POLPAL
PROGRAM FOR COUNTING POLLEN GRAINS, DIAGRAMS PLOTTING AND NUMERICAL ANALYSIS

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ABSTRACT. POLPAL may be described as an CAx – type system, namely: CAP = Computer Added Palynology. It serves not only as simple data – base but provides extended facility for data input. The idea of counting pollen (microfossils) directly to the computer is completely materialised in the program. The min output of the system is the MS Windows – type bitmaps with diagram. Variety of plotting conventions is applied. Almost every graphical element is parametrized. The resulting figure is nice, readable and keeps all the informations carried by the data. In addition to diagram the numerical analysis may be performed, like PCA, ConSLink, Rarefaction Analysis and Samples Similarity Matrix. The first result in the numerical methods which are still not in common use, may be obtained as simply as three mouse kliks.

KEY WORDS: Pollen, software, counting microfossils, data base, plotting diagrams, numerical analysis

The Windows version of the old polish palynological program (Ralska-Jasiewiczowa & Walanus 1991, Walanus 1994, 1995, Walanus & Nalepka 1996) is now released (Walanus & Nalepka 1997). It offers capability of small data base, rather advanced and highly specialised graphics, also numerical analysis and special routine for data input, namely for individuals counting. Program is designed for pollen tables, however, equally well diatoms, *Cladocera*, macrofossils and other data, of similar type may be stored. Principally, the integer numbers of counts are to be stored.

The problem of taxa assignment to the data is resolved on the basis of the list of taxa, which should be as universal as possible. Taxa, despite names (up to 255 characters long) are characterised by one letter of plant groups "life form", and two to four letter long code (Fig. 1).

Sets of taxa easily created and edited are useful in plotting large diagrams.

The special module for counting pollen grains is very useful while the keyboard is close to the microscope. Coding taxa by function keys (the most frequent ones), by two letter code or by three or four letter codes makes counts registration fast and reliable. Also sound may be involved (previously recorded by the user taxa names may be recorded on every individual count). At the figure the case of registration of the 28th *Alnus* grain is visible (Fig. 2).
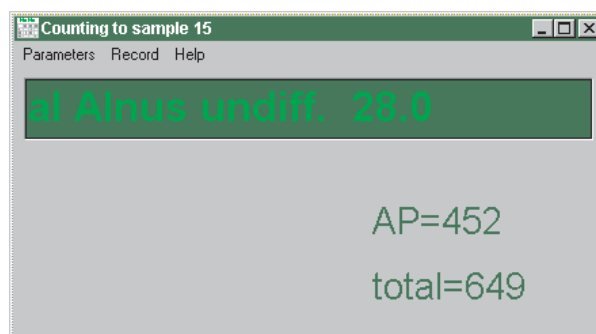

Fig. 1. Taxa editing

Fig. 2. Counting of sporomorphs. The 28th of *Alnus* pollen grains has just been counted on

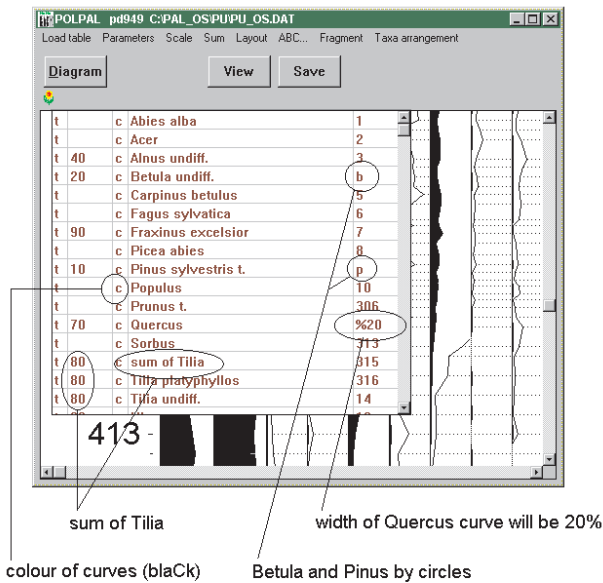The main application of the POLPAL is diagram producing (Fig. 3).

Fig. 3. Diagram construction

Program offers many options of diagram organisation. There are twelve options for taxa arrangement. The list layout options is given below, as an example. Chosen options are demonstrate on the figures 4 and 5.

Scale %=1 *horizontal scale, in [pixels/%]*
Scale depth=2 *vertical scale, in [pixels/cm]*
Top=10,Bottom=170 *samples, topmost and bottom to be printed*
Colour for all=c *that colour will be assigned to every taxon*
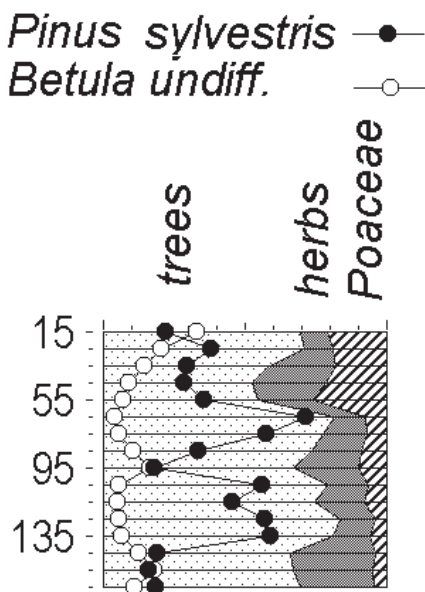

Fig. 4. Diagram AP/NAP

Sample numbers=y *the numbers in front of curves to be printed or not*
Sum, numbers=n *the numbers after the last curve*
Round %= *if the width of curves is to be equal to 5% or 10% or 15%*
AP/NAP=y *if the diagram AP/NAP is to be plotted*
Macro=n *if the macrofossils-type diagram is to be plotted*
Histogram=10 *the thickness of histogram bars, for macro-diagram should be no number*
Enlarge curve=y *if exaggerations have to be added*
Horiz.lines in AP/NAP=y *if horizontal lines in AP/NAP diagram are to be plotted*
Horiz.lines while no enl.=n *if horizontal lines are to be plotted while no exaggerated curve is plotted*
Additional space=5 *additional horizontal space between curves [pixels]*
Max. width=1000 *maximal width (horizontal) of curves, will be cut if larger*
Sum up close samples=n *if the width between samples (PW file) are 0, the samples could be summed up*
Smoothing=n *curves may be smoothed (gaussian smoothing), type here range of smoothing [pixels], for example: =50*
CirclesPB=6 *diameter of circles [pixels] for p or b curves*
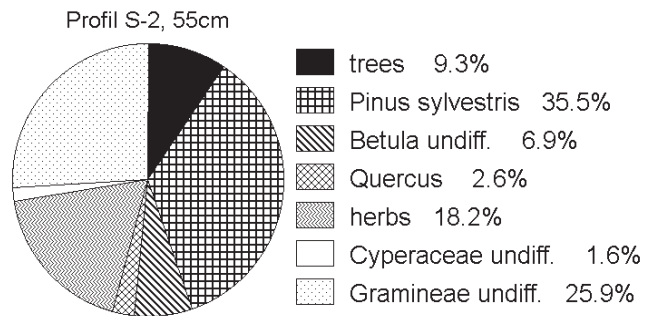Cyclogram=200 *diameter of circle [pixels]*

Fig. 5. Example of cyclogram from the S-2 profile, spectrum 55 cm depth

Horizontal= *width of the resulting diagram (bitmap) [pixels], read only value!*
Vertical= *height of the resulting diagram [pixels], read only value!*
y0= *space [pixels] from the top of the bitmap to the top of the curves, read only!*
y0 external=n *as above, type here in the value [pixels] you need*
Plotting time= *read only value [s]*
Max. plotting time=60 *program will ask user after that time [s] if continue*
Numbers 1:1=y *if row data are to be plotted (numbers from the table, no %, no conc.)*
Concentration=y *if concentration instead of % is to be plotted*
Indicator in table=110 *position of indicator in the table, to be changed if other taxon have to play role of ind.*
Added indicator=10000 *if no PI file exists, that number will be used for concentration calculation*
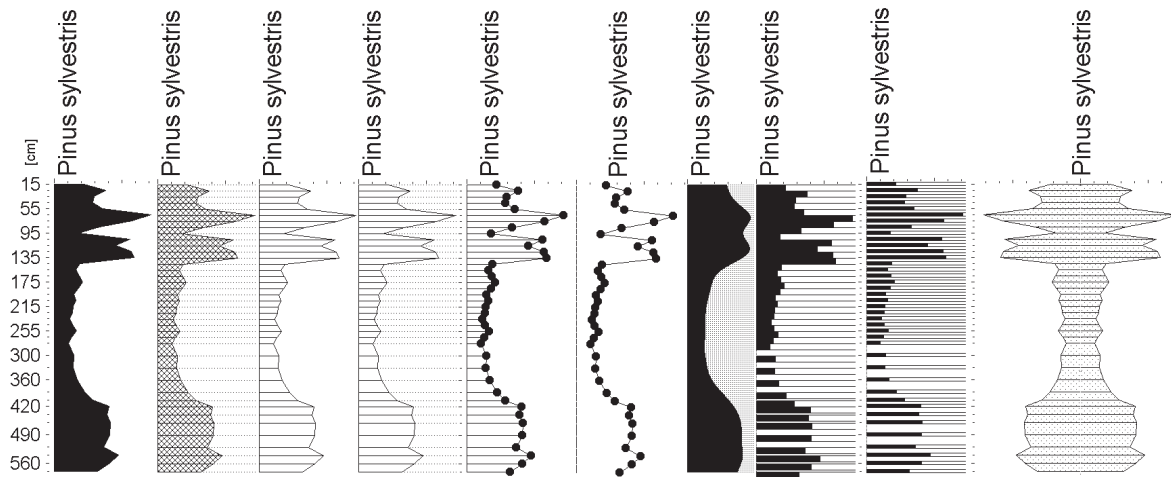Sum=tsdh *definition of pollen sum for % calculation*
nr 10=ts

Fig. 6. Example of different silhouettes of *Pinus sylvestris* curve. The last one is obtained using capabilities of MS Paint

nr 20=dh

nr 30=

nr 40= .... *after click* Taxa arrangement / according to life forms *that numbers will be attached as sequential, to given life forms (plant groups)*

pt 10=l

pt 20=3

pt 30=l

pt 40=c

pt 50=: .... *if* Colour for all= *i.e. empty (no space), that colours will be used after clicking* Layout / assign colour to all

PS=

PW=

PI=

PZ=no.... *if versions of files are to be used (ex.* PS=a*), also for* PZ, *if* PZ=no *that file (despite of version) will not be used (PAZ lines will not be drawn)*

Font tax, name=

Font tax, size=

Font nr, name=

Font nr, size= *fonts for taxa names and sample numbers, ex.* =Times New Roman =28

Draw line=(Right, Left, Up, Down, Vertical, Horizontal) *type a letter here if to draw lines on the diagram (try it).*

There are four modules for numerical data analysis, namely:

– CONSLINK,

– PCA,

– rarefaction analysis,

– samples similarity matrix.

As may be estimated from the screen of CONSLINK (Fig. 7) programs are extremely easy in operation. Three mouse clicks are enough to get analysis. Of course many parameters may be adjusted by more mouse and keyboard operations, if necessary.
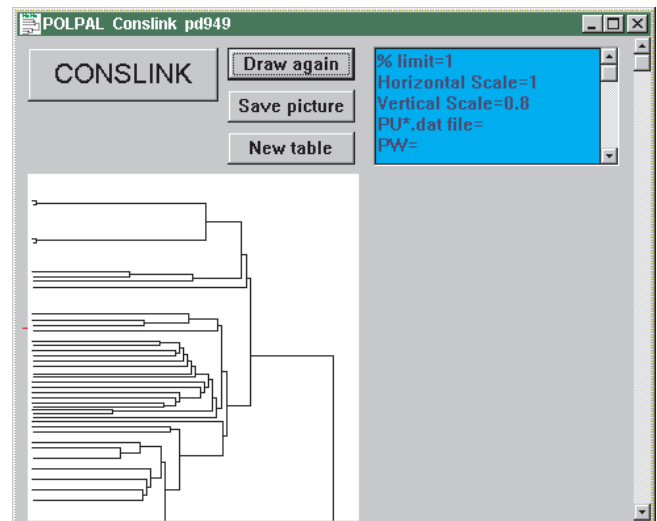

Fig. 7. Example of numerical methods: Constrained Single Link (CONSLINK)

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