

A MediaWiki implementation of single-access keys

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Abstract — Design principles, features, and data exchange options of an open source implementation of single access keys for the collaborative MediaWiki platform are presented.

Index Terms — field guides, flora, fauna, identification tools, *KeyToNature*, social software, SDD, MediaWiki, single-access key, dichotomous key, polytomous key.



1 INTRODUCTION

Among the various forms of computer-aided identification keys (compare [1], [2]), single-access keys have long been neglected, being studied primarily as a printable output from character \times taxon matrices. However, single-access keys may also be used interactively. Examples are Lucid Phoenix [3] (commercial), Frida/Dryades [4] (closed source), and the two *KeyToNature* open source projects: Open Key Editor [5] and biowikifarm [6] “Wiki keys”. The latter implementation, based on JavaScript enhanced MediaWiki [7] templates, is presented here in detail. Its strength is the integration into the collaborative MediaWiki software with much broader applicability for developing floras, faunas or field guides.

2 DESIGN PRINCIPLES

Much of the strength of single access keys derives from information reduction. The information which is actually used in the key (and which must be understood by the user) is only a fraction of the total information present in the descriptions of the taxa.

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In a perfect world with an unlimited number of characters that are convenient and reliable to observe, monomorphic (not variable within species), available for observation at all times, and splitting the remaining taxa into evenly sized partitions, the most reduced identification keys would be the best. In the real world, however, the various imperatives for character selection are in conflict. The resulting keys often use character combinations instead of single characters and may provide verification characters that are not strictly necessary. Similarly, several suboptimal illustrations may be necessary to understand character variability.



Fig. 1 – A Wiki key [8] as part of a wiki page, presented in overview mode (“Step-by-step identification” starts the interactive mode), and with part of the information hidden (“more...” will display the hidden information). The key metadata (Geographic Scope following) are initially displayed, but hideable.

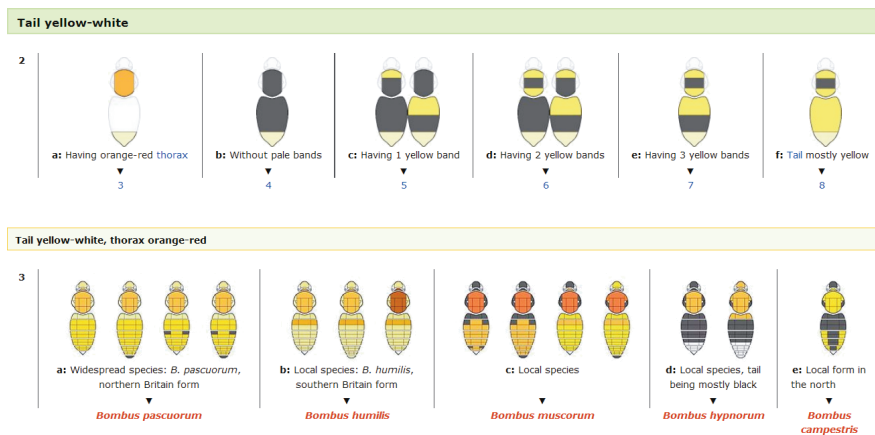




Fig. 2 – A variant wiki template generates a horizontal (side-by-side) layout. Both the horizontal and vertical layout can be used interactively and both provide for sub-headings (“Tail yellow-white”, etc.).

- ▶ Leaves opposite (more...) Continue
 - ▶ Leaves alternate (more...) Continue
-
- ▶ Leaves opposite (show less) Continue

When leaves are borne in pairs, with one leaf on either side of the stem, they are *opposite*. The pairs all line up so the shoot has two rows of leaves. Sometimes the pairs alternate so that the shoot has four rows of leaves. They are said to be *opposite and decussate*. Even if there are no leaves of the tree, you can tell how they will be arranged by looking at the leaf buds.



Twig with leaves opposite.



The buds on this ash twig show the leaves will be opposite
 - ▶ Leaves alternate (more...) Continue

Fig. 3 – Extra information is initially hidden (top). It will be displayed (bottom) after clicking on “more...”.

In the MediaWiki single-access keys, initially only terse lead statements (which should be limited to information strictly complementary within a couplet) and a subset of images are shown (in standard layout, Fig. 1, small previews in a margin plus up to 2 larger images below each lead; in horizontal layout, Fig. 2, up to 8 images above the lead statement).

As a form of “information reduction management”, further information is shown only on request: general remarks, a gallery of up to 8 secondary illustrations, and – for taxa – synonyms, brief diagnosis, occurrence, distribution, and habitat information (Fig. 3).

All images are displayed at a reduced size, sufficient only to enable the user to decide if enlarging is worthwhile. The zoom functionality acts in the page context (Fig. 4). It further provides a link to creator, copyright, and license information, required to be directly accessible by many licenses.

Information hiding is implemented through JavaScript in a graceful degradation design (i. e. without JavaScript, no information is hidden).

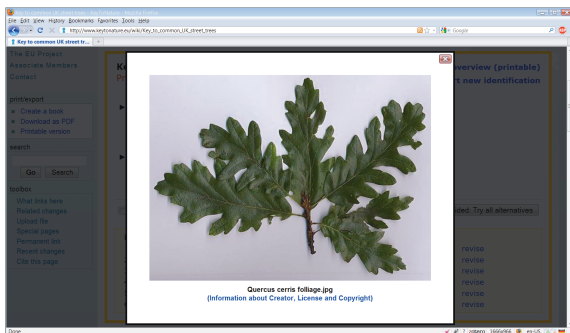


Fig. 4 – Enlarged image as an overlay to the page. At the bottom an image caption and a link to the IPR information (legally required by the Creative Commons licenses) is provided.

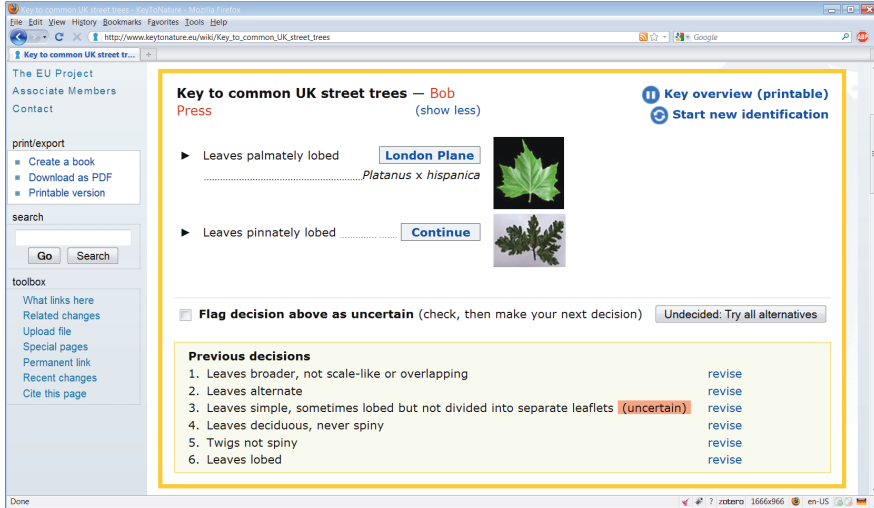


Fig. 5 – Wiki key in JavaScript-based interactive mode. The history of previous decisions is displayed at the bottom, with decision 3 having been marked as uncertain.

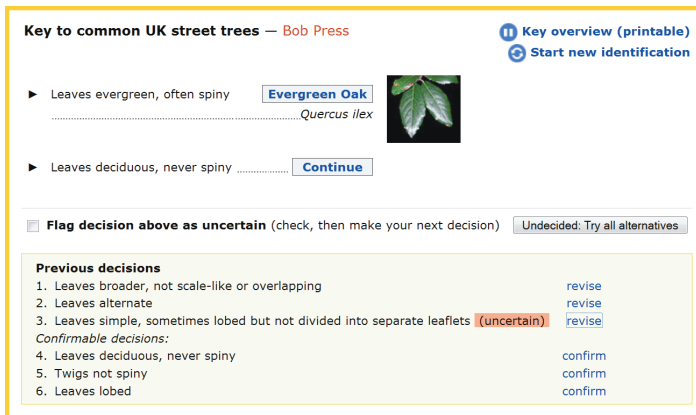


Fig. 6 – Steps in the history or previous decisions are revisable (here step 4 is being revised). Later steps are confirmable and discarded only if a conflicting decision is taken.

3 Interactive step-by-step identification

The printable overview can be switched to an interactive mode. The open source jKey player [9] then displays only a single choice at a time (Fig. 5), helping esp. students to concentrate. To maintain context, a history of previous decisions is provided. Steps are revisable, maintaining progress as long as possible (Fig. 6). The history also helps to verify identifications, since it can be read as a description of the object that is being identified.



Fig. 7 – Display of a glossary definition in an overlay on the web page (not in a separate window).

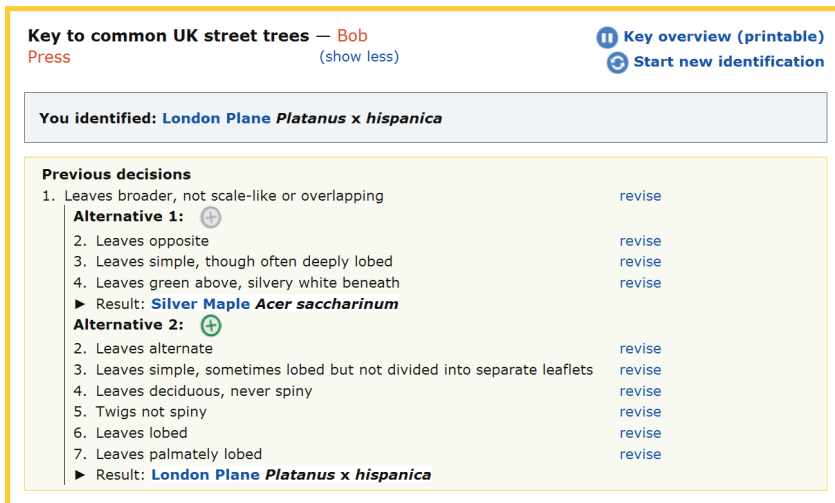


Fig. 8 – After selecting the button: “Undecided: try all alternatives”, multiple alternative paths may be followed.

4 DATA EXCHANGE

The *KeyToNature-Dryades/Frida* system provides a special export format that directly creates text formatted to be pasted into wiki pages as ready wiki text. Wiki keys can further be converted to SDD xml data by a converter created at the Natural History Museum in London.

5 PEDAGOGICAL FEATURES

The single-access keys are supported by several pedagogically relevant features:

1. Illustrated concept definitions and help pages, stored as editable wiki pages, may be accessed from any point in the identification key, providing context-sensitive help. When the user hovers the mouse over a term, the definition opens in a pop-up layer (Fig. 7). From there a new window can be opened if needed.

2. The history allows direct access to and revision of any previous decision. This may occur in a dialogue with the teacher, who can help in reviewing misinterpretations.

3. Users can flag particular decisions as “uncertain” (Fig. 5). Although this does little more than marking a step in the history, it can greatly enhance the student-teacher communication. It allows students to actively seek teacher assistance at a time when he or she is available, while continuing their work in the meantime.

4. The interactive mode offers an option to not take a decision at a given step, allowing users to explore the key in multiple directions. After selecting the “Undecided: try all alternatives” button, the player will continue with the first alternative. However, the history allows the user to switch between alternative branches, recording in all branches (Fig. 8).

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