expanded on the registry web site itself).
2. ZooBank will check the submitted details automatically, and provide the author a unique identifier (reference code: e.g. DOI/GUID/LSID) for each name or nomenclatural act. This code will be deposited in ZooBank but inaccessible to the general public until completion of the registration procedure.
3. After all required details have been entered, and the submitting taxonomist has indicated that the name or nomenclatural act is ready to be officially registered, the primary (master) ZooBank service will propagate the registration entry data to all official replicate copies of the ZooBank database, in the order of their established ranking [ranking would be determined initially as simply the chronological sequence of established replicate servers, but might be modified later as a function of historical reliability of each replicate service]. Each official replicate copy of the ZooBank service would, upon receiving and verifying accuracy of the registration data, send a confirmation back to the primary (master) service.

4. Once the primary (master) ZooBank service has received sufficient confirmations of data replication, the official date and time of registry would be assigned to the registry record, and that date and time value would be propagated (as described above) to all replicate copies of ZooBank.

5. After a registration entry has received its official date and time of registry, the registration procedure would be complete, and the registry entry would be made available to the general public.

Considerations for Discussion:

We propose to establish a prototype of ZooBank, as a collaborative project between ICZN, *Zoological Record* and the Global Biodiversity Information Facility (GBIF). This will provide a voluntary registration service as a proof of concept.

Clearly there are major overlaps with ZooBank in the information content of *ZR*'s Index of Organism Names (ION) and GBIF's Electronic Catalogue of Names of Known Organisms (ECAT). The maximum compatibility between these two databases and ZooBank needs to be aimed for. With unique identifiers (reference code: e.g. DOI/GUID/LSID) appearing with registered names in all three databases.

For the procedure described above, amending the 4th Edition of the ICZN Code to only require mandatory registration of traditionally published names and nomenclatural acts, paper archiving of species descriptions will require resources and space. ICZN is currently in discussions with the Library and Information Services Department of the Natural History Museum (London, UK) to see how such a facility might be jointly developed and funded. Checking published descriptions against ZooBank registration entries will also require additional resources. A business plan is presently being developed to address funding issues.

For the situation described above, establishing the act of registration as equivalent to the act of publication, careful consideration must be given to all aspects of the revised, 5th Edition of the ICZN Code establishing such a procedure.

Under either of these alternatives, the success of ZooBank will depend largely on the willingness of taxonomists to register their work with it. For this reason the registration process must be uncomplicated, and third party registration must also be possible. The three organisations working together on this project, ICZN, GBIF and Thomson Zoological (producers of *Zoological Record*) will exchange information on unregistered data, as well as alerting authors. ZooBank will also provide an alerting service to authors advising them by e-mail of changes in their groups of interest. Extensive documentation and context-sensitive help features, written in easy-to-understand language, will need to be developed and included as an integral component of the ZooBank web site.

Both alternatives also require the resolution of many technical details relating to data integrity assurance, perpetual access (both in terms of continuous day-to-day access and long-term archival access), replication and synchronization, and unique identifiers used as registry keys. Of particular importance for the ZooBank database is access security. The system must be open access such that any taxonomist can register new names and nomenclatural acts with minimal encumbrance. At the same time, the database must be carefully safeguarded against malicious or unintentional hacking, spurious registration entries, and other forms of "data vandalism". The solution will involve a simple one-time user-registration process for any taxonomist wishing to submit registration records, with associated write-access password protection. Procedures for recognizing illegitimate users will need to be established, and a mechanism for enforcement appropriately implemented.

Summary

This discussion document attempts to outline a possible procedure for implementing ZooBank as an open-access, central web-based registry of animal names and taxonomic acts in zoology. Indications to date are that a consensus can be reached among the zoological taxonomic community that such a register is desirable. However, there are many technical aspects that need to be addressed before it can be implemented. In this document we have attempted to include as many of these as we can envisage at this time, but no doubt there is a great deal still to be discussed. We therefore invite all comments on this paper to

be addressed to the dedicated discussion list at:
<http://list.afriherp.org/mailman/listinfo/zoobank-list>