Rakesh Mohan rzoornc@*rediffmail.com*

Taxonomic key

A taxonomic key is a device for quickly and easily identifying to which species an unknown organism belongs.

The key consists of a series of choices, based on observed features of the organism specimen. It provides a choice between two contradictory statements resulting in the acceptance of one and the rejection of the other

A single pair of contradictory statements is called a couplet and each statement of a couplet is called a lead. By making the correct choice at each level of the key, one can eventually arrive at the name of the unknown organism.

TYPES OF TAXONOMIC KEYS:

There are two types of keys:

(a) Dichotomous and

(b) Poly clave (also called Multiple Access or Synoptic).

I. Dichotomous Keys:

Keys in which the choices allow only two (mutually exclusive) alternative

couplets are known as dichotomous keys. In constructing a key, contrasting characters are chosen that divide the full set of possible species into smaller and smaller groups (i.e. the statements typically begin with broad characteristics and become narrower as more choices are required.)

Each time a choice is made, a number of species are eliminated from consideration and the range of possible species to which the unknown specimen may belong is narrowed. Eventually, after sufficient choices have been made, their range reduces to a single species and the identity of the unknown organism is revealed. Dichotomous comes from the Greek root dich meaning "two" and temnein meaning "to cut".

Couplets can be organized in several forms. The couplets can be presented using numbers (numeric) or using letters (alphabetical). The couplets can be presented together or grouped by relationships.

(a) ***Types of Dichotomous Keys:***

There are two types of dichotomous keys. They differ in the method by which the couplets are organized and how the user is directed to successive choices.

(i) Indented Keys (also called yoked):

Indents the choices (leads) of the couplet an equal distance from the left

margin. The two choices of the couplet are usually labelled 1 and 1' or la and lb. It is not necessary that the choices are numbered, but it helps. The user goes to the next indented couplet following the lead that was selected.

(ii) Bracketed Keys:

Provides both choices side-by-side. The choices of the couplet must be numbered (or lettered). It is very helpful if the previous couplet is given. The choices are separated, but it is easy to see the relationships. While this key might be more difficult to construct, it gives more information to the user.

(b) Problems using Dichotomous Keys:

A key may be difficult to use at times because:

I. The key may not include all potential variations in the species;

III. The key may not include "all" species of interest;

IV. One may misinterpret a feature or make a mistake.

ii. Poly Clave Keys:

This key is based on the identification of organisms by a process of elimination. In a written poly clave key there is a series of characters and character states. Each state is followed by a number or code for the species that possess that feature.

The user needs to select any character and then copy down the list of

species that possess the feature. Then the user has to select another character and eliminate any species that is not common to both lists. This process has to be continued until the specimen is identified.

(a) Advantages of Poly clave Keys:

The advantages of a poly clave (multiple-access) key are:

I. They are easy to use.

II. They allow multi-entry i.e. the user can start anywhere.

III. They are order-free i.e. the user can work in any direction with any character.

IV. They are faster.

V. They are easily computerized. In fact, these keys are most commonly used in this form. Paper versions are typically large and unwieldy because each character needs to list all possible taxa.

There are several types of identification keys. The more traditional and probably the most common type is the single-access key, but multi-access and tabular keys are often more useful.

Single-access key

The classical key in biology is a single-access key (also called a "**branching key**"). In this key the sequence and structure of identification steps

is fixed by the author of the key. At each point in the decision process, multiple alternatives are offered, each leading to a result or a further choice. The alternatives are commonly called "**leads**", the set of leads at a given point a "couplet". **If the entire key consists of exactly two choices at each branching point, the key is called dichotomous, otherwise it is described as polytomous.** The majority of single-access keys are dichotomous.

Single-access keys have been in use for several hundred years. They may be printed in various styles (e. g., **linked, nested, graphical**) or used as interactive, computer-aided keys.

Muliti-access keys

A multi-access key allows the user to adapt the key to the particular organism that is being identified. This is very useful when those characters which are necessary for identification are often not all obtainable at a given time for every taxon in a key (especially in keys for identifying organisms).

Multi-access keys may be printed in various way (tabular, matrix, formula style, etc.) but are more commonly used as computer-aided, interactive keys.

In a typical multi-access key the choice of characters used for

identification can be repeated multiple times while in multi-entry keys the free choice of characters is allowed only in the first step.

Examples for multi-entry keys are those created by the FRIDA software, where a single step of selecting one or multiple criteria is followed by a dichotomous key for the species remaining after this step.

Tabular keys

A tabular key is a special key style combining properties of branching and multi-access keys.

Tabular keys are found both in print and as hyperlinked text on the web. They may include illustrations, either through reference, or sometimes directly within the table cells.

SUGGESTION FOR CONSTRUCTION OF TAXONOMIC KEYS:

(a) Constant characteristics rather than variable ones should be used.

(b) Proper measurements rather than terms like "large" and "small" should be used.

(c) Characteristics that are permanent in nature are used to frame couplet. Seasonal characteristics or those seen only in the field should not be used.

(d) A positive choice should be made. The term "is" instead of "is not" should be used.

(e) If possible one should start both choices of a pair with the same word.

(g) The descriptive terms should be preceded with the name of the part to which they apply.

SUGGESTIONS FOR THE USE OF TAXONOMIC KEYS:

(a) Appropriate keys should be selected for the materials to be identified

(b) The introductory comments on format details, abbreviations, etc. should be read before using the key.

(c) Both the leads of a couplet should be read before making a choice.

(d) A glossary should be used to check the meaning of terms, which one does not understand.