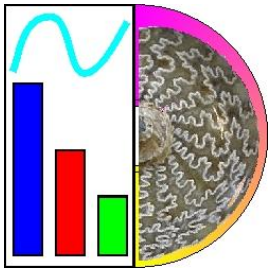


PaleoTax/Graph

Programme Release 2.4 (May 2022)

Content

1 Introduction

1.1 What is PaleoTax/Graph?

PaleoTax/Graph was originally only a tool to visualise the results of data analysis and estimations carried out with the database system Hdb2Win and to produce vector outputs in a versatile format. It was developed in the mid nineties. The Windows version was published in September 2004. The original reason to write this programme was the missed ability of commercial programmes to export graphics in a versatile vector format. The Windows Meta File (WMF) format is easy to write, small and can be imported by many programmes. As vector format, it can be modified after importation by vector graphics editors (Adobe Illustrator, CorelDraw). The first versions of PaleoTax/Graph offered already some basic statistics such as correlation, cluster and factor analysis. Newer versions received more applications. By now, PaleoTax/Graph offers a wide range of tools. Most of them serve for the visualisation of data exported by the database system Hdb2Win. With a few exceptions, graphs are exported in the Windows Meta File format, some applications export in the BMP, JPG, or HTML format. Not all applications of the programme are explained here, only those that are kept update.

Generally, the source files to be processed by PaleoTax/Graph are created by the Interpreter of Hdb2Win, based on data that comes from the database. When you want to prepare a single graph, it is easier to use a spread sheet or vector graphic programme in place to write code for PaleoTax/Graph. Because of the close connection between Hdb2Win and PaleoTax/Graph, all functions of PaleoTax/Graph are integrated into the database programme and can be launched through the Hdb2Win interpreter from version 2.5 on. The most recent Application Library Oliva makes frequent use this option.

Both the database system and PaleoTax/Graph cannot replace sophisticated data analysis and presentation, but it can help to give a rough idea about the data. The used methods are simple but robust. PaleoTax/Graph is more a graphic than a statistic programme.

As for the database system, PaleoTax/Graph can only grow in its functionality when being critical evaluated. Suggestions are therefore very welcome. This concerns also the programmes for data analysis and estimation of the published Application Libraries of the database system (PaleoTax, PalCol, Oliva).

Many applications of version 2.3 are – compared to version 2.2 – profoundly improved, as for instance the Bar Chart, Line Diagram, Table, and Vector programming. Configuration options were increased for all applications.

Version 2.4 encompasses changes and improvements in several applications (with most changes in the Curve, Table, and Polygon applications). For some applications more options are available. An advanced page setting menu is available in some applications that includes also more output formats. The principal menu and most applications are now also in the Spanish language available. The font and font size can be selected globally.

Version 2.5 will include the option to print the graphs. The publication date of this version is not yet defined.

1.2 Conditions of use

PaleoTax/Graph is released as freeware. You may use the software without paying any fee, but you bear the risks involved; the author will not be responsible for the correctness of data or for agreement of the results of analysis with your expectations. Although it cannot be ruled out that updated versions will be sold or service contracts concluded, you will always have the right to work with the free version. At present you cannot advance any claims for support, for the elimination of faults, the improvement of the programme, or training, but the author will endeavour to improve the programme, to speedily remove faults and to advise its users.

1.3 Installation and versions

PaleoTax/Graph is delivered as an independent programme which will be installed together with Hdb2Win in the Hdb2Win programme folder. As mentioned above, the functions of PaleoTax/Graph can be called from the interpreter of Hdb2Win from version 2.5 on. PaleoTax/Graph expect input files with the extension PGR in a plain text format (ASCII/ANSI). The input files are normally produced by Hdb2Win, but can be also produced by any other programme. The first lines of the files contain information about the data and the way how to be processed by PaleoTax/Graph.

From version 2.3 on, PaleoTax/Graph requires a screen resolution of at least 768x1024 pixel. This is an important change compared to version 2.2. All versions of PaleoTax/Graph use the same file format. So you may work with an older programme version if you have got a smaller screen. On screens with a comparably high resolution, the programme may finish with error 3. This is because the operating system "pretends" a small screen. You may fix this with a right-click on the programme; selecting Properties > Compatibility > Change high DPI settings. Mark the box labelled "Disable Display Scaling on High DPI Settings".

This manual describes only a part of the functions of PaleoTax/Graph. Check regularly not only for programme updates but also for updates of the manual. New versions of the programme and the documentation are released with new versions of Hdb2Win.

2 Start PaleoTax/Graph

2.1 Stand alone version

The programme is located in the current HDB2WIN programme directory and its name is PGRAPH2.EXE. During the start of the programme the following errors may occur:

1 The unit HSERR cannot be started. Possible reasons are memory problems or errors in the HSUH unit.

2 The unit HSMES cannot be started. This generally happens when the message (MSG) files are not found.

3 The resolution of the screen is insufficient. It must have at least 768x1024 pixel.

4 The file PGRAPH.ERR could not be found.

5 The HDB2WIN programme folder could not be set.

6 The file HDB2WIN2.MSG or PGR24.MSG could not be found.

7 The file HDB2WIN2.MSG or PGR24.MSG for the selected language could not be found.

8 The data path could not be set.

After starting, the main menu will appear (Fig. 3.1). The programme may run in English, German, and Spanish. For some applications only English labeling is available. You may select your language (English, German, Spanish) from the list. You may also adapt the font and font size for all applications. This works for most, but not for all applications.

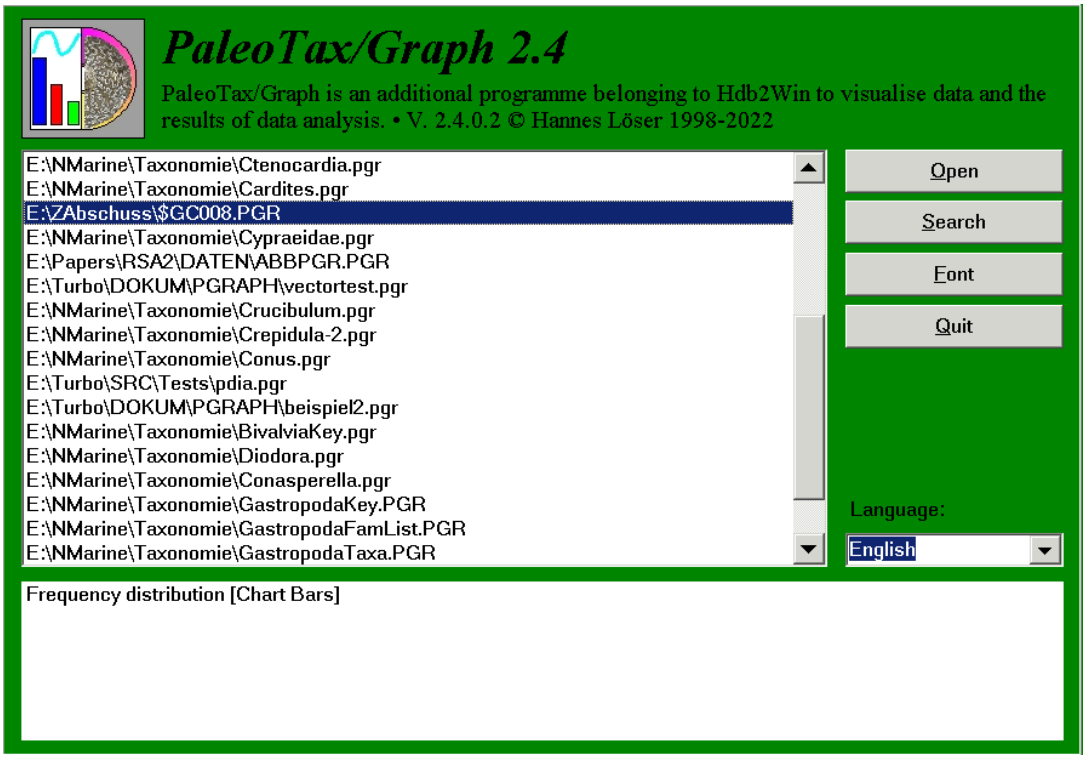


Figure 2.1. Main menu.

Whereas in the upper area a list of previously opened files is shown, a slightly more detailed description is shown in the lower part, with the application in brackets. When you click on **Search**, you may select a file (Fig. 2.2).

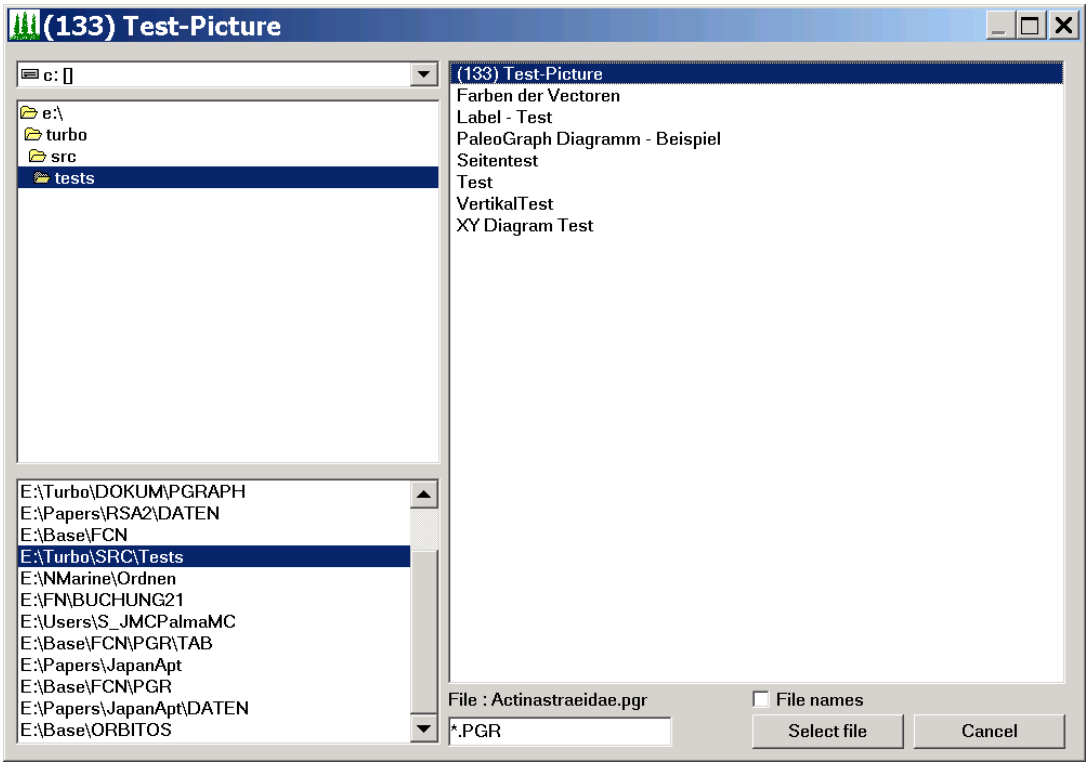


Figure 2.2. File selection.

After selection of one or multiple files, the corresponding application of PaleoTax/Graph will be started. After terminating, the previously selected file will be kept in the file window of PaleoTax/Graph. When terminating the programme and starting again, the list will be reload (as far as the corresponding files are not deleted). **Open** would now display the graph again, **Search** opens again the load file dialog. The **Font** function allows to modify the global font, size, colour and style for the menus in the applications. The modification should work in most applications.

2.2 Start from Hdb2Win

For the moment, PaleoTax/Graph can only be started from the Interpreter of the database system. There is only one command (older commands are still working, but should not be used anymore).

```
GRAPH                <cconst> | &<cvar>[,1]
```

The first parameter (a string constant or a variable with the macro operator) corresponds to the file name. The second optional parameter sets to the auto run mode. This means, the file is loaded and the graph written, without offering the possibility to modify any settings. See below examples:

```
GRAPH                test.pgr
GRAPH                default ; when called from within an application
GRAPH                &filename,1
```

The auto run function works for the moment only for the Bar Chart application of PaleoTax/Graph.

2.3 Output format

The standard output format of PaleoTax/Graph is the Windows Meta File. Depending on the application, different output file formats can be selected.

2.3.1 Vector formats

EMF - Enhanced Windows Meta File

WMF - Windows Meta File

WMF (Windows 3.1 Metafile with Aldus-Header) and EMF (Win32 Enhanced Metafile) are both vector formats. WMF is the older version, EMF the newer. Try with your vector graphic programme which is better for you purposes. If you wish to save the graphs always in the enhanced EMF format, set in the file c:\Users\<username>\AppData\Roaming\Hdb2Win\PGRAPH.INI the value of EnhancedWMF from zero to 1.

2.3.2 Bitmaps

JPG - JPG Bitmap format (a quality selector is shown)

BMP - Windows Bitmap format

Both bitmap formats represent a mere screen copy. The size of the image in pixels is visible in the right upper corner of the preview image. Bitmap files cannot be created without frame because they would loose the correct aspect ratio.

2.3.3 HTML

HTML - Hypertext Markup Language.

HTML files are so far only produced by the Table application. There is no header and footer section; the files contain only the table. The HTML format may also have links to images and other HTML files. See below for more explanation.

3 Input file formats

The files are in the ASCII and ANSI format. The header is in the ASCII format, the data part in ANSI or ASCII. Texts must be in ANSI when containing special characters (äñç). The input file consists of three major parts.

3.1 File title and description

The first line (or optional the first two lines) encompasses a title or short description of the file content and starts with a semicolon, the letter C and a colon. Two lines starting with ;C: indicate that the first line is the title in German and the second line the title in English. The second line is optional. If the file has only one content line, this line is shown. So the first line may be also in French or Swahili.

```
;C: [Title in German]
;C: [Title in English]
```

Example:

```
;C: Korrelation der Gattung X
;C: Correlation of genus X
```

The next (second or third) line contains the description of the file and starts with ;D: . It has up to four parameters, separated by a comma. The first is the application selector, a number. The second denominates the configuration file, the third a possible parameter file, and the fourth any other needed parameter. For explanation on the configuration file see below because the parameters varies, depending on the application.

```
;D: application selector, configuration file, additional file, parameter
```

as for example

```
;D: 4,AW29.CFG,AW29#11.LST
```

The application selector selects the type of graphic. The configuration file stores settings for this specific graphic. The third and fourth parameter can be empty, depending on the application. Some applications may have one or more information lines that starts with #comment. This information is shown in the graph with a different colour. It helps to remember settings of the programme when creating the PGR file.

```
#comment Estimation with a reduced data set
#comment n>=5
```

3.2 Settings

Most applications allow settings within the PGR file. Settings start with the number symbol (#), followed (without space) the name of the setting, a tabulator and the value:

#name value

Example:

```
#Format              12
#TopMargin           20
#BottomMargin        25
```

The example defines the paper format, and the margins. Numerical values can be in the hexadecimal format (that will be principally colours), but need to start with a $ symbol:

```
#LineCol             $FF
```

Note that settings in the data file rule over settings of the configuration file. Settings have no fixed position in the file. They may stand at th beginning or at the end.

3.3 Data

After the settings follows the data. The data format depends on the application. The data are followed by a lead out that indicates the end of the file. This is a single line as follows:

```
; - end
```

A line that starts with a semicolon is a comment. Here it guarantees that the file is read up to its very end. In the case that after the data part follow settings, the lead out should be after the settings.

4 General programme functions

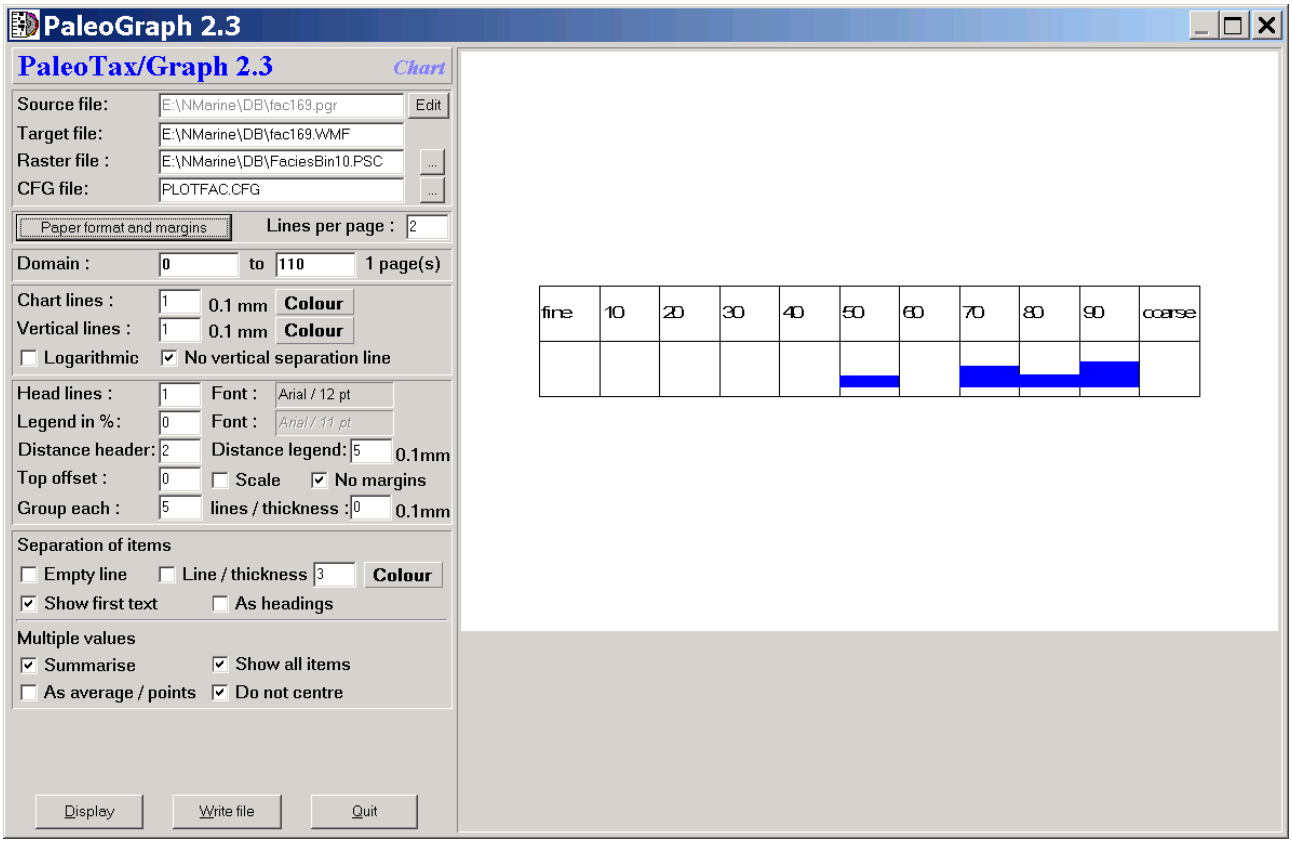


Figure 4.1. Screen shot of the programme.

4.1 Introduction

PaleoTax/Graph includes various applications as mentioned above. You cannot select the application yourself since the programme start the application according to the information in the PGR file. The applications have not got a traditional menu, normally the windows is divided into a (left) option and a (right) preview part (Figure 4.1). Change the options and you see immediately the changes in the right portion of the window.

The preview is only a preview! It may look different when imported into an application (text processor, vector graphics editor). The screen preview depends much on settings of your computer (Figure 4.2). The preview gives you just an impression how your graphic may look like. Generally the graphic looks better when imported into a vector graphics editor or printed.

E:\BASE\FCN\PGR\TAB\ST-HETEROSMILIA.WMF
09.10.2020 12:50:02

Heterosmilia – 17.09.2020			
cy	cmin	cmax	Species (specimens)
1	2.3 - 2.5	2.4 - 3.5	pachythecalium (2)
	3.3 - 5.6	3.8 - 6.2	elmari (7)
	6.5 - 11.1	7.8 - 14.5	sp. 2 (5)
2	4 - 4.6	4 - 4.9	sp. 1 (2)
	8 - 10.7	9.8 - 11.4	spinosa (5)

E:\Base\FCN\PGR\TAB\ST-Heterosmilia
09.10.2020 12:52:00

Heterosmilia – 17.09.2020			
cy	cmin	cmax	Species (specimens)
1	2.3 - 2.5	2.4 - 3.5	pachythecalium (2)
	3.3 - 5.6	3.8 - 6.2	elmari (7)
	6.5 - 11.1	7.8 - 14.5	sp. 2 (5)
2	4 - 4.6	4 - 4.9	sp. 1 (2)
	8 - 10.7	9.8 - 11.4	spinosa (5)

Figure 4.2. What you see (left) and what you get (right).

4.2 General settings

The top of the left setting part of the window is the same in most applications (Figure 4.3). It starts with the programme version, the application name, and four file names: the source file, the target file, an optional parameter file, and the configuration file. You can modify the target file, and select a different the parameter and configuration file. You may edit the source (data) file in some applications. You cannot not edit the parameter and configuration file name. If a configuration file does not exists (which is normal when opening a data file for the first time) it will be created. If a parameter file does not exists, the programme execution is not possible or limited, depending on the application.

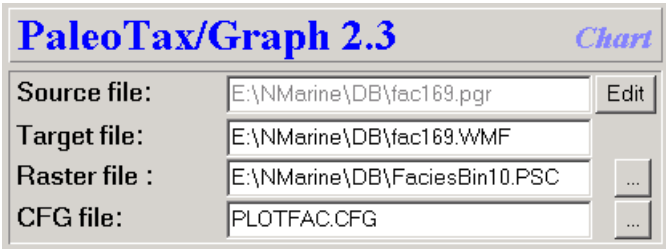


Figure 4.3. File list.

Just below the file list is one button that defines general page setting and in some applications another button that defines the settings of a xy diagram (Figure 4.4).

Figure 4.4. Page and xy diagram settings.

Clicking on the left button opens another window (Figures 4.5 and 4.6).

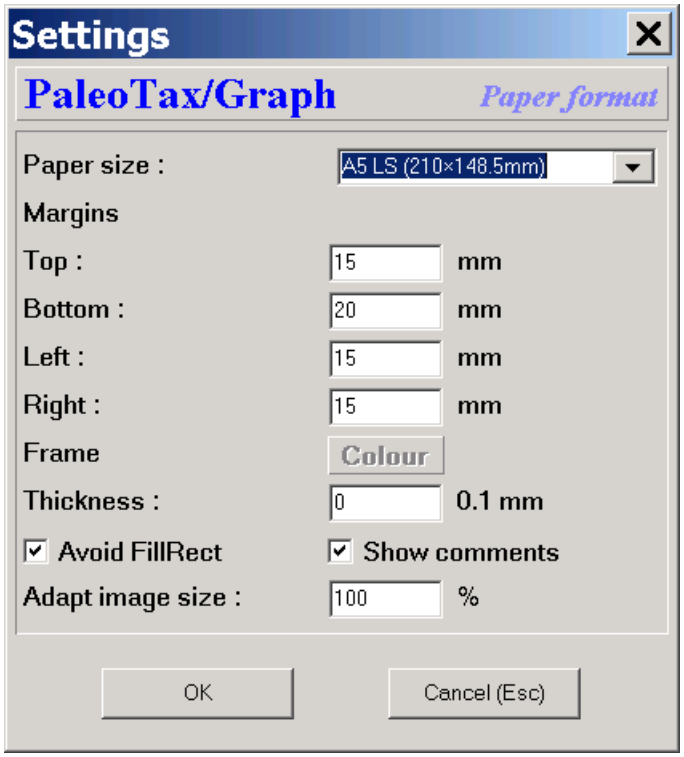


Figure 4.5. Page settings.

Page settings start with the selection of the paper format and the margins. The paper format reaches from the European DIN A5 to DIN A2 format, both in portrait and landscape mode, and covers also other formats such as Letter and Tabloid. A wild format of 20×20cm is also available. It can be defined whether a frame should be placed around the graph, its thickness and colour. If the thickness is zero, no frame is shown. The checkbox 'Avoid FillRect' should be marked if the file import does not work properly. Sometimes the FillRect command is not understood properly. Comments can be switched on and off. In some UHD screens it may happen that your image is smaller than the available space in the windows. You may increase the percentage value in the field 'Adapt image size' to make the image larger.

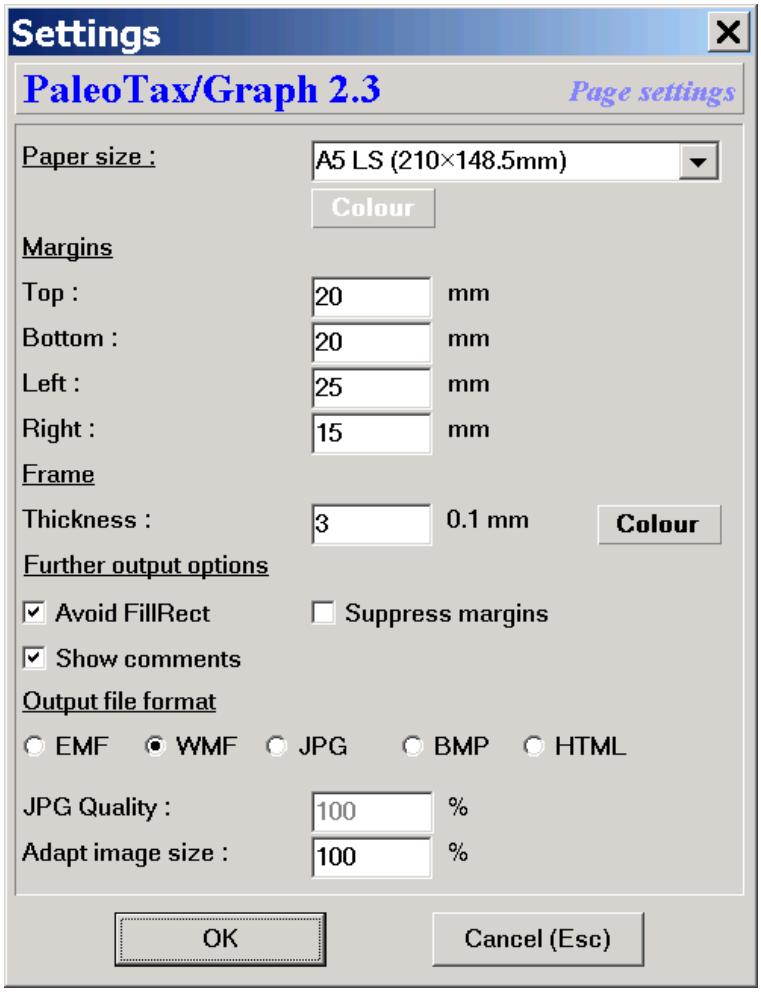


Figure 4.6. Advanced page settings.

Advanced page settings is available with some applications. It start as above with the selection of the paper format (and colour), and the margins. The paper format reaches from the European DIN A5 to DIN A2 format, both in portrait and landscape mode, and covers also other formats such as Letter and Tabloid. A wild format of 20×20cm is also available. Based on the selected paper format and the margins, the size of the resulting graph is calculated. It can be defined whether a frame should be placed around the graph, its thickness and colour. If the thickness is zero, no frame is shown. The checkbox 'Avoid FillRect' should be marked if the file import does not work properly. Sometimes the FillRect command is not understood properly. In the EMF and WMF output, margins can be suppressed completely. This makes sense if you nee the graphic in a specific size and you want to import it as it is, without occupying a whole page. Comments can be switched on and off. The export format may vary from application to application. When JPG is selected, the quality of the JPG export can be defined (where 0 is the worst and 100 the best). In some UHD screens it may happen that your image is smaller than the available space in the windows. You may increase the percentage value in the field 'Adapt image size' to make the image larger. This setting has no influence on the vector graph output.

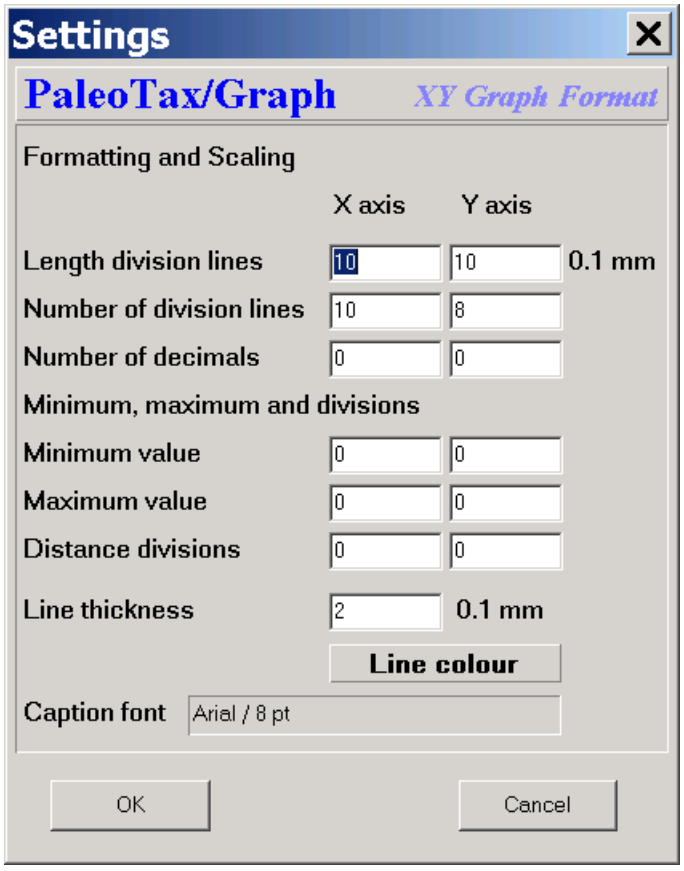


Figure 4.7. Diagram settings.

The second button opens a new window for settings of the xy diagram (Figure 4.7). For each axis you may select the length of the small help lines, their number, and the number of the decimals. In some applications you can define the inner margin (left, bottom) for labelling the axes. You may also define the minimum and value as well the distances between the help lines. You may set the line colour and thickness, as well as the font type.

4.3 Numerical reference

An essential element for several applications is a numerical reference or framework. This is a separate ANSI file with the extension PSC (**P**aleoTax/Graph **Sc**ale). The reference is used to label the X axis. In many programmes of the Application Library PaleoTax it has a time reference:

Framework of stratigraphic data; the standard PSC file (which forms part of the data structure; STANDARD.PSC) looks like this:
Note that the file starts with the youngest age boundary and it ends with the oldest.

```
Pli             -5.1
Mio             -22.5
Oli             -27
Eoc             -54.9
Tha             -62.3
Dan             -65
Maa             -71.3
Cam             -83.5
S               -85.79
C               -89
Tur             -93.5
...
```

This numerical reference file related to time can be created by the PaleoTax Application Library from Service Release 17 (published together with Hdb2Win 2.5.1) on. Probably you should create your own numerical reference file. The table AGEIUGS offer this function and has two data fields to control the output:

"Show with text" - If marked, the text in the field *Ageiugs* is shown. If not marked just a line is shown.
"Include in data estimation" - If not marked neither text nor line are shown, and it is not included into calculation (this is the case only for some programmes, so see the separate manual Estimation-17). When you create your own numerical reference file you surely need to adapt this file because the text is usually too long and need to be abbreviated.

It follows the format <name><tab><-ma>[<tab>colour], where the name of the stage or period is followed by a tabulator and the numeric value. The value always corresponds to the base (lower limit) of the unit. So in the above example, the base of the Danian (Dan) is -65 ma. Stages and periods are abbreviated; later you will see, why. You may modify, add or delete values. It is very important that you compare your own time frame (as recorded in the table AgeIugs in the Application Library PaleoTax) with the PSC file. It is very probable that you need to adapt the PSC file to the GSPS time scale you use.

A detailed stratigraphical PSC may look like this:

```
Cen.            -98.9    FFFF
=Upper          -102.12  40FF00
=Middle         -106.18  DF00
=Lower          -112.2   408000
Albian          -112.2   408000
-               -115.11
#               -116.0
=Upper          -117.07  FFACAC
=Lower          -121     FF7979
Aptian          -121     FF7979
```

A name replaced by a hyphen is not shown in the legend, but as vertical line in some applications. A name replaced by the number sign (#) is not shown at all but used in calculations. A name that starts with = indicates text for the second head line in the Chart application, and a vertical line is also shown. A colour is helpful in some PaleoTax/Graph applications. It must be in the hexadecimal format (see below for a translation).

For a chart that shows any numerical values, the scale looks different, as for instance like this example to the right hand side.

On the left hand side of the line you see the caption, on the right hand side the value. Again, if there is a hyphen in place of a caption, the value will not be shown (but a line).

As you can see, the highest value is always on the top of the list and the lowest value at the end. You should follow this rule.

```
100             100
90              90
80              80
70              70
60              60
50              50
40              40
30              30
20              20
15              15
10              10
5               5
-               4
-               3
-               2
-               1
0               0
```

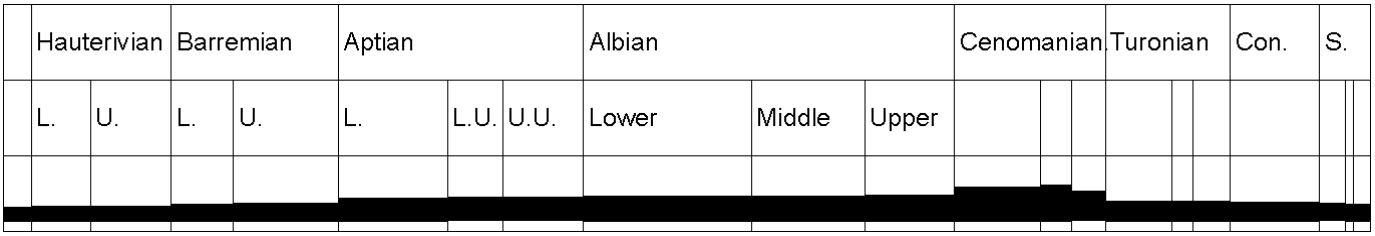


Figure 4.8. Settings in the PSC file is reflected in the head lines.

5 Applications

5.1 Bar chart

The Bar chart module is a versatile tool to show horizontal and vertical bars. It can be used to show the ranges of taxa in time, or to compare values. It offers a wide range of functions. The chart has the form of a table: on the left hand side is a legend, a list of items (such as taxa), and on the right hand side is a field for bars which indicates a numerical value or extend in time. The chart is not restricted to one single page, it may extend over various pages. You need to have a PSC file. The chart application allows the auto-run mode and settings in the source file are applied.

5.1.1 File format

As in any PGR file, there is a header, setting, and data part. The header contains the description of the file:

```
;C: Chart Verbreitung der Gattungen auf der Basis der Arten
;C: Chart Stratigraphical distribution of the genera based on species
;D: 1,GENER2.CFG,STANDARD.PSC
```

The first lines described the file content in German and English, below follows the instruction line for the programme: The first value describes the mode (1 for standard chart, 5 for abundance chart), and the two file names the configuration and raster file. After the header follows the optional settings (see below) and after the settings the data part finished by a lead-out.

In the data part each line corresponds to one item, the labels and values are separated by tabs. The items have the following format

```
<Label1>[<tab><Label2>]<value from><tab><value to>[<tab><colour>[<tab><line
thickness>]]
```

Label1 and label2 are texts, value from and value to are real numbers (that can be negative), colour is a hex value and line thickness an integer value. Data in brackets are optional. If you want to give a line thickness but no colour, enter -1 in place for the colour.

A simple data file looks like this:

```
;C: Distribution of species of the family Negoporitidae
;D: 1,ES65.CFG,E:\base\DETAIL.PSC
#title               Species;Stratigraphy
Negoporites          aff. michelini-97.39      -95.84
Negoporites          aff. quartus  -102.12     -93.99
Negoporites          cf. spissus   -97.39      -93.9
Negoporites          michelini     -97.39      -93.5
Negoporites          quartus -94.71      -93.73
Negoporites          spissus -98.9 -93.9
Negoporites          sp. 1   -97.39      -94.71
Negoporites          sp. 2   -95.84      -94.71
Paractinacis         elegans -89   -83.5
Paractinacis         uliae   -95.84      -83.5
Paractinacis         sp.2    -89   -83.5
Paractinacis         sp.4    -89   -85.8
Paractinacis         sp.5    -97.39      -85.8
Paractinacis         sp.6    -89   -85.8
```

The first label is the genus, the second label is the species, follow by the lower value and the upper value. Note that the values are negative because it is a range in time. As you can see the title may consist of two parts that are separated by a semicolon. Is there only one head line only the first part is shown.

5.1.2 Chart options

The left hand option panel is subdivided in six sub panels.

We were talking already about the file block and the paper format and margins. Right to this button you may define the number of lines per page. Note that header lines also counted. The domain panel shows initially the range of all values in the data file. Let's assume your data file has values from the Jurassic to the Paleogene, but you want to see only the Cretaceous values, you may change the limits.

Next panel defines the thickness and colour of the (horizontal) chart lines and the (vertical) separation lines. A changing colour from bar to bar can be set by activating the Auto checkbox. Thickness of bars can be logarithmic. You may suppress the line that separates the legend from the chart lines. The chart lines can lay above or below the lines that defines the columns.

Next panel defines the number of head lines. A value between one and two makes sense when horizontal, four to five when vertical. Note that only those vertical lines run through the whole image for which a name is available in the numerical reference file. For values that are marked with a hyphen in this file, the lines reach not into to the top, when two head lines are defined. To the right you can define the font for the head lines. The box marked with 'V.' defines the head lines being vertical. In this case the number of head lines should be increased until the heading fits. The legend width is defined as a percent value. It can be zero.

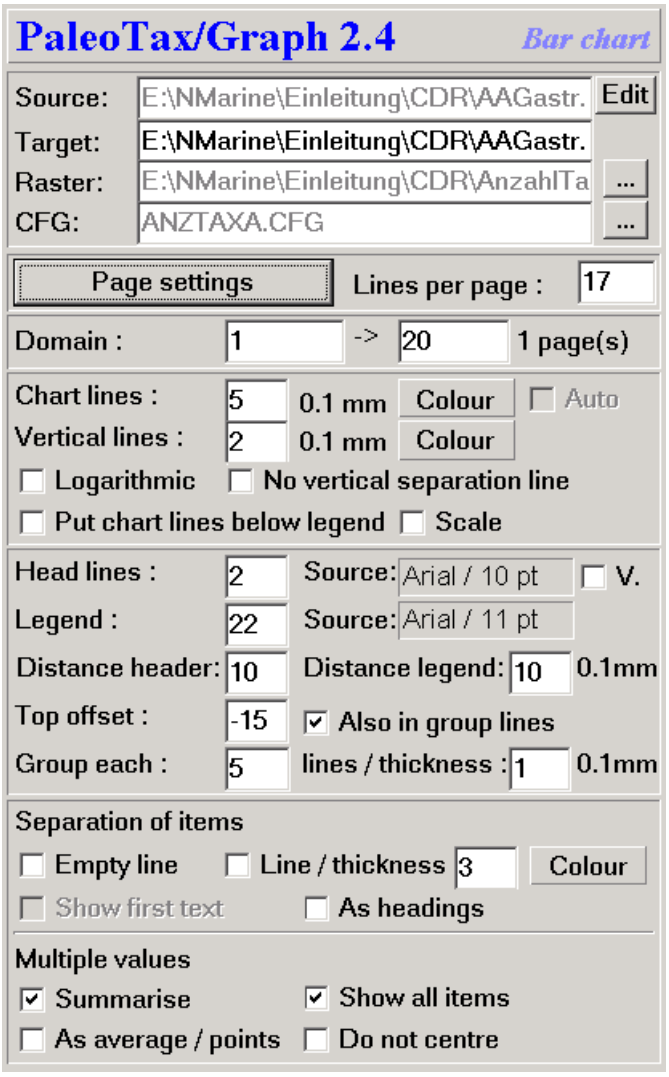


Figure 5.1. Chart control of the Bar chart application.

To the right the legend font can be defined. The distance values defines the space on the left hand side for both the header and legend text. The top offset helps to adjust the distance of the legend text and the chart lines from above. This top offset can be applied to the lines that separate groups of chart lines or not. Chart lines can be grouped and separated by thin lines what makes the graphic easier to read. A scale can be shown on the bottom right of the page.

This last panel offers various options. ‘Separation of items’ defines how groups should be separated. This does only apply if the second text is not empty. As for instance, the first part is the family and the second the genus, or the first part is the genus and the second one the species. Let’s assume the second case: species can be grouped by genera since the output is normally alphabetically sorted. The separation between genera can be by an empty line or by a horizontal line. In the latter case, line thickness (in 0.1 mm) and colour can be defined. If first and second part are present, headings can separated the groups. If the first and the second part are present, the first part can be suppressed in the list (this makes sense if heading is tagged).

In the case of an abundance chart (see below), ‘Summarise’ has to be tagged. ‘Show all items’ means, that all text lines are printed, independently whether the bar is visible or not. This might be the case, when the range was manually adapted and one or various bars become out of range. As for the example from above: a chart was limited to the Cretaceous but a Jurassic genus is shown anyway, even if there is no chart line visible. ‘As average / points’ is only valid for non abundance charts: the average range is calculated and plotted as a dot. ‘Do not centre’ is only for abun-

dance charts: normally the bars are centred, but varying thickness are more obvious when they have an unique baseline, e.g. the bars are not centred.

5.1.3 Settings

Settings start with the number symbol (#) followed (without space) by the name of the variable to be set, a tab, and the value. As for instance

```
#TopMargin<tab>10
```

Colours can be in decimal or hexadecimal format, as for instance

```
#ChartLineColor<tab>$FF
```

Ranges

#Min	Minimal value	real number
#Max	Maximal value	real number

Paper format and margins

#Format	0=DIN A5 (148.5x210mm)	1=DIN A5 landscape (210x148.5mm)
	2=DIN A4 (210x297mm)	3=DIN A4 landscape (297x210mm)
	4=DIN A3 (297x420mm)	5=DIN A3 landscape (420x297mm)
	6=DIN A2 (420x594mm)	7=DIN A2 landscape (594x420mm)
	8=Letter A (216x279mm)	9=Letter A landscape (279x216mm)
	10=Tabloid (279x432mm)	11=Tabloid landscape (432x279mm)
	12=Wild format (200x200m)	integer
#PaperColour	Background colour	integer/hexadecimal
#TopMargin	Top margin (mm)	integer
#BottomMargin	Bottom margin (mm)	integer
#LeftMargin	Left margin (mm)	integer
#RightMargin	Right margin (mm)	integer
#NoFillRect	Different handling	boolean (0/1)
#FrameThickness	Frame and headline thickness (0.1mm)	integer
#FrameColor	Frame colour	integer/hexadecimal
#LinesPerPage	Lines per page	integer
#NoMargins	Suppress the margins	boolean (0/1)
#FileFormat	Output format (0=EMF, 1=WMF, 2=JPG, 3=BMP, 4=HTML)	integer

Formatting of chart lines

#ChartLineThickness	Thickness of bar chart lines (0.1mm)	integer
#ChartLineColor	Colour of bar chart lines	integer/hexadecimal
#Log2ChartLines	Logarithmic	boolean (0/1)
#CLBelowLegend	Draws the chart lines below the legend lines	boolean (0/1)

Heading

#Title	Title in the heading above the legend	text
#ColumLineThickness	Thickness of vertical lines (0.1mm)	integer
#ColumLineColor	Colour of vertical lines	integer/hexadecimal
#ColumTextPt	Text size of the header (pt)	integer
#ColumTextFont	Font name for the header text	string
#ColumTextColor	Text colour for the header text	integer/hexadecimal
#ColumTextStyle	Font style for the header	integer
#InnerMarginTop	Space between frame and text in the header (0.1mm)	integer
#VerticalHeadLine	Head lines are vertical	boolean (0/1)

Legend

#Legend	Percentage of the legend (can be zero)	integer
#LegendTextFont	Font of the legend	string
#LegendTextPt	Font size of the legend (pt)	integer
#LegFontStyle	Font style for the legend	integer
#LegendTextColor	Legend text colour	integer/hexadecimal
#NoSepLine	Suppresses the line that separates legend and chart area	boolean (0/1)
#LineLegend	Shows a scale in the bottom right	boolean (0/1)
#InnerMarginLeft	Space between frame and text in the legend (0.1mm)	integer
#TopOffset	Correction value for lines and the text from above (0.1mm)	integer
#TopOffsetPN	The offset is also applied to the lines that separate groups of bars	boolean (0/1)
#PrimaNotaFrequ	Size of the groups of bar chart lines	integer
#PrimaNotaLineTh	Thickness of separation lines of groups	integer

Grouping

#SeparateByBlank	Separate the groups by a empty line	boolean (0/1)
#SeparateByLine	Separate the groups by a line	boolean (0/1)
#DivLineThickness	...Line thickness (0.1mm)	integer
#DivLineColor	...Line colour	integer/hexadecimal
#TextHeadings	Separate the groups with the name of the group	boolean (0/1)
#ShowAlsoPart1	Show in the chart lines both the group name and name	boolean (0/1)

Multiple data

#SumChartLines	Summarises the values for one item	boolean (0/1)
#ShowAllData	Show also text in the legend of data beyond the defined range	boolean (0/1)
#ShowAverage	Show the average of a line	boolean (0/1)
#DoNotCenterLines	Aligns the bars of one line at the bottom	boolean (0/1)

5.1.4 Bar chart adjustment

If for one item various values are in the source file, there are different ways to handle this. In the simple mode the data are only shown as ranges, in the multiple mode the items are summarised (Figure 5.2)

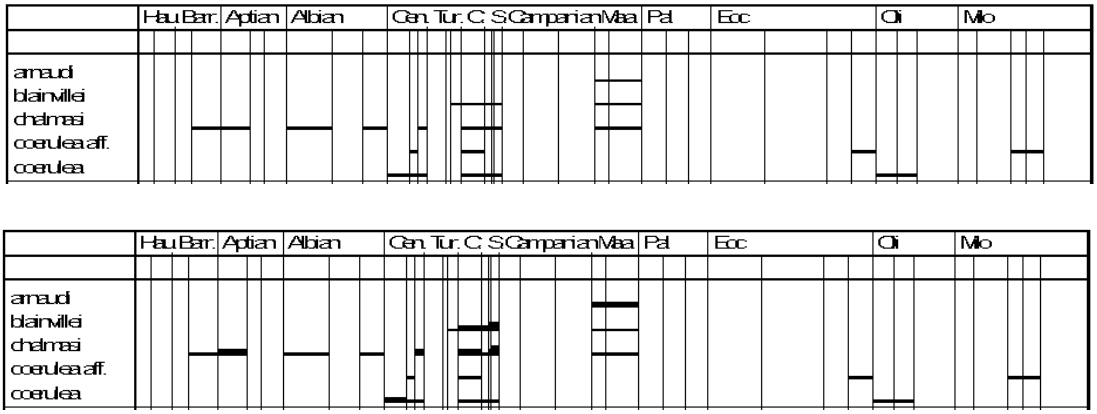


Figure 5.2. Simple mode (above) and multiple mode (below) compared for the same data.

To switch to the multiple mode, the value in the instruction line has to be changed form 1 to 5:

```
;D: 5,GENER2.CFG,STANDARD.PSC
```

When the application code is 5, a small programme (Bar chart adjust) is started (Figure 5.3).

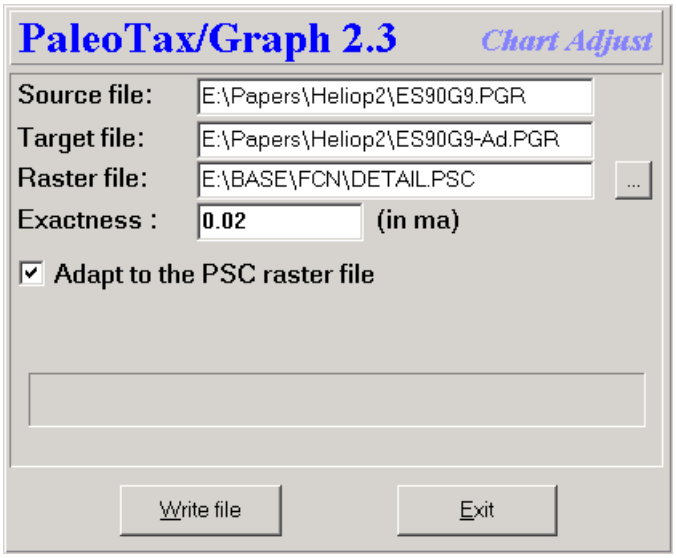


Figure 5.3. Adjustment of data.

The source file and target file are automatically set by the programme. You may change the raster file to get a coarser or finer raster for the display. The value 'Exactness' should be as fine as the values are in your scale. A small value gives finer results but produces more data, a higher value produces coarser output but less data. It is recommended to use a numerical reference file for calculation ('Adapt to the PSC raster file') when available. Click on **Write file**, and the target file will be created and the chart programme will be opened. This looks very strange (Figure 5.4) because values are not yet summarised.

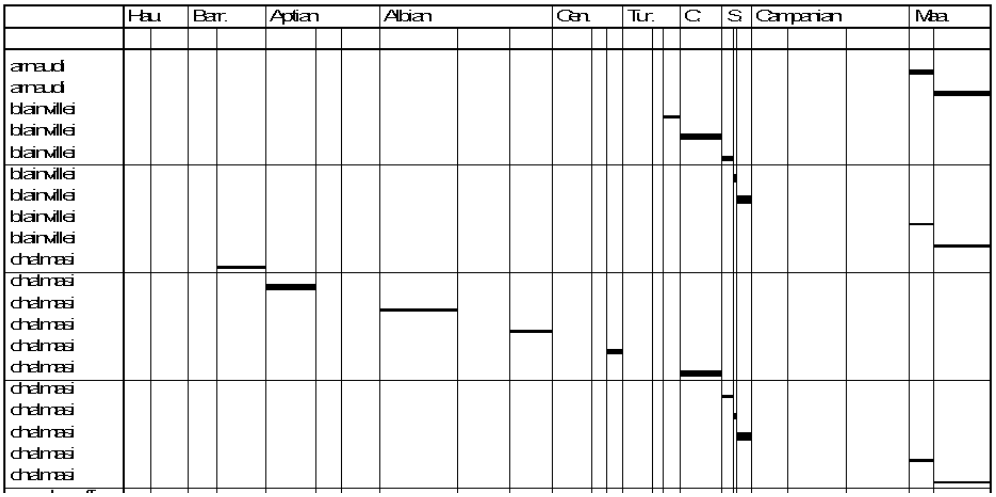


Figure 5.4. Summarised data without correct setting.

Tag the box 'Summarise' below right and get correct details (Figure 5.5).

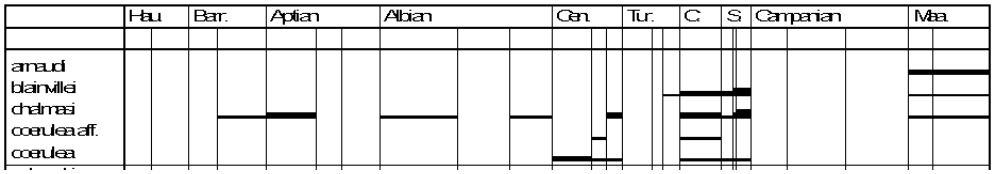


Figure 5.5. Summarised data with correct setting.

If the numerical reference file is too coarse for this chart, you can see some artefacts. It is therefore recommended to use a fine numerical reference file. Please compare directly below for details of the chart programme.

5.1.5 PaleoTax output

Actually exist four profiles which export PGR files showing charts.

5.1.5.1 Species

Stratigraphy from indications (Chart) [Stratigraphie aus Indikationen (Chart)] : Calculates the **range and abundance** for each species from the indications, say from the localities which are assigned to the citations in the literature. - The output is automatically sorted according to current genus and species name.

Stratigraphical distribution (Chart) [Stratigraphische Verbreitung (Chart)] : Displays **only the ranges** of each species as recorded in the species table. You may decide whether the standard range (as calculated for each species based on the indications) or critical range is used. - The output is not automatically sorted and it makes sense, the sort the table according to your need before starting the output.

The difference is, that the first profile gives more information because it values the abundance (chart bars have a differing thickness), whereas the second profile just shows the range and not more.

5.1.5.2 Genera

Stratigraphy based on species range (Chart) [Stratigraphie auf Arten basierend (Chart)] : Equivalent to above, the **range and abundance** for each genera is calculated on the base of the species. Also here, you may select: the standard range (as calculated for each species based on the indications) or critical species range is used. Note that both may differ depending on data recorded. - The output is automatically sorted according to current family and genus name.

Stratigraphical distribution (Chart) [Stratigraphische Verbreitung (Chart)] : Displays **only the ranges** of genera as recorded in the genera table. You may decide whether the standard range (as calculated for each genus based on the indications) or critical range is used. - The output is not automatically sorted and it makes sense, the sort the table according to your need before starting the output.

The difference is, that the first profile gives more information because it values the abundance (chart bars have a differing thickness), whereas the second profile just shows the range and not more. Depending on both methods (with and without abundance data) different procedures are applied.

5.2 Correlation

Correlation means to evaluate the similarity or dissimilarity of objects, events or conditions on the basis of their characteristics. For instance, localities of fossils can be more or less similar under the aspect which fossils are found there. Normally, localities in one and the same facies, which are geographically or stratigraphically closely related, may have also a similar fauna and will show a high correlation. In this example, the localities are the examined individuals (n), and the species are the characteristics (m).

The correlation is based on 1/0 values (species m exists on locality n or not). If two localities are compared, there is a certain number of joint species ("C"), and a certain number of species which do not occur in any of the two localities ("A"). The easiest way ("simple correlation") just looks for a positive correlation, say, only to value the number of joint species. This may give a coarse idea, but it ignores that the absence of certain species may also deliver important information, and it ignores when small to large faunas are compared.

Therefore a high number of various Correlation Coefficients (a good overview give Cheetham & Hazel 1969) exists. PaleoTax/Graph offers only a small number. If your favourite correlation coefficient lacks, please do not hesitate to contact the support. It is easy to incorporate more coefficients.

The following abbreviations are used:

C number of species which occur in both localities

A number of species which does not occur in any of the both localities

N1 number of species present in the first locality

N2 number of species present in the second locality

Nt number of involved species at all (N1+N2-C)

E1 N1-C

E2 N2-C

Of course, instead of localities, genera may be used and instead of species, regions. Any correlation can be applied.

The module expect a source file (extension PGR) and a list file for the true names of examined (n) items (extension LST). When items in the list file are followed by the $ symbol and a hexadecimal value for a colour, a bar with this colour is painted below the line of the dendrogram. The source file has the following format.

First lines of the source file :

```
;C: [Title in German]
;C: [Title in English]
;D: 4,[configuration file],[list file]
```

e.g.

```
;C: Korrelation der Gattungen (Regionen)
;C: Correlation of genera based on regions
;D: 4,GENREG.CFG,GENERA.LST
```

In the description line (;D:) the first number stands for the application type. In the configuration file options for the dendrogram (see below) are saved (and reloaded automatically the next time). It is not necessary that the configuration file exists. The list file contains the names of the individuals (in the example above, the localities).

The header may contain comments that will be printed in the graph with a different colour:

```
#comment Correlation of areas with more than 4 species
#comment March, 12, 2020
```

After the three heading description lines follow the data:

```
 1 1155
 2 1155
```

The first digit (five characters long) refers to the individuals in the list file; the item with the number 1 refers to the item in the first line of the list file. The second digit (5 characters long) is the characteristic (here, the number of the species). Bother digits are not separated ! The format of the line is 1111122222 where 11111 stands for the first digit and 22222 for the second digit.

The maximal number of pairs is restricted to 15,000, the number of individuals to 1,000. The value of individuals and characteristics at all may exceed this value up to 10,000, say, they may not be current numbers. But the maximum of items which can be correlated, is limited to 1,000.

The processing is easy: select one of the methods, and click on **Go!**. The programme offers also the output of a correlation matrix. You have to tick the box and select the number of decimals.

The programme does not only the correlation, it calculates also a cluster diagram using the agglomerative single linkage method (Shi 1993). If successfully processed, the programme outputs a ASCII file with the extension CLT which contains the description of the cluster diagram with the following format:

```
1 13 1.0000000 1
```

The first number (5 digits) indicate the first individual, the second number (5 digits) the second individual, which form a group (cluster) at the value indicated as third number (12 digits) resulting in the cluster indicated as fourth number (5 digits). The individuals are successively added to the diagram until it remains only one item.

The correlation module calls automatically the dendrogram module which opens the CLT file and displays the dendrogram. At the present moment you have no influence on the methods used to build the tree. You may include settings for the Dendrogram application in the source file for the correlation. For details see below.

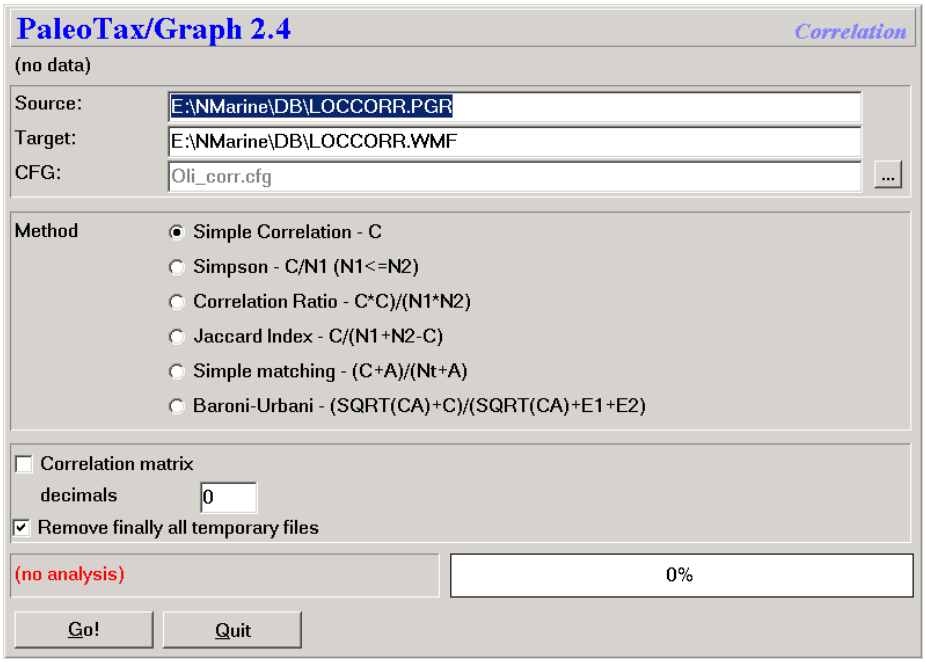


Fig. 5.6. Main menu of the correlation.

5.3 Dendrogram

The dendrogram expects a file with the extension CLT which format is explained above, and the list file. The programme interprets the CLT file and constructs a cluster diagram (dendrogram). The diagram can have a maximum of 4096 individuals and can be distributed on 255 pages (Figure 5.7).

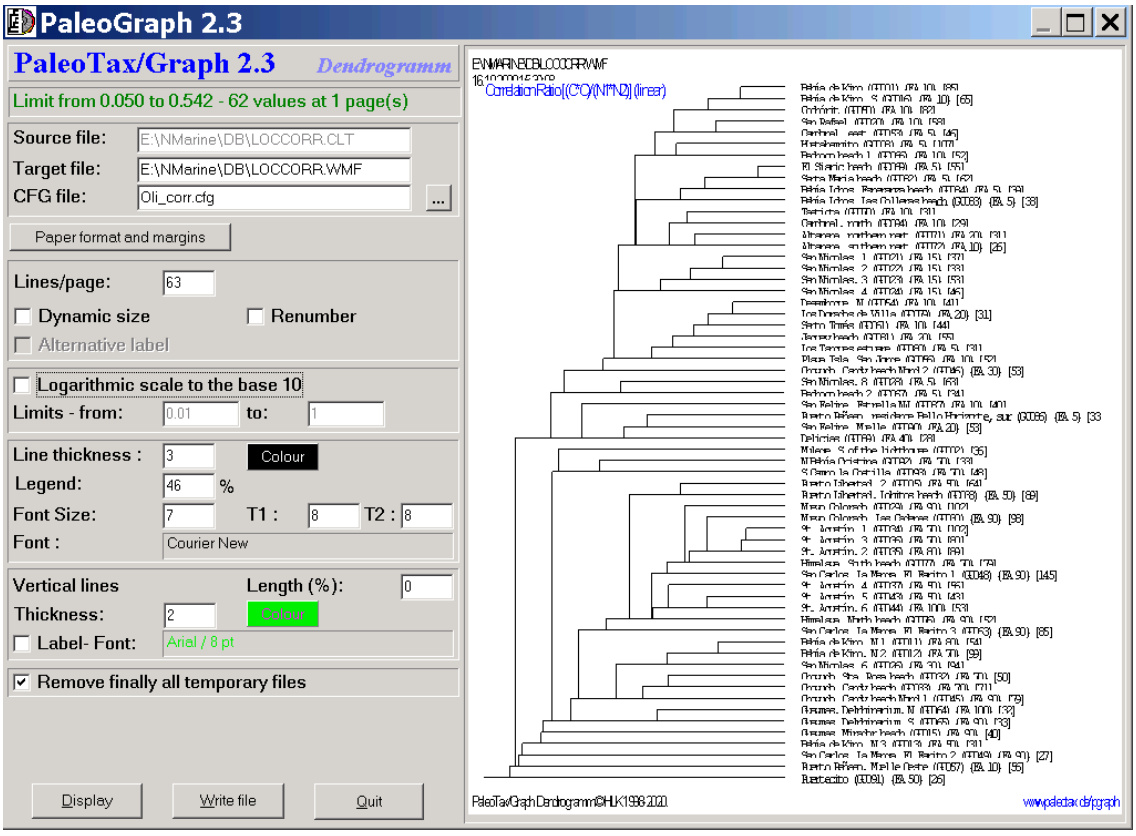


Fig. 5.7. Dendrogram application.

5.3.1 Chart control

The left hand option panel is subdivided in eight panels (Figure 5.8).

When first called, the programme reads the input file and displays the dendrogram using default values. The first panel it shows the number of values, their range, and the number of pages.

The second panel contains the source file (which cannot be modified since it comes from the dendrogram module), the target file and the configuration file.

The third panel defines the paper size and the margins. The fourth panel defines general format settings, as the number of lines per page. The first checkbox adapt the frame size to the number of items (if there are less items on the page than in 'Lines/page' indicated) and the second checkbox changes the labels and number the items currently. The last checkbox can be marked if an alternative label file is available.

In the fifth panel you may define whether the graph should be logarithmic or not. Normally the scale of the graph is linear, but by ticking this checkbox, it can be changed to logarithmic. Sometimes it results in a clearer graph. The limits are defined automatically, but can be set manually as well.

The sixth panel is dedicated to the lines and labels of the graph. The 'Line thickness' is given in 0.1mm units. The colour can be selected in a dialog. The number behind 'Legend' gives the percentage of the text on the right hand side of the graph. A low value gives more space to the dendrogram. The 'Font size' applies when the text is undivided. When the text is separated by a tabulator into two parts, the font size in 'T1' and 'T2' are used, respectively. By clicking in the field behind 'Font : ', the font can be selected.

For orientation, vertical lines can be drawn. The 'Vertical line length' in the seventh panel gives the percentage from the whole page length, measured from above. The thickness is as well in units of 0.1 mm. The colour may be select in a dialog. The checkbox 'Label' should be ticked when labels for the lines are desired; the font can be selected by clicking in the field on the right.

The programme creates a number of temporary files which normally can be removed in the last panel. When clicking on **Display** or hitting **SPACE**, the programme displays the first page. Via **PgDn** and **PgUp**, other pages can be displayed. Clicking on **Write file** force the programme to write the graph in WMF files. For each page, a separate (numbered) file will be created. **Quit** terminates the application.

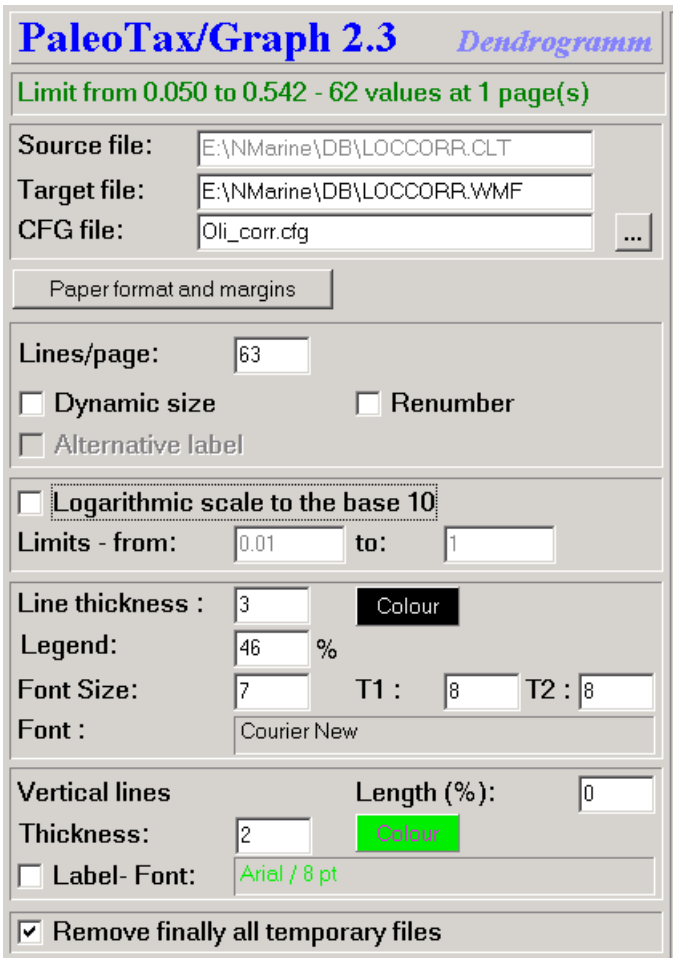


Figure 5.8. Image control of the Dendrogram application.

5.3.2 Settings

Settings start with the number symbol (#) followed (without space) by the name of the variable to be set, a tab, and the value. The settings can be included in programmes that call the Dendrogram application.

Paper format and margins		
#Format	0=DIN A5 (148.5x210mm)	1=DIN A5 landscape (210x148.5mm)
	2=DIN A4 (210x297mm)	3=DIN A4 landscape (297x210mm)
	4=DIN A3 (297x420mm)	5=DIN A3 landscape (420x297mm)
	6=DIN A2 (420x594mm)	7=DIN A2 landscape (594x420mm)
	8=Letter A (216x279mm)	9=Letter A landscape (279x216mm)
	10=Tabloid (279x432mm)	11=Tabloid landscape (432x279mm)
	12=Wild format (200x200m)	integer
#TopMargin	Top margin (mm)	integer
#BottomMargin	Bottom margin (mm)	integer
#LeftMargin	Left margin (mm)	integer
#RightMargin	Right margin (mm)	integer
#NoFillRect	Different handling	boolean (0/1)
#Frame	Frame and headline thickness (0.1mm)	integer
#FrameColor	Frame colour	integer/hexadecimal
#LinesPerPage	Lines per page	integer
#ShowComments	Shows the comments in a separate box on the left upper corner	boolean (0/1)
Labels		
#RenumLabel	Renumbers the labels	boolean (0/1)
#DynamicSize	Adapts the frame to the graph	boolean (0/1)
#AlternativeLabel	Show alternative label (when available)	boolean (0/1)
Logarithmic scale		
#LogValue	Logarithmic scale	boolean (0/1)
#LogBase	Basis of the logarithm (not used)	integer
Formatting of lines		
#LineThick	Thickness of lines (0.1mm)	integer
#LineColor	Colour of lines	integer/hexadecimal
Legend		
#Legende	Percentage of the legend (cannot be zero)	integer
#TextStandPt	Font size of the legend (pt)	integer
#Text1Pt	Font size of the first text (pt)	integer
#Text2Pt	Font size of the second text (pt)	integer
#TextCol	Legend text colour	integer/hexadecimal
Vertical help lines		
#VerticalLines	Shows vertical help lines	boolean (0/1)
#VerticalLabel	Shows labels for vertical help lines	boolean (0/1)
#LegendLineLen	Length (%) of help lines	integer
#LegendLineThick	Thickness of help lines (0.1mm)	integer
#LegendLineCol	Colour of help lines	integer/hexadecimal
#LegendTextCol	Text colour of help line labels	integer/hexadecimal
#LegendTextFont	Text size (pt) of help line labels	integer

5.4 Line diagram

The application shows up to three lines in a chart. Lines can be shown as polygons.

5.4.1 File format

The file header corresponds the typical format.

```
;C: [Title in German]
;C: [Title in English]
;D: 3,[configuration file],[raster file]
```

e.g.

```
;C: Summieren der Arten gemäß ihres Vorkommens an Breitengraden
;C: Summarize species based on latitude occurrences
;D: 3,SUMLA.CFG,SUMLA.PSC
```

A raster file is not needed it makes the graph clearer. A short section encompasses the labels for the graph and the axes:

```
LABEL HEAD;Distribution of species
LABEL X;Latitude
LABEL Y;Number of species
```

Optional a box describing the graph can be shown:

```
LABEL LINE1;Genera
LABEL LINE2;Species
```

The data part has the format:

```
DATA;x-value;y-value[;second y-value[;third y-value]]
```

The values are separated by a semicolon (;). The values can bei either lines or polgyons; this can be defined with the keyword format, followed by a semicolon, the number of the graph, a semicolon, and the type:

```
FORMAT;1;Polygon
FORMAT;2;Line
```

The second and third value are optional. For the x-axis a minimum and maximum value can be indicated:

```
#min<tab>20
#max<tab>40
```

5.4.2 Chart control

The first panel contains the source file, the raster file, the configuration file, and the target file. The second panel defines at the left hand side the paper size and the margins, and one the right hand side the options for the diagram.

The third panel defines the thickness of all lines, in the field right to the line thickness it can be defined whether lines on the top should be thinner. In the next line the colour of the various lines are defined. The graph can be shown as square cut, and as polygon. Is 'Return line' activated, the line starts at and returns to zero in the y-axis. This setting has no meaning for polygons because they always return to the y-axis. The numerical values of the graph can be shown, the font and font size can be defined. A raster of vertical lines can be added as well as a box with more descriptive data below the x-axis. If the box 'X-axis without labelling' is tagged, the x-axis will have no labels at all and a eventually existing legend box will be shifted close to the axis. The fourth panel allows to modify the labels, font and font size.

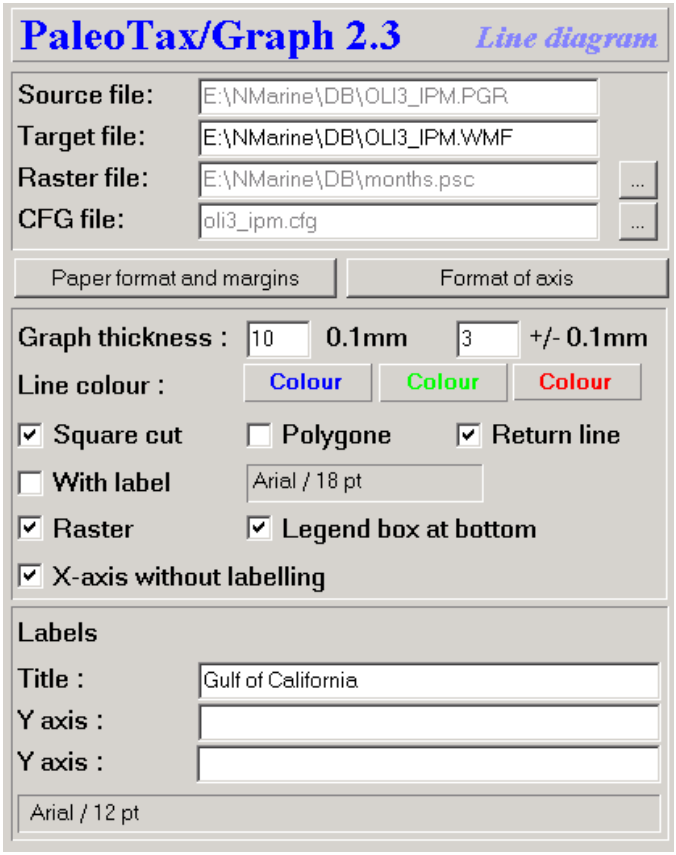


Figure 5.9. Chart control of the Line diagram application.

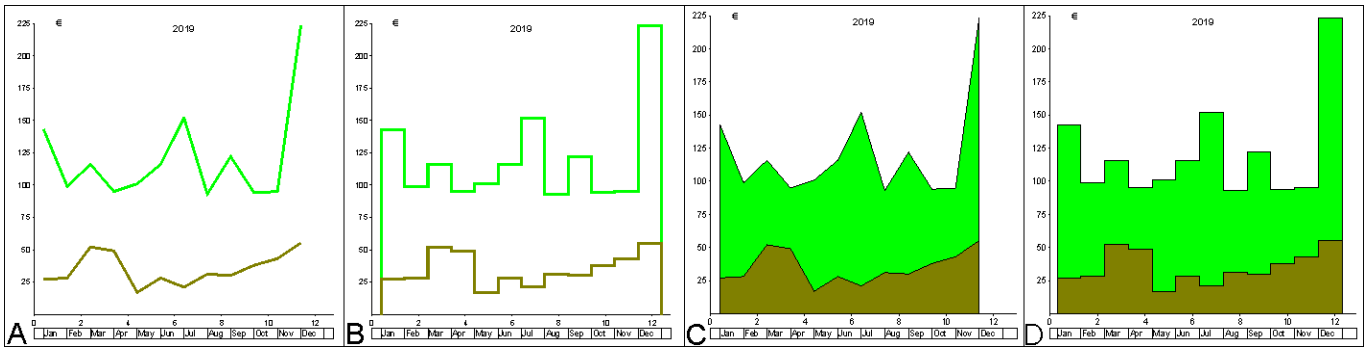


Figure 5.10. Different types of the Line diagram. A, normal line; B, square cut; C, polygon normal; D, polygon square cut.

5.4.3 Settings

Settings start with the number symbol (#) followed (without space) by the name of the variable to be set, a tab, and the value. As for instance

```
#TopMargin<tab>10
```

Colours must be in decimal or hexadecimal format, as for instance

```
#LineColor<tab>$FF
```

Ranges (x-axis)

#Min	Minimal value x-axis	real number
#Max	Maximal value x-axis	real number

Paper format and margins

#Format	0=DIN A5 (148.5x210mm)	1=DIN A5 landscape (210x148.5mm)
	2=DIN A4 (210x297mm)	3=DIN A4 landscape (297x210mm)
	4=DIN A3 (297x420mm)	5=DIN A3 landscape (420x297mm)
	6=DIN A2 (420x594mm)	7=DIN A2 landscape (594x420mm)
	8=Letter A (216x279mm)	9=Letter A landscape (279x216mm)
	10=Tabloid (279x432mm)	11=Tabloid landscape (432x279mm)
	12=Wild format (200x200m)	integer
#TopMargin	Top margin (mm)	integer
#BottomMargin	Bottom margin (mm)	integer
#LeftMargin	Left margin (mm)	integer
#RightMargin	Right margin (mm)	integer
#NoFillRect	Different handling	boolean (0/1)
#FrameThickness	Frame and headline thickness (0.1mm)	integer
#ShowComments	Shows the comments in a separate box on the left upper corner	boolean (0/1)
#FileFormat	Output format (0=EMF, 1=WMF, 2=JPG, 3=BMP)	integer

Chart design

#LineColour	Colour of lines	integer/hexadecimal
#HelpLineXLen	Length of legend help lines x-axis (0.1mm)	integer
#HelpLineXNum	Number of legend help lines x-axis	integer
#DecPointX	Number of decimals in labels x-axis	integer
#HelpLineYLen	Length of legend help lines y-axis (0.1mm)	integer
#HelpLineYNum	Number of legend help lines y-axis	integer
#DecPointY	Number of decimals in labels y-axis	integer
#TextColour	Text colour of the legend	integer/hexadecimal
#TextPt	Font size of the legend (pt)	integer
#TextFont	Font name of the legend	string

Graphs

#LineThickness	Thickness of lines (0.1mm)	integer
#Line1Color	Colour of the first line	integer/hexadecimal
#Line2Color	Colour of the second line	integer/hexadecimal
#Line3Color	Colour of the third line	integer/hexadecimal
#LineLabel	Shows the numerical values	boolean (0/1)
#LLabelColour	Colour of numerical values	integer/hexadecimal
#LLabelFont	Font of the numerical values	string
#LLabelPoint	Font size of the numerical values (pt)	integer
#RectangleMode	Shows the lines in the square cut	boolean (0/1)

#Polygon	Shows the lines as polygons	boolean (0/1)
#Indention	Returns the line to the zero value of the y-axis	boolean (0/1)
#DrawRaster	Shows vertical lines	boolean (0/1)
#LegendBox	Draws a box with more data below the x-axis	boolean (0/1)
#NoXScale	Suppresses labelling of the X-axis	boolean (0/1)

Text labels

#Xlabel	Label of the x-axis	string
#Ylabel	Label of the y-axis	string
#Header	Header of the chart	string
#LabelColour	Colour of the labels	integer/hexadecimal
#LabelPoint	Font size of the labels (pt)	integer
#LabelFont	Font of the labels	string

5.5 Polygon

The Polygon application compares to the above Line diagram but is more complex. The x-axis represents generally the time and is structured by a numerical reference file described above. The Polygon application offers two different modes; both were originally designed to illustrate the abundance of taxa (such as genera or families) through time.

The standard mode shows the success of the groups of taxa that evolved in a certain time span. The extended mode compares the richness of taxa of higher-ranking taxa, as for instance the richness of families in genera, or the richness of genera in species. The resulted graph is a group of polygons in different colours. The creation of the source files is comparably easy. In the standard mode, the results depend much on the design of the numerical reference. In both modes the time data must correspond to the numerical reference file. When the chronostratigraphic data in the database are adapted to a new Geological Time Scale, the numerical reference file must be modified as well.

The polygon application was improved with version 2.3.1 of the programme. For the Hdb2Win Application PaleoTax is more information available about data estimation which results are shown in polygons.

5.5.1 File format

The file starts with the typical describing part.

```
;C: Verbreitung der Arten
;C: Distribution of species
;D: 2,DS.CFG,DS.PSC
```

In the standard mode, the application selector is 2, for the extended mode, the selector is 20. Before the data part label texts for the axes and a title can be given.

```
LABEL HEAD; Distribution of species
LABEL X;Time
LABEL Y;Number of species
```

A minimum and maximum value can be defined; both correspond in their values to the dimension of the numerical reference.

```
#MIN;-159.4
#MAX;-121
```

The data part is different for both modes. The standard mode contains only ranges of taxa:

```
DATA;-127;-124.76
DATA;-121;-117.07
DATA;-121;-117.07
DATA;-98.9;-97.39
DATA;-127;-124.76
DATA;-122.87;-93.5
DATA;-121;-116.82
DATA;-80.69;-71.3
```

The programme takes care to translate this data into polygons. For the standard mode the design of the numerical reference file is important. Too many entries in this file will make the result too complicated, very few entries make the results coarser and therefore wrong. It is also important that the distances (or the thickness of time slices) are equally. As for instance, if a time span of 100ma should be examined, a distance of about five to ten ma makes sense. Please note that the numerical reference file may contain colours. The colours are not mandatory; without colours all polygons are in white, or, when the auto mode is used, the system uses a colour. After importing the WMF file into a vector graph programme, the colours can be assigned manually without problems to the polygons. The colours can be also set in the programme and are saved in the configuration file. The source file for the standard mode can be produced rather easy.

We give here an example for the Hbd2Win application PaleoTax for the table of species:

```
OPEN                species,4
STRM                sppoly.pgr,O
OUTPL               ';C: Distribution of species (Polygon)'
OUTPL               ';D: 2,SPPOLY.CFG,MYOWN.PSC'
OUTL                'LABEL HEAD; Distribution of species'
OUTL                'LABEL X;Time'
OUTL                'LABEL Y;Number of species'
RESET
:begin
CMP                 sage_l*sage_u,0
JE                  skip
OUTL                'DATA;-'+str(sage_l.value)+';-'+str(sage_u.value)
:skip
SKIP
JNEOF               begin
STRM
CLA
GRAPH               sppoly.pgr
EXIT
```

The extended mode is more complicated and requires preparation. The extended mode is not just a list of taxa with their ranges, but for each taxon the number of lower-ranking taxa per time slices enter in the data file. A more detailed numerical reference file helps the data analysis, and for a time span of 100 ma a distance of two or three ma is recommendable. The extended mode consists of polygon groups. A group is a higher ranking taxon such as a family or a genus. Each group starts with three standard lines:

```
LABEL NAME;Rhynchonellidae
POLYG;0;-1
POLYG;-2000;0
```

The first line is the name of the group (family or genus name), the second line marks the beginning of the new group and the third line roots the polygon. The rooting value (here -2000) value must be far below of the lowest value. If you work in the Paleogene, it can be -100, if you work in the Silurian, better put -1000. But with -4000 your rooting is always well placed. After these initial values follows the data for the group:

```
POLYG;-251;0
POLYG;-250;1
POLYG;-240;2
POLYG;-230;2
POLYG;-225;3
POLYG;-222.85;3
POLYG;-220.7;6
POLYG;-219.5;6
POLYG;-217.25;6
POLYG;-216;6
POLYG;-215.8;6
```

For each base of a time slice it gives the amount of lower-ranking taxa. For families this may be genera, for genera species. So the first value is a time line, the second an amount of taxa. There is no special lead-out for a group, but it makes sense to finish a group with a zero value for the lower-ranking taxa. For the sake of understanding of the resulting graph it is recommendable to start with the oldest higher-ranking taxa. A examples for the Hdb2Win Application Library PaleoTax follows here:

```
DEFINE              bt,n
DEFINE              tp,n
DEFINE              fa,i
DEFINE              sw1,i,default,0,10  ; treshold value: families that have
                                        ; less than 10 genera are not included
DEFINE              ai,i
; - programme code
OPEN                genera,4
FILE                ageiugs
RESET
:begin0
PUT                 aidata2,0
FLSH
SKIP
JNEOF               begin0
STRM                EVO.PGR,O
OUTPL               ';C: Evolution Familien'
OUTPL               ';C: Evolution of families'
OUTPL               ';D: 20,EVO.CFG,MYOWN.PSC'
OUTPL               'LABEL HEAD;Families'
OUTPL               'LABEL Y;Genera'
OUTPL               'LABEL X;t'
FILE                families
INDEX               fage_l.value*(-1),~evo,o  ; define the order of families
RESET
:begin2
MOV                 fa,recno
CMP                 gennum,sw1          ; this is a filter to exclude
                                        ; families with only few genera
JB                  skip2
CMP                 fage_l*fage_u,0     ; no distribution data, skip
JE                  skip2
OUTL                '; '+famname+' (Start)'
OUTPL               'POLYG;0;-1'
FILE                ageiugs
USEIND
RESET
:begin1
PUT                 aidata,0
FLSH
SKIP
JNEOF               begin1
INDEX               value,~ageiugs,u
FILE                genera              ; Calculate this family
RESET
:begin5
CMP                 (family=fa) and (gage_l*gage_u>0),1
JNE                 skip5
CMP                 gage_u.value,gage_l.value
JA                  skip5
```

```
MOV                 tp,kgage_u.value
MOV                 bt,kgage_l.value
FILE                ageiugs
FIND                tp
:begin6
CMP                 value,bt
JA                  aw
PUT                 aidata,aidata+1
FLSH
:skip6
SKIP
JNEOF               begin6
:aw
FILE                genera
:skip5
SKIP
JNEOF               begin5
FILE                ageiugs
RESET
INDEX               value*(-1),~out,u
:begin7
MOV                 ai,aidata
OUTL                'POLYG;-'+str(value)+';'+str(ai+aidata2)
PUT                 aidata2,aidata2+ai
FLSH
:skip7
SKIP
JNEOF               begin7
FILE                families
OUTL                'LABEL NAME;'+famname+' ('+str(gennum)+')'
:skip2
SKIP
JNEOF               begin2
STRM
CLA
GRAPH               evo.pgr
EXIT
```

5.5.2 Chart control

The first panel contains the source file, the raster file, the configuration file, and the target file. The second panel defines at the left hand side the paper size and the margins, and one the right hand side the options for the diagram. The third panel defines the polygon style. The first lines defines whether percent values in place of absolute values are shown, and whether the graphs should be displayed in a square cut. In the second line the colours for each polygon can be defined. As already mention above, the colours are saved in the configuration file. In the third line it can be decided to use the colours of the system. The fourth lines defines whether numbers on the top are shown or vertical reference raster lines. In the fifth line additional information on the polygons can be shown as the number of taxa or a legend (only in mode 20). For the legend, a broad left margin should be set. The font for the numbers and legend can be modified. In the fourth panel the characteristics of the x axis is defined. A box can be shown at the bottom and the fields may have the same colour as the polygons. The text of the x axis can be suppressed completely. In the fifth panel the captions of the graph can be modified.

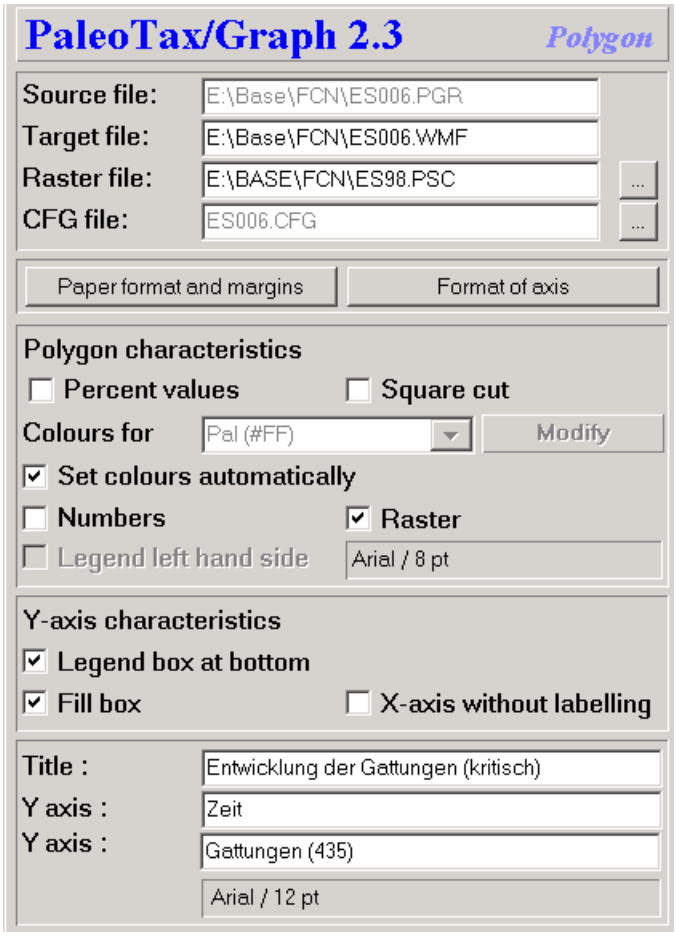


Figure 5.11. Chart control of the Polygon application.

5.5.3 Settings

Settings start with the number symbol (#) followed (without space) by the name of the variable to be set, a tab, and the value.

Paper format and margins

#Format	0=DIN A5 (148.5x210mm)	1=DIN A5 landscape (210x148.5mm)
	2=DIN A4 (210x297mm)	3=DIN A4 landscape (297x210mm)
	4=DIN A3 (297x420mm)	5=DIN A3 landscape (420x297mm)
	6=DIN A2 (420x594mm)	7=DIN A2 landscape (594x420mm)
	8=Letter A (216x279mm)	9=Letter A landscape (279x216mm)
	10=Tabloid (279x432mm)	11=Tabloid landscape (432x279mm)
	12=Wild format (200x200m)	integer
#TopMargin	Top margin (mm)	integer
#BottomMargin	Bottom margin (mm)	integer
#LeftMargin	Left margin (mm)	integer
#RightMargin	Right margin (mm)	integer
#NoFillRect	Different handling	boolean (0/1)
#FrameThickness	Frame and headline thickness (0.1mm)	integer
#ShowComments	Shows the comments in a separate box on the left upper corner	boolean (0/1)

Chart design

#LineThickness	Thickness of lines (0.1mm)	integer
#LineColour	Colour of lines	integer/hexadecimal
#HelpLineXLen	Length of legend help lines x-axis (0.1mm)	integer
#HelpLineXNum	Number of legend help lines x-axis	integer
#DecPointX	Number of decimals in labels x-axis	integer
#HelpLineYLen	Length of legend help lines y-axis (0.1mm)	integer
#HelpLineYNum	Number of legend help lines y-axis	integer
#DecPointY	Number of decimals in labels y-axis	integer
#TextFont	Font name of the legend	string
#TextPt	Font size of the legend (pt)	integer
#TextColour	Text colour of the legend	integer/hexadecimal

Polygons

#LineLabel	Shows the numerical values	boolean (0/1)
#LeftLegend	Legend on the left hand side (mode=20)	boolean (0/1)
#Scale100%	Shows the values as a percentage	boolean (0/1)
#Block	Square cut mode	boolean (0/1)
#LLabelColour	Colour of numerical values	integer/hexadecimal
#LLabelFont	Font of the numerical values	string
#LLabelPoint	Font size of the numerical values (pt)	integer
#DrawRaster	Shows vertical lines	boolean (0/1)
#Autocolor	Activates the colours of the system for the polygons	boolean (0/1)

X axis

#Box	Shows a legend box at the bottom	boolean (0/1)
#BoxFill	Fills the legend box at the bottom	boolean (0/1)
#NoXAxis	Suppress labels of the x axis	boolean (0/1)

Text labels

#Xlabel	Label of the x-axis	string
#Ylabel	Label of the y-axis	string
#Header	Header of the chart	string
#LabelFont	Font of the labels	string
#LabelPoint	Font size of the labels (pt)	integer
#LabelColour	Colour of the labels	integer/hexadecimal

5.6 Plot

The plot application is rather old and did not receive much improvement during the last years. In a xy-diagram, lines, rectangles and points can be shown.

5.6.1 File format

The x-y-diagram file has the following format:

(1) Head lines

```
;C: XY Diagram Test
;D: 6,XYD.CFG
```

(2) Settings

The settings starts with the number symbol (#) followed by the name, a tabulator, and the setting.

(3) Description

```
LABEL HEAD;X-Y-Diagram Test
LABEL X;X axis label
LABEL Y;Y axis label
```

(4) Data

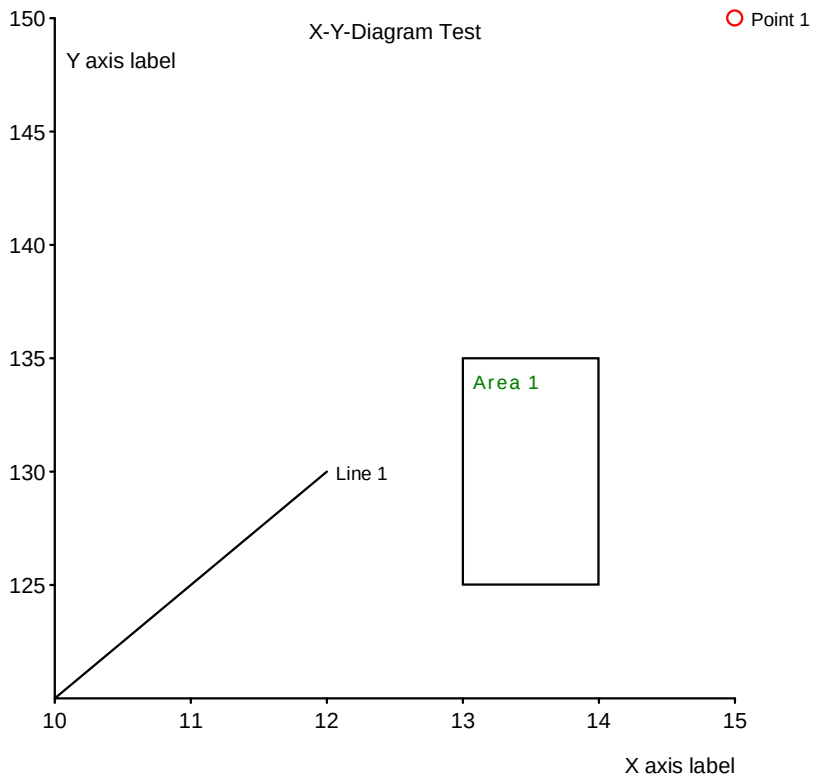


Figure 5.12. Example of the Plot application.

Data point:

```
DATA POINT;x-value;y-value[;label[;colour as hex value[;point diameter in 0.1mm]]]
DATA POINT;30;25;Point 1;0000FF;8
```

Data line:

```
DATA LINE;x-start-value#x-end-value;y-start-value#y-end-value[;label[;colour as hex
value[;line thickness in 0.1mm]]]
DATA LINE;10#25;25#10;Line 1;00FF00;10
```

Rectangle:

```
DATA AREA;x-start-value#x-end-value;y-start-value#y-end-value[;label[;colour as hex
value[;line thickness in 0.1mm]]]
DATA AREA;15#20;25#30;Area 1;FF0000;15
```

Labels, colour and point diameter/line thickness are optional. When indicating the line thickness, the colour must be indicated and must have six characters (0000FF in place of FF). See below the result of the above example data (Figure 5.12).

5.6.2 Chart control

The first panel contains the source file, the configuration file, and the target file. The second panel defines at the left hand side the paper size and the margins, and one the right hand side the options for the diagram. The third panel defines the characteristics of the points, their type, their size (0.1mm), colour and labelling (labelling also valid for lines). The fourth panel controls the labelling of the rectangles. The domain defines the place of the labels; switched changes the place from corner to corner. The distance defines the distance to the rectangle (and also to the line). The fifth panel allows to modify the labels, font and font size.

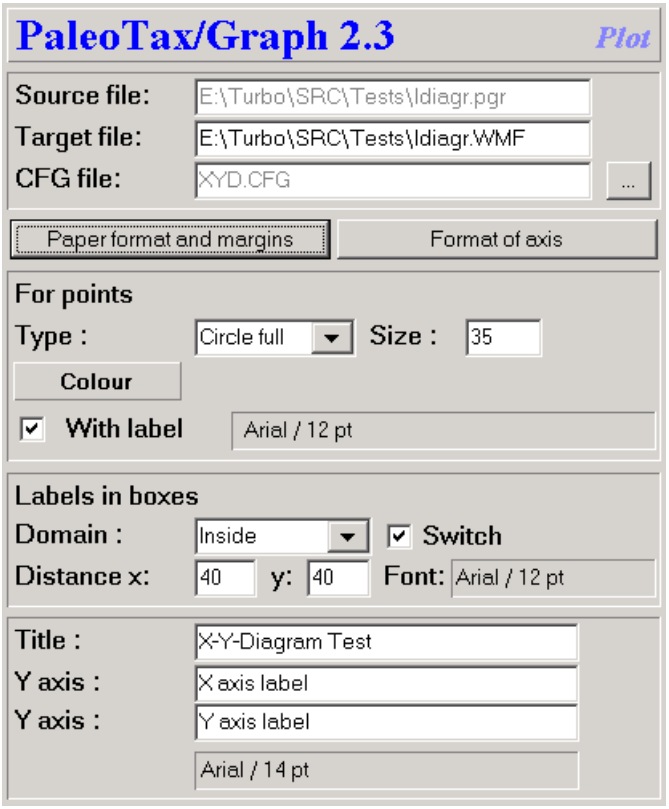


Figure 5.13. Chart control of the Plot application.

5.6.3 Settings

Settings start with the number symbol (#) followed (without space) by the name of the variable to be set, a tab, and the value.

Paper format and margins

#Format	0=DIN A5 (148.5x210mm)	1=DIN A5 landscape (210x148.5mm)
	2=DIN A4 (210x297mm)	3=DIN A4 landscape (297x210mm)
	4=DIN A3 (297x420mm)	5=DIN A3 landscape (420x297mm)
	6=DIN A2 (420x594mm)	7=DIN A2 landscape (594x420mm)
	8=Letter A (216x279mm)	9=Letter A landscape (279x216mm)
	10=Tabloid (279x432mm)	11=Tabloid landscape (432x279mm)
	12=Wild format (200x200m)	integer
#TopMargin	Top margin (mm)	integer
#BottomMargin	Bottom margin (mm)	integer
#LeftMargin	Left margin (mm)	integer
#RightMargin	Right margin (mm)	integer
#NoFillRect	Different handling	boolean (0/1)
#FrameThickness	Frame and headline thickness (0.1mm)	integer

Chart design

#LineThickness	Thickness of lines (0.1mm)	integer
#LineColour	Colour of lines	integer/hexadecimal
#HelpLineXLen	Length of legend help lines x-axis (0.1mm)	integer
#HelpLineXNum	Number of legend help lines x-axis	integer

#DecPointX	Number of decimals in labels x-axis	integer
#HelpLineYLen	Length of legend help lines y-axis (0.1mm)	integer
#HelpLineYNum	Number of legend help lines y-axis	integer
#DecPointY	Number of decimals in labels y-axis	integer
#TextFont	Font name of the legend	string
#TextPt	Font size of the legend (pt)	integer
#TextColour	Text colour of the legend	integer/hexadecimal

Point formatting

PointType	Type of the point (0, full circle; 1, empty circle; 2, full square; 3, empty square)	integer
PointSize	Size of the point (0.1mm)	integer
PointCol	Colour of the point (line when empty)	integer/hexadecimal
PointLabel	Point with label	boolean (0/1)
PointFont	Font of the point and line label	string
PointFontSize	Font size (pt) of the label	integer
PointFontColour	Font colour of the label	integer/hexadecimal

Rectangle formatting

ArrangeBoxLabel	Type of the label (0, without; 1, inside; 2, outside)	integer
SwapBoxLabel	Switches the position of the label	boolean (0/1)
BoxLabelXDistance	Lateral distance of the label from the rectangle/line (0.1mm)	integer
BoxLabelYDistance	Vertical distance of the label from the rectangle/line (0.1mm)	integer
BoxLabelColour	Font of the rectangle label	string
BoxLabelPoint	Font size (pt) of the label	integer
BoxLabelFont	Font colour of the label	integer/hexadecimal

Legend labels

#Xlabel	Label of the x-axis	string
#Ylabel	Label of the y-axis	string
#Header	Header of the chart	string
#LabelFont	Font of the labels	string
#LabelPoint	Font size of the labels (pt)	integer
#LabelColour	Colour of the labels	integer/hexadecimal

5.7 Percentage Bar

The percentage bar applications draws one or more (up to 32) horizontal percentage bars. The bars may have up to 128 categories and values.

5.7.1 File format

(1) Head lines

```
;C: Spending money
;D: 8,EUROBAR.CFG
```

(2) Options

The settings starts with the number symbol (#) followed by the name, a tabulator, and the setting.

(3) Data

Each data line start with an identifier (one single letter), followed by a tabulator and one or more attributes.

(3.1) Title for the bars

T<tab>ID

The ID is a number that refers to one of the bars.

```
T <tab> 1,Petra spends per months in €
T <tab> 2,Klaus spends per months in €
```

(3.2) Categories and colours

L<tab>ID, Category, Colour

The colour must be hexadecimal. If the colour value is lacking, the programme takes a colour from an internal table. This table has 32 different colours.

```
L <tab> 1,Shoes
L <tab> 2,Clothes
L <tab> 3,Handbags
L <tab> 4,Gas
L <tab> 5,Beer
```

(3.3) Data

V<tab>Bar, Category, Value

The first number refers to the of bar, the second to the category, and the third any value. The value may not be a percentage value; it can be any value. The programme recalculates all.

```
V <tab> 1,1,80
V <tab> 1,2,200
V <tab> 1,3,50
V <tab> 1,4,10
V <tab> 1,5,10
V <tab> 2,1,10
V <tab> 2,2,100
V <tab> 2,3,0
V <tab> 2,4,50
V <tab> 2,5,50
```

The above values result in the following graph.

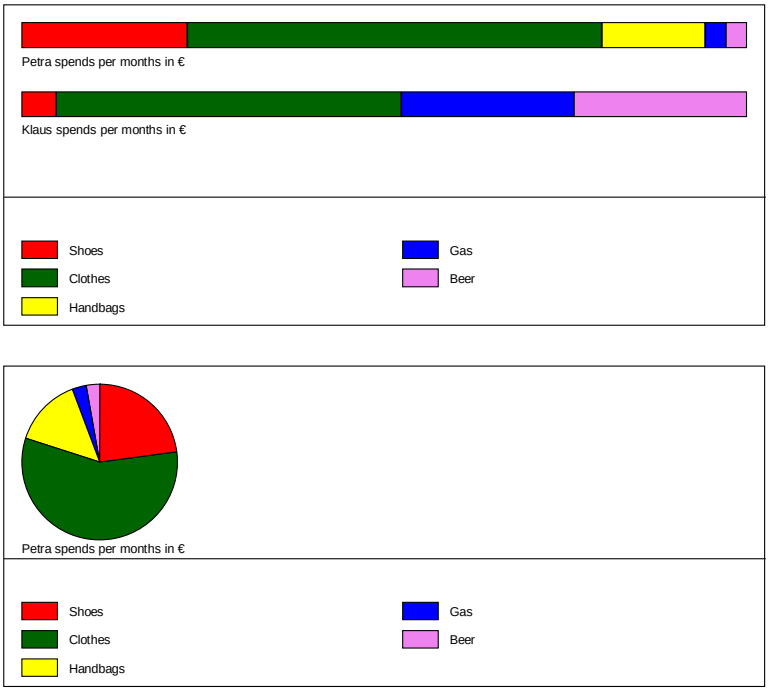


Figure 5.14. Example of the Percentage bar application. The first bar can be also shown as pie chart (other values are not shown in this case).

5.7.2 Chart control

The first panel contains the source file, the configuration file, and the target file. The second panel defines the paper format and margins and the output format. The third panel defines the format of the bars, the upper part of the page. This panel includes the height of the bars, their distance, line thickness and colour. Here it is defined whether the labels and percentage values are shown, and the formatting of the corresponding font. The fourth panel is dedicated to the legend in the lower part of the page. The first value gives the percentage of the legend in relation to the page. It is followed by the number of columns, the size of the boxes and the font definition of the text.

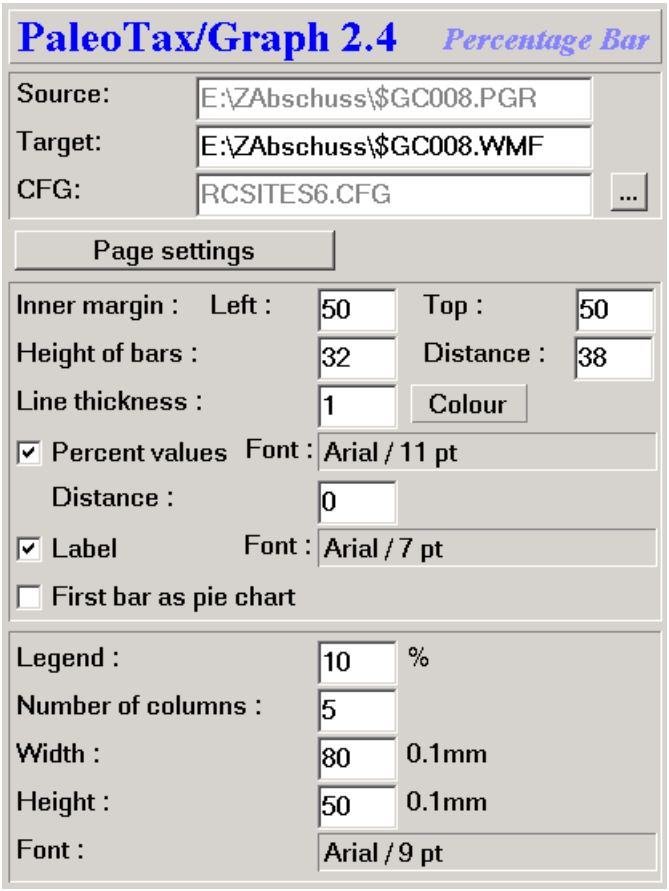


Figure 5.15. Chart control of the Percentage bar application.

5.7.3 Settings

Paper format and margins

#Format	0=DIN A5 (148.5x210mm)	1=DIN A5 landscape (210x148.5mm)
	2=DIN A4 (210x297mm)	3=DIN A4 landscape (297x210mm)
	4=DIN A3 (297x420mm)	5=DIN A3 landscape (420x297mm)
	6=DIN A2 (420x594mm)	7=DIN A2 landscape (594x420mm)
	8=Letter A (216x279mm)	9=Letter A landscape (279x216mm)
	10=Tabloid (279x432mm)	11=Tabloid landscape (432x279mm)
	12=Wild format (200x200m)	integer
PaperColour	Background colour	integer/hexadecimal
#TopMargin	Top margin (mm)	integer
#BottomMargin	Bottom margin (mm)	integer
#LeftMargin	Left margin (mm)	integer
#RightMargin	Right margin (mm)	integer
#NoFillRect	Different handling	boolean (0/1)
#FrameThickness	Frame thickness (0.1mm)	integer
#NoMargins	Suppress margins	boolean (0/1)
#FileFormat	Output format (0=EMF, 1=WMF, 2=JPG, 3=BMP, 4=HTML)	integer
#JpgQuality	JPG quality (1...100; where 100 is the best quality)	integer

Data

#BarHeight	Height of bars (0.1mm)	integer
#BarDistance	Distance of bars (0.1mm)	integer
#LineThickness	Line thickness of bars (0.1mm)	integer
#LineColor	Line colour of bars	integer/hexadecimal
#ShowLabel	Shows the bar label	boolean (0/1)
#LegendTextFont	Font name of the bar labels	string
#LegendTextPt	Font size of the bar labels(pt)	integer
#LegendTextColor	Font colour of the bar labels	integer/hexadecimal
#ShowPercent	Shows the percentage value	boolean (0/1)
#PerTextFont	Percentage text font	string
#PerTextPt	Percentage text size (pt)	integer
#PerTextColor	Percentage text colour	integer/hexadecimal
#InnerTop	Inner top margin (0.1mm)	integer
#InnerLeft	Inner left margin (0.1mm)	integer
#PercentDistance	Distance of the percent value from the bar (0.1mm)	integer
#PieChart	Shows (only) the first group as pie chart	boolean (0/1)

Legend

#Legend	Height in percent of the page	integer
#Columns	Number of columns	integer
#LegXValue	Width of box	integer
#LegYValue	Height of box	integer
#Legend2TextFont	Font name	string
#Legend2TextPt	Font size (pt)	integer
#Legend2TextColor	Font colour	integer/hexadecimal

5.8 Table

The programme creates tables over one or multiple pages. Table files are usually created by the database (see for instance in the Oliva application). A maximum of 10240 lines and 32 columns can be shown. The maximum size of characters in one cell is 255. The text can be oriented horizontal or vertical. A text too large for the cell is shown in red.

5.8.1 File format

The table has the following format:

(1) Header lines

```
;C: Arten
;C: Species
;D: 31,Species.CFG
```

(2) Options

There are two types of settings. The first type are settings of the variables of the system that starts with the number sign (#), the second type starts with the keyword SET and describes mainly the format of the columns.

(3) Data

Data must be separated by tabs. See the below example.

```
#title        1
#format       12
set vertical,1,1
set width,1,100
set width,2,300
```

```
set width,3,300
set width,4,300
Weekend options
Work                        Write a paper
                            Examine material
No Work       Beach         Kino
                            San Carlos
              City   Cinema Cinemax
                            Other
                     Pub    7/11
                            Verbena
              Stay at home                Watch TV
                            Invite friends
                            Watch a movie
; -
```

Results in:

Weekend options			
Work			Write a paper
			Examine material
No Work	Beach		Kino
			San Carlos
	City	Cinema	Cinemax
			Other
		Pub	7/11
			Verbena
	Stay at home		Watch TV
			Invite friends
			Watch a movie

Figure 5.16. Example of the Table application.

Text fields may have up to 255 characters distributed into 32 lines. A line break can be forced with the character ˜. When a text does not fit into the available space, it is printed in red. A text starting with \\ addresses a bitmap image file (BMP, GIF, JPG). The height of the image is adapted to the line height. The following source code creates the table in Figure 5.17.

```
;C: (133) Test-Picture
;D: 31,TEMP.CFG
SET FSTYLE,4,2
SET WIDTH,1,22
SET WIDTH,2,22
SET WIDTH,3,22
SET WIDTH,4,22
SET WIDTH,5,10
Ohne Pali           Coenosteum mit großen Trabekeln      Actinastrea \\ABB1.JPG
                    Coenosteum mit Rippen          Stelidioseris    \\ABB439.JPG
Pali vorhanden              Columactinastraea \\ABB506.JPG
```

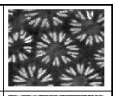
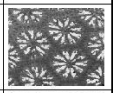
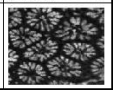
Ohne Pali	Coenosteum mit großen Trabekeln	*Actinastrea*	
	Coenosteum mit Rippen	*Stelidioseris*	
Pali vorhanden		*Columactinastraea*	

Figure 5.17. Example of the Table application.

Normally, it is defined for each column whether the text is horizontal or vertical oriented. A single text can be forced to be printed vertical when it starts with the character | (vertical dash). The following source code

```
;C: VerticalTest
;D: 31,Weekend.CFG
SET VERTICAL,1,1
SET FSIZE,1,14
SET FSTYLE,1,3
#title 1
Weekend options
Work                Write a paper
                    Examine material
No work             |Beach        Kino
                             San Carlos
                    |City    Cinema      Cinemax
                             Other
                       Pub   7/11
                             Verbena
                    |Stay at home        Watch TV
                             Invite friends
                             Watch a movie
```

shows the following table:

Weekend options			
Work	Write a paper		
	Examine material		
No work	Beach		Kino
			San Carlos
	City	Cinema	Cinemax
			Other
		Pub	7/11
			Verbena
	Stay at home		Watch TV
			Invite friends
			Watch a movie

Figure 5.18. Example of the Table application.

5.8.2 Characteristics of columns

In an (optional) section (that should directly follow after the titles lines) the characteristics for each columns can be defined, such as the width, the font, the colour, and the text orientation. It is not mandatory to use these settings since for all of them exist default values. The setting has the general format as follows:

```
SET <keyword>[,<column>,<value>]
```

For all settings (except the page setting) the column and value are mandatory.

5.8.2.1 Column width

Width of the column (in ‰), must be at least 30‰, values for all columns must be indicated. Note that these values has been changed from percent to per mill. You do not need to modify your source files since the programme always adapts the indicated values. A per mill value allows more precision. A DIN A4 page with a margin of 1cm at both sides has 1900units, so one per mill corresponds to 0.2mm.

```
SET WIDTH,<column>,‰ value
SET WIDTH,1,10
```

5.8.2.2 Text orientation

Text can be horizontal (default value) or rotated by 90% (anti clock-wise). Please note that not all fonts can be rotated. When as for instance Courier is set as the standard font and one column should be shown vertical, the system uses another font (general Arial). You can also rotate the text of a single cell be setting a vertical dash before the text.

```
SET VERTICAL,<column>,0|1
SET VERTICAL,1,1
```

5.8.2.3 Text font

Font type (default value : Arial)

```
SET FONT,<column>,Font name
SET FONT,1,Arial
```

Font size (default value : 10)

```
SET FSIZE,<column>,Font size
SET FSIZE,1,12
```

The font size can also have decimals.

Font style (bit wise coding: 1, bold; 2, italics; 4, underlined; 8, strike-out; default value : 0)

```
SET FSTYLE,<column>,Font Style
SET FSTYLE,1,2
```

Font colour (hexadecimal or decimal; default value : 0)

```
SET FCOLOUR,<column>,[$]Font Colour
SET FCOLOUR,1,$FF
```

Font size correction factor (floating-point number)

```
SET FCX,<column>,<correction value for width>
SET FCX,1,0.7
SET FCY,<column>,< correction value for height>
SET FCY,1,1.1
```

Font size correction is necessary when text appears too long (exceeding the available space) or to short (line break even if there is still enough space). This has much to do with the inividual font and font style. Italics often require a reduction. When different fonts and font sizes are used, a fine tuning can be also helpful. The standard is that set in the chart control as 'Pt Correction'. The value must be above zero and below two.

5.8.2.4 Global image path

The global image path is valid for all images in the table. An eventually existing path of a file will be deleted.
`SET IPATH,d:\tables\images\small\`

5.8.2.5 Page skip

Page number (when more than one page). When no page is indicated, a page skip is inserted.
`SET PAGE[,1]`

5.8.3 Output formats

This application allows various formats, the two vector formats EMF and WMF, the tow bitmap formats JPG and BMP, and the HTML format. JPG and BMP are only screen shots of the image. HTML may include links to images (when starting with \\), and set their size according to the line height of the table and assuming a resolution of 300dpi. The resolution can be modified in the corresponding CFG file or directly in the source file. A larger value produces larger images, a small value smaller images. All images have the same height, independent of their original size. HTML may include also links to other files that must start with ::. Images cannot be mixed with text in one cell, and links must be at the end of the text of one cell. Text cannot be rotated in the HTML output.

5.8.4 Chart control

The first panel contains the source file, the configuration file, and the target file. The second panel defines the paper format and margins and the output format. The third panel defines the margin within the table, and the orientation of the text. The text is per default vertically centred. The fourth panel defines details of the table. Inner line thickness refers to the thickness of lines within the table. The thickness of the frame of the right and bottom part can be reduces. The height of one line in the table can be defined. The hyphen zone, a percent value of the available space defines how hyphens are set. The point correction may increase or reduce the space for texts. The font size can be adapted when the available space does not allow to show the text. A possible title will be not formatted. The font name, size, colour and style can be defined. If the source files does no contain any column settings, for each column the width can be modified clicking on the small **<** and **>** buttons, as well as the font clicking on the button **(Standard Font)** to the right hand side of these buttons. For each column it can be also defined whether it will be rotated by 90° counter-clock-wise. In the right hand side preview part, a red line is shown indicating the bottom margin. If the table exceeds this line you should reduce the height of the lines (and probably also the font size), or distribute the table on more than one page.

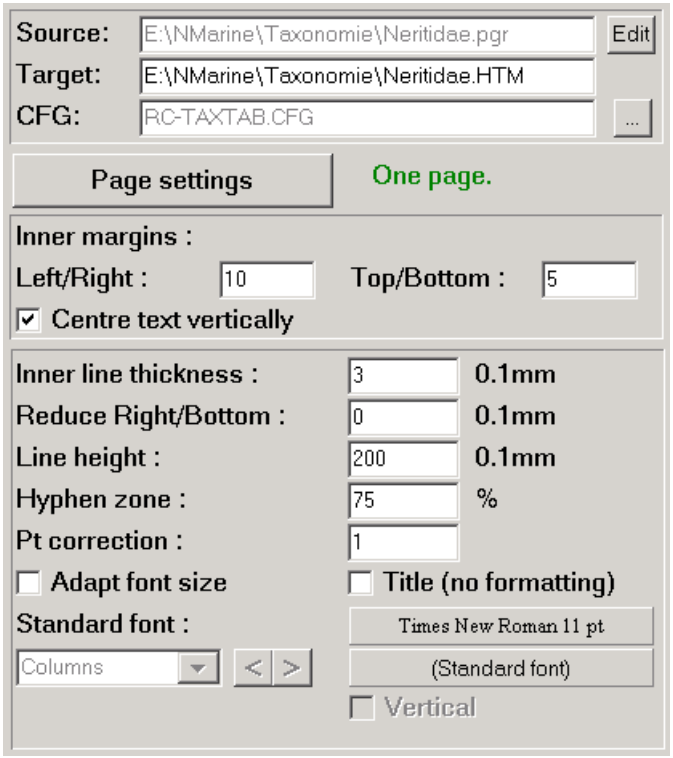


Figure 5.19. Chart control of the Table application.

5.8.5 Settings

Paper format and margins

#Format	0=DIN A5 (148.5x210mm)	1=DIN A5 landscape (210x148.5mm)
	2=DIN A4 (210x297mm)	3=DIN A4 landscape (297x210mm)
	4=DIN A3 (297x420mm)	5=DIN A3 landscape (420x297mm)
	6=DIN A2 (420x594mm)	7=DIN A2 landscape (594x420mm)
	8=Letter A (216x279mm)	9=Letter A landscape (279x216mm)
	10=Tabloid (279x432mm)	11=Tabloid landscape (432x279mm)
	12=Wild format (200x200m)	integer
#PaperColour	Background colour	integer/hexadecimal
#TopMargin	Top margin (mm)	integer
#BottomMargin	Bottom margin (mm)	integer
#LeftMargin	Left margin (mm)	integer
#RightMargin	Right margin (mm)	integer
#NoFillRect	Different handling	boolean (0/1)
#NoMargins	Suppress margins	boolean (0/1)
#CorrectFrameThickness	Reduces the thickness of the right and lower frame (0.1mm)	integer
#FileFormat	Output format (0=EMF, 1=WMF, 2=JPG, 3=BMP, 4=HTML)	integer
#JpgQuality	JPG quality (1...100; where 100 is the best quality)	integer
#HTMLdpi	Resolution of images in HTML files	integer

Table design

#LeftInnerMargin	Distance between text and frame on the left hand side (0.1mm)	integer
#UpperInnerMargin	Distance between text and frame on the top (0.1mm)	integer
#TextFont	Standard text font	string
#TextPt	Font size (pt)	integer
#TextPtCorrect	Correction value for the font	integer
#TextColour	Text colour	integer/hexadecimal
#TextStyle	Text style	integer
#HyphZone	Width of hyphen zone (in percent of the available space)	integer
#AdaptFontSize	Reduces the font size when the text does not fit in the available space	boolean (0/1)
#LineThickness	Line thickness within the table (0.1mm)	integer
#LineHeight	Height of one line (0.1mm)	integer
#TextCenter	Centre text vertically	boolean (0/1)
#Title	Title line is present	boolean (0/1)

5.9 Vector programming

The vector interpreter combines simple graphic elements such as lines, circles, texts, and images to create labels, forms, tables, etc. The graphic may extend over various pages. Normally, the data files will not be created manually but by a programme, as for instance the Interpreter of Hdb2Win. Several programmes in various application libraries of the database system offer to create labels, but these labels are simple text files, not labels that contain graphical elements **and** data from the database. The database application Oliva (table Specimens) has one output form in this format. The vector programming "language" is very simple and with the help of the GRAPH command of the interpreter the results can be observed immediately, what makes the design rather easy.

The below example of the Interpreter of Hdb2Win draws a number of labels that contains the number of column and line:

```
define      columns,i,default,0,5   ; maxcolumns
define      lines,i,default,0,11    ; maxlines
define      xsize,i,default,0,33    ; width (mm)
define      ysize,i,default,0,20    ; height (mm)
define      distance,i,default,0,2  ; distance (mm)
define      i,i         ; columns
define      j,i         ; lines
; --- program ...
cda
strm        L-Test.pgr,o
outl        ';C: Label - Test'
outl        ';D: 33,L-Test.CFG'
outl        '#framecolour     0'
outl        '#paperformat     2'
outl        'setlinethickness 0.3'
outl        'setfont    Arial'
outl        'setfontsize      12'
; Start Lines
:beginline
mov         i,0   ; reset column
; Start Columns
:begincolumn
outl        'goto '+str(i*xsize+i*distance)+','+str(j*ysize+j*distance)
outl        'rect '+str(xsize)+','+str(ysize)
outl        'goto '+str(i*xsize+i*distance+2)+','+str(j*ysize+j*distance+2)
outl        'text "Line '+str(j+1)+'"'
outl        'goto '+str(i*xsize+i*distance+2)+','+str(j*ysize+j*distance+7)
outl        'text "Column '+str(i+1)+'"'
; Next Column
mov         i,i+1
cmp         i,columns
jb          begincolumn
; next line
mov         j,j+1
cmp         j,lines
jb          beginline
strm
graph       L-Test.pgr
exit
```

5.9.1 File format

(1) Header lines

The file has the following format:

```
(1) Header lines
;C: Vector Labels
;D: 33,MLABEL.CFG
```

(2) Settings

Settings start with the number symbol (#) followed (without space) by the name of the variable to be set, a tab, and the value.

(3) Source code

The source code consists of very few commands with their respective attributes. Command and attributes are separated by a tabulator. Attributes are the position on the page, the thickness and colour of lines, the size of objects, and the characteristics of texts. All positions, size of objects, and line thickness are given in millimetres, and may have decimals. Positions are in reference to the margins set in the application. The position 0,0 is not at the upper left margin of the paper, but at the upper left corner of the area that is defined by the margins. If you want to draw something outside the left or upper margins, you may use negative values. You should be aware of the target format (the paper size). Colour can be names (see below) or hexadecimal values (see below for attributes). Here follows the description of the commands.

`goto` `x,y`

Moves the graphic cursor to a specific (x, y) position. The unit is millimetre. Zero for both values is the top left of the area defined by the margins.

`line` `x,y[,line thickness[,line colour]]`

Draws a line from the present position to the indicated position. The line thickness (mm) and colour are optional. If no attributes are given, the formerly applied attributes are used, or the default values.

`polygon` `x,y`

Adds a point to a polygon. A polygon must have at least three points.

`polygonclose` `[line thickness[,line colour[,fillcolour | nofill]]]`

Closes a polygon. If the polygon should be empty and not filled with any colour, the third parameter must be `nofill`. Otherwise the third parameter contains the fill colour,

`rect` `x,y[,line thickness[,line colour]]`

Draws a rectangle. The attributes x and y are the size of the rectangle. The line thickness and line colour are optional. If no attributes are given, the formerly applied attributes are used. The rectangle is always empty and not filled with any colour.

`fill` `x,y[,line thickness[,line colour[,fill colour]]]`

Like `rect` but fills the rectangle with a colour. The attributes x and y are the size of the rectangle. The line thickness and line colour, as well as the fill colour are optional. If no attributes are given, the formerly applied attributes are used.

`circle` `diameter[,line thickness[,line colour[,fill colour]]]`

Draws a circle. The line thickness and line colour, as well as the fill colour are optional. If no attributes are given, the formerly applied attributes are used.

`text` `text[,font size[,font name[,font colour[,font style[,angle]]]]]`

Writes a text at the present position. The font size (in pt, may have decimals), the font name, colour, style, and angle are all optional. If no attributes are given, the formerly applied attributes are used. The command resets former attributes. When printing a text bold all further texts are printing bold unless another font style is given in the text command or the setfontstyle command. Note that the `text` command resets the fill colour: texts have no fill colour and a fill colour different from white is set to white. The angle may have decimals. The rotation is counter clockwise. Use only fonts that are available on your computer. Moreover when writing programmes for other computers it is recommendable to use only simple fonts that are available with any installation (such as Arial, Courier or New Tomes Roman).

```
textbox              "text",x,y[,font size[,font name[,font colour[,font style]]]]
```

Writes a text in a specified area. This area starts at the present position and has the size indicated by the x and y value. No visible box is drawn. As above, all text attributes are optional. If a box is too small for the given text, a message is shown in the message window and the text is printed in red.

```
image                file name,width[,line thickness[,line colour]]
```

Loads and displays an image (BMP, GIF, JPG, WMF). You cannot define the height, only the width. The height will be calculated on the basis of the size proportion of the image. The image may have a frame when line thickness and line colour are indicated, and line thickness is different from zero. Large bitmap files (BMP, GIF, JPG) make problems, moreover if their are in full colour. It is possible that you receive an error message during writing.

```
page                 [page number]
```

The command indicates the beginning of a page. The page command without page number just increases the current page number. Per default, the first page is page number one.

Apart from commands there are settings available. All settings are optional but the use may increase the speed and reduce files size. The commands set the current attributes.

```
setlinethickness     line thickness
setlinecolour        line colour
setfillcolour        fill colour
setfont              font name
setfontsize          font size
setfontstyle         font style
setfontcolour        font colour
```

The colours can be represented by their names or the hexadecimal values. The font size may hace decimals. Figures 6.19 shows the colours sorted according to the name, and Fig. 5.20 according to the hexadecimal value (both images were created by the same vector programme).

Text style is coded as follows,

1, bold 2, italics 4, underline 8, strikeout

You may combine text styles by adding the values. Bold and underline is 5 (1+4), italics and bold is 3 (1+2). You cannot replace text styles by names, you must use the numbers.

The graph shown in Figure 5.20 was produced by the following script.

```
;C: Vector - Test
;D: 33,TEST.CFG
#framecolour         0
#format              12
goto                 10,10
image                E:\Turbo\SRC\ptx_logo.jpg,20,0.2,black
goto                 10,40
rect                 50,18,0.4,green
goto                 11,41
textbox              "Welcome to PaleoTax/ Graph with the new Vector Draw
Application. Version",48,16,12,Times New Roman,blue,2
goto                 70,78
circle               15,1,black,cornflowerblue
goto                 58,70
text                 "2.4",36,Arial,lightsalmon,3
goto                 70,86
polygon              120,120
polygon              120,140
polygon              100,140
polygonclose         1,seagreen,nofill
```

```
goto                70,86
polygon             20,120
polygon             20,140
polygon             40,140
polygonclose        1,seagreen,lightcoral
goto                130,160
text                "This is a rotated text",10,Courier,gold,4,45
goto                130,10
text                "Text 11 pt",11,Arial,black,0
goto                130,15
text                "Text 11.2 pt",11.2
goto                130,20
text                "Text 11.4 pt",11.4
goto                130,25
text                "Text 11.6 pt",11.6
goto                130,30
text                "Text 11.8 pt",11.8
goto                130,35
text                "Text 12 pt",12
; - end
```

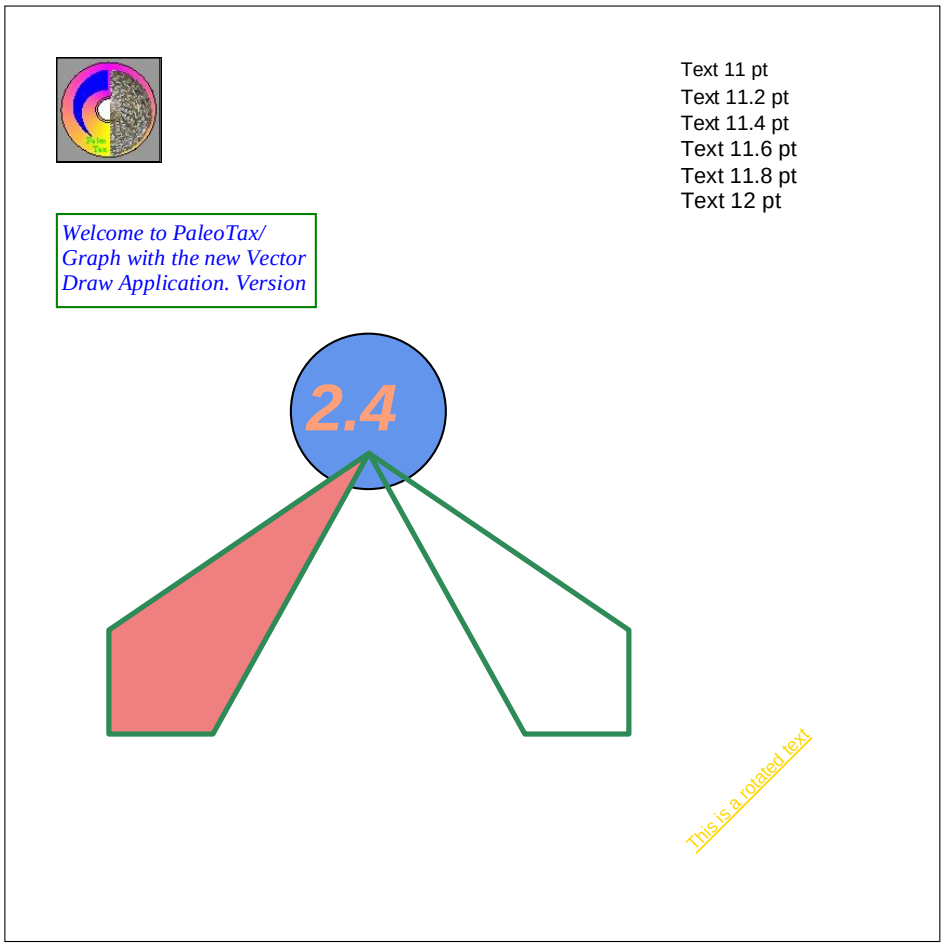


Figure 5.20. Example of the Vector graphic application.

Figure 5.21. Colour table according to the name.

Figure 5.22. Colour table according to the hexadecimal value.

5.9.2 Chart control

The first panel contains the source file, the configuration file, and the target file. The second panel defines at the left hand side the paper size and the margins. One the right hand side the number of pages is shown. A third panel informs about possible errors in the source file, such as unknown commands or lacking attributes. If the programme finds an error, it ignores the line and continues.

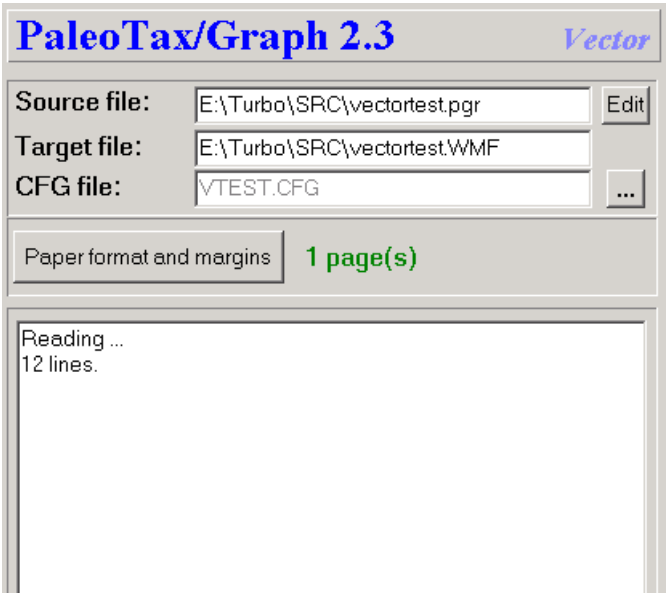


Figure 5.23. Chart control of the Vector Graphic application.

5.9.3 Settings

Settings start with the number symbol (#) followed (without space) by the name of the variable to be set, a tab, and the value.

Paper format and margins

#Format	0=DIN A5 (148.5x210mm)	1=DIN A5 landscape (210x148.5mm)
	2=DIN A4 (210x297mm)	3=DIN A4 landscape (297x210mm)
	4=DIN A3 (297x420mm)	5=DIN A3 landscape (420x297mm)
	6=DIN A2 (420x594mm)	7=DIN A2 landscape (594x420mm)
	8=Letter A (216x279mm)	9=Letter A landscape (279x216mm)
	10=Tabloid (279x432mm)	11=Tabloid landscape (432x279mm)
	12=Wild format (200x200m)	integer
#PaperColour	Background colour	integer/hexadecimal
#TopMargin	Top margin (mm)	integer
#BottomMargin	Bottom margin (mm)	integer
#LeftMargin	Left margin (mm)	integer
#RightMargin	Right margin (mm)	integer
#NoFillRect	Different handling	boolean (0/1)
#FrameThickness	Frame thickness (0.1mm)	integer
#NoMargins	Suppress margins	boolean (0/1)
#FileFormat	Output format (0=EMF, 1=WMF, 2=JPG, 3=BMP, 4=HTML)	integer
#JpgQuality	JPG quality (1...100; where 100 is the best quality)	integer

6 Configuration files

The configuration files save the settings for a specific graphic. They are stored in c:\Users\<username>\AppData\Roaming\Hdb2Win. The are in the ASCII format. For a specific project it makes sense to keep the configuration files in a separate directory to avoid that they are overwritten by other applications. After opening a PGR file you may select another configuration file and the settings of the current configuration file is applied to the current graph. The application ID in the configuration file must coincide with the ID of the application. It is not the same number as in the description line.

7 References

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