This manual is a guide how to use *Digiphyll* for determination of fossil leaves.

I. Quick guide

1. Select your leaf traits in **menu "Leaf traits"**, first **tab "Leaf trait selection"** by checking the true checkboxes (tab 1 left); the number of remaining applicable taxa (tab 1 right) depends on the number of chosen traits.
2. Afterwards choose a fossil taxon from the filtered list (tab 1 right) by selecting it in the table.
3. Study the chosen fossil taxon by comparing your fossil to the images in the **"Image gallery"** (tabs 2a and 2b). It may be possible to proceed with the identification (step 1, 2) and to narrow down the list of applicable taxa.
4. Study the **"Fact sheet"** (tab 3) of the chosen fossil taxon.
5. Study the **"Extant analogues"** (tab 4) of the chosen fossil taxon.

II. Step by step guide

0. Preliminary

- If you are not familiar with the leaf morphological terminology please read the **Manual: Leaf Morphological Characters** and/or **Manual: Leaf Cuticle Characters** which are available in the menu *Manuals* online or in the menu Downloads for offline use.
- *Digiphyll* shows the taxa down to the **species level**. However, it does not contain each fossil taxon. It is thus possible 1) that you identified the genus correctly but your fossil specimen belong to a species which is not yet available in *Digiphyll*, or 2) identification is not possible because your fossil belongs to a genus not yet available in *Digiphyll*. Final validation should therefore be made by using the images and – in uncertain cases - by using further literature.

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1. Fossil leaf trait selection (menu *Leaf traits* - tab 1)

- To start with the identification a fossil leaf choose the **menu *Leaf traits*** (tab 1).
- The main panel is now divided into two parts: (1) On the **left** half you can see the leaf trait selection section. (2) In the section of the **right** the filtered (according to you selections) fossil species are listed in the table of fossils.
- In order to **start** a determination you first have to select leaf traits on the left section of the main panel.
- Depending on the available information of your fossil leaf you can select several **macroscopic** and/or **microscopic** leaf traits.
- For macroscopic leaf traits you can choose them from two black collapsed boxes named **Leaf morphological characters** and **Leaf venation characters** respective. For microscopic leaf traits there are three black collapsed boxes **Adaxial Cuticle**, **Mesophyll** and **Abaxial Cuticle** available.
- In order to show the available character states for each character (trait) open the boxes (and also their sub-boxes) by clicking on the **plus sign** at the right end of the boxes. A description of the leaf trait are provided by mouse-over for the **I-icon** (text description) or the **image-icon** (pictogram) which are on the right of each checkbox.

- The traits are ordered from the lowest parts (petiole) up the apical parts (leaf tip) of the leaf. Although the determination of your fossil leaf is independent of the succession of chosen traits we recommend to process in the given order. A trait which is represented in your fossil leaf can by selected by activating the respective **checkbox**. Select only well-identifiable traits for your fossil leaf.
- Some of the leaf traits are organised hierarchically. For example the trait *"leaf organisation compound"* has two sub-hierarchical traits, (1) *"palmately compound"* and (2) *"pinnately compound"*. By selecting a sub-hierarchical trait e.g. "pinnately compound" the corresponding higher level trait "leaf compound" is also selected automatically.
- Depending on your trait selections (checkboxes) the appropriate fossil taxa are listed in the table of fossils on the right half of the main panel. At the beginning of the determination without any selected check boxes all available fossil taxa in the database are listed in the table of fossils. This list of taxa is successive filtered (reduced) depending on your selected traits. Some of your selected traits will reduce the number of appropriate fossil taxa distinctly (in case of rare leaf traits) whereas other selected leaf traits will not reduce the number of fossil taxa noticeable (in case of very common leaf traits). In case of *"No data available in table"* your chosen combination of leaf traits belongs either to a taxon which is not represented in the database so far, or the chosen traits are contradictory.
- On the top of the left section of the main panel you can get a summary of your currently selected leaf traits (button **"show selected traits"**).
- You can start a new identification session by deselecting all currently selected leaf traits (button **"clear selected traits"**). The taxon list in the table of fossils on the right section is reset immediately to show all fossil taxa represented in the data base.
- When you have selected all traits which are identifiable for your fossil, then the filtered taxon list has narrowed down to a number of possible taxa. You can **choose a specific fossil taxon** by clicking it (it is then highlighted in blue) to 1) obtain further information for this taxon, such as fossil images, fact sheets or extant analogues (see below), and to 2) possibly proceed further with the identification. To deselect the blue highlighted taxon in the table click it again.
- If a fossil taxon is highlighted in the table of fossils, all other tabs (tab 2-4) show specific information of the selected taxon.

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2. Image gallery of fossil taxa (menu *Leaf traits* - tab 2a,b)

- Depending on the selection the table of fossil taxa (see above) the following two tabs **"Image gallery (leaf)"** and **"Image gallery (cuticle)"** shows the complete name of the taxon and all available fossil images within the database.
- Mouse-over at an image provides the location (fossil site) where the specimen was found together with stratigraphic information.
- Clicking an image within the gallery opens a high resolution image.
- If you cannot find your specimen among the taxon list after a first round, then it is possible that 1) your fossil leaf belongs to a taxon which is not yet included in *Digiphyll* or 2) there was an error during trait selection. You can then return to the first tab ("Fossil leaf trait selection") and refine and/or check your selected traits (see paragraph 1). Please note that it is also possible that you have identified the correct genus but that your fossil belongs to another species.

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3. Fact sheet of fossil taxa (menu *Leaf traits* - tab 3)

- Depending on the selection in the table of fossil taxa (see paragraph 1) the tab **"Fact sheet"** provides the detailed name of the fossil taxon.
- A detailed description of **leaf morphology**, **palaeoecology**, **stratigraphy** and **distribution data** as well as **references** for the fossil taxon.
- If you cannot find your specimen among the taxon list after a first round, then it is possible that 1) your fossil leaf belongs to a taxon which is not yet included in *Digiphyll* or 2) there was an error during trait selection. You can then return to the first tab ("Fossil leaf trait selection") and refine and/or check your selected traits (see paragraph 1). Please note that it is also possible that you have identified the correct genus but that your fossil belongs to another species.

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4. Extant analogues of fossil taxa (menu *Leaf traits* - tab 4)

- Depending on the selection in the table of fossil taxa (see paragraph 1) the tab "Extant analogue" provides the detailed name of the taxon and information on **living relatives** which are available in the botanical garden of the University of Hohenheim (Germany).
- Detailed descriptions of the **extant species** with leaf morphology, ecology and location within the botanical garden are provided.

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5. Further buttons on the main menu bar (on the left)

- **Glossary:** All botanical terms used in *Digiphyll* are listed and briefly explained in alphabetical order.
- **References:** All literature cited in the manuals, fact sheets and glossary is listed here in detail.
- **Downloads:** Manuals and fact sheets for all fossil taxa considered by *Digiphyll* are provided here.
- **Web links:** Shows a list of other websites, which are relevant to *Digiphyll*, both for fossil and extant plant species.
- **Map:** All fossil sites dealed within *Digiphyll* are presented here.
- **Legal information:** Information of the hosting institution.