

A MICROCOMPUTER PROGRAM-PACKAGE FOR LABEL PRINTING AND DATA RETRIEVAL FOR SMALL HERBARIA

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Abstract

A microcomputer program package which prints herbarium labels, retrieves and edits information has been developed. Individual labels consist of a maximum of 12 lines, each with 40 character spaces. Required number of labels are automatically printed and the label information is stored on a computer file. The paper suggests how data presented on herbarium labels might be improved and made suitable for retrieval. The program-package is portable and can be implemented on a variety of machines using different dialects of BASIC. However, due to memory and speed constraints the program is suitable for small herbaria. The advantages of computer application as related to herbarium procedures are discussed.

Introduction

Information presented on herbarium labels constitutes the most fundamental and essential part of permanent plant specimens. The usefulness and relevance of herbarium specimens is often judged by the collection data given on the label. The label provides data of the plant and its habitat, and ideally includes such information as botanical name and its authority, specific geographic location, habitat data, collector(s), date of collection and collection number. Besides often, additional information is given on labels such as associated plants, flower colour, pollinators, bark, abundance, height or diameter at breast height, life form, economic uses, etc. The importance of the labels on the type specimens becomes many fold as the authenticity of a nomenclatural type mainly depends upon the information given on the labels which should match with the original publication. Therefore illegible labels written in poor hand writing offer difficulties while typifying a taxon. One has to spend enormous amount of time in reading such labels. Because of their great importance in taxonomy and systematics, herbarium labels must be neat, legible and permanent. As a first step in most taxonomic researches such as the variation pattern or geographical distribution large number of specimens of a taxon from various localities must be studied. One has to lend/borrow specimens to obtain locality information from the labels. Thus the borrowing of the specimens, is fairly expensive and the specimens could be damaged during transportation. This could be avoided by the transmission of label data directly to the researchers.

Computers are increasingly being used in taxonomy and systematics due to their ability to store, recombine and retrieve huge amount of information with great accuracy and efficiency. One important use in systematics is the herbarium collection database and their management (Hall, 1972; Mellor, 1974; Morse, 1974; Allkin & Bisby, 1984;

Beaman & Regaldo, 1989; Macrander & Haynes, 1990; Green, 1994). Unfortunately most of the program packages for taxonomic database management have been developed for mainframe or minicomputers (Argus & Sheard, 1972). However, most taxonomists have access to microcomputers. If the database management systems are to gain any general acceptance among systematists, they should be portable and adaptable to the memory and speed constraints of these smaller computers.

To be efficient and user-friendly the label printing and taxonomic data-banking program-package should be designed to meet the following criteria:

1. The program should be written in a widely used and understood language that can be implemented on a wide range of machines including microcomputers.
2. The programs should be interactive and the input of information should be rapid and simple.
3. Allowance should be made for editing before label printing or storage in the data files.
4. Provision should be made for likely lengths of fields making up the record.
5. For operations on data retrieval, options should be provided for ordering and listing of the nature and frequency of different taxa.
6. Ample facility should be provided to amend or edit the data files.

The program-package

The present program-package is specially designed for BASIC interpreters and compilers on microcomputers operating under MSDOS/PCDOS. Although BASICA has been used, the idiosyncrasies of the particular dialect of BASIC are kept to minimum so that with minor modifications the package is easily implemented on other machines. BASIC was preferred because it is relatively powerful, versatile, most widely used and understood language.

The package, which is menu driven consists of four programs including LABELS for printing herbarium labels and storing information on data files, RETRIEVE for data retrieval and EDITINF to amend or manipulate the data file and MAIN a program providing the main menu. A brief description and capabilities of these programs is given in the sequel.

LABELS: This is an interactive program which prints labels via a dot-matrix, NLQ, laser, or a line printer. The major advantages of this program are reduction in time and cost of printing.

The labels are printed on a good quality bond paper. Each labels is 6.5x11.5 cm and four replicas are printed on a 21.5x28 cm page of continuous feed paper. The program consists of placing into a sequential access computer file, via the keyboard, the fundamental label information of upto 12 different items (Fig. 1). Each printed label contains the heading (which is changeable) "Karachi University Herbarium (KUH)".

The label format (Fig. 1) includes:

Species: Here the user provides the scientific name of the taxon (generic and specific epithets). If the identification has been carried out to intraspecific level, it should be provided by the addition of its rank such as using *ssp.*, for subspecies, *var.*, for variety and *form.*, for forma. If the taxon name is longer than 28 characters the program adjusts the name in two lines.

```

* * * * *
*
*   KARACHI UNIVERSITY HERBARIUM (KUH)
*
* SPECIES....  Gentianodes nasirii
* Omer Ali & Qaiser
* FAMILY.....  Gentianaceae
* HABIT.....  herb
* FLOWER COLOUR deep blue
* ADDIT. INFO. holotype common 11-11600 ft.
* HABITAT....  open places
* ALTITUDE...  11000 ft.
* LOCALITY...  Rd. to mt. Makra Kaghan
* COLLECTION NO.31144  DATE 24-06-1978
* COLLECTOR..  Y. Nasir & W. Meiyer
*
* * * * *

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Fig. 1. An example of a completed herbarium label printed on a laser printer.

Authority: The user enters the authority as per recommendations of International Code of Botanical Nomenclature. If the character length of this item fits in front of the scientific name then it is printed on the same line else it is printed on the next line.

Family: The user enters the family name. First letter of the family name should be capital and the rest small.

Habit: The user enters the habit and the growth form.

Flower colour: If this is not known, the user enters a dash.

Additional information: Here the operator provides information such as associated plants, pollinators, bark, height or diameter at breast height. If a specimen constitutes the "type" material then the particular information about the kind of type (isotype, holotype, etc.) can be entered.

Locality: A locality name is provided. Grid location may be added. Distance and compass direction from a named place can also be entered. Maximum character length for this entry is 33 characters.

Habitat: The user enters the habitat type. The characterization of habitat stresses soil type (condition) and/or topographic situation, dominant growth form or type of disturbance. Name of host plant for an epiphyte or parasite should be given as part of the habitat's description.

Altitude: The user enters an estimate of altitude to the nearest hundred feet. The altitude may not be important in lowlands, but for mountainous regions, it becomes an essential part of the label.

Collector: The user enters the initials and surname of the principal collector of the specimen. Names of additional collectors should be limited to two. Titles of persons such as Dr., Prof., Mrs., etc. should be omitted.

Collection Number: Each specimen is assigned a unique collection number. Exact duplicates in time and space are given the same collection number. The program enquires about the number of duplicate labels required.

Date: The day, month, and year of the collection (dd-mm-yyyy) is entered by the user.

In contrast to photocopy, mimeograph or other means of duplication, replicas of the herbarium labels are produced automatically. The computer-based system also has the added advantage that a permanent record of all the information on the labels is retained in a computer file.

RETRIEVE: The data stored in the sequential access file (DATBASE1) while printing labels can be retrieved through this program. Options are available to retrieve data on family, genus or species (or infra-specific category). Information on four variables other than the species name can be retrieved at a time. The program enquires about the variables on which information is required. The program output includes the sorted list of the species along with the information on four variables. The program also gives the total number of records in the file and the frequency of the taxon. Option is provided to print the required list and to save it on a disc file.

EDITINF: This program permits the user to edit the data file DATBASE1. When nomenclatural changes occur in various taxa it becomes necessary to incorporate such changes in the data file. Options are available to edit a particular family, genus or species. Specific records are modified by the user in an interactive manner. Once the modifications are made the edited data file is saved on the disc.

MAIN: This program serves to link rest of the programs in the package when the user runs this program, the main menu is displayed. Option are available of gaining access to LABELS, RETRIEVE, EDITINF or ending up the session. From any of the program in the package the user has the facility to go back to the MAIN program. Thus, this program serves to achieve greater efficiency and control in the use of the package.

The label printing and data retrieval system presented here operates in the computer under the control of four program modules of which three are application programs while the fourth is a control program linking up the system. The suggestions made regarding the information presented on the labels will standardize the herbarium procedure (Beschell & Soper, 1970). The package is portable and compatible with a wide range of computers though it is particularly designed for microcomputers with 80386 and 80486 processors using PCDOS/MSDOS. With slight modifications the programs can use almost all the dialects of BASIC. Rapid processing of data in the RETRIEVAL program was achieved using an efficient sorting algorithm. Listing of the programs are presented in Appendix 1. The entire package is available on diskettes from the authors.

APPENDIX - 1
MAIN

```

10  REM MAIN MENU PROGRAM
20  REM PROGRAMMER : S.SHAHID SHAUKAT
30  REM COPYRIGHT (C):S.SHAHID SHAUKAT & M. QAISER
40  A$="***** "
50  CLS
60  PRINT
70  PRINT TAB(18);A$;A$;A$
80  PRINT TAB(18);" ";TAB(64);" "
90  PRINT TAB(18);" ";TAB(30);"M A I N M E N U ";TAB(64);" "
100 PRINT TAB(18);" ";TAB(64);" "
110 PRINT TAB(18);A$;A$;A$
120 PRINT
130 PRINT TAB(18);A$;A$;A$
140 PRINT TAB(18);" ";TAB(32);"O P T I O N S ";TAB(64);" "
150 PRINT TAB(18);" ";TAB(22);"1. PRINT HERBARIUM
    LABELS";TAB(64);" "
160 PRINT TAB(18);" ";TAB(64);" "
170 PRINT TAB(18);" ";TAB(22);"2. RETRIEVE INFORMATION ";TAB(64);" "
180 PRINT TAB(18);" ";TAB(64);" "
190 PRINT TAB(18);" ";TAB(22);"3. EDIT INFORMATION ";TAB(64);" "
200 PRINT TAB(18);" ";TAB(64);" "
210 PRINT TAB(18);" ";TAB(22);"4. END SESSION ";TAB(64);" "
220 PRINT TAB(18);" ";TAB(64);" "
230 PRINT TAB(18);A$;A$;A$
240 PRINT TAB(22);"PROVIDE THE OPTION NUMBER ";:INPUT N
250 ON N GOTO 260,270,280,290
260 RUN "LABELS"
270 RUN "RETRIEVE"
280 RUN "EDITINF"
290 CLS:END

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LABELS

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10  REM
20  CLS
30  PRINT TAB(10);"***** PROGRAM: LABELS ***** "
40  PRINT
50  REM PROGRAMER :S.S.SHAUKAT
60  REM COPYRIGHT (C) 1995: S.SHAHID SHAUKAT & M.QAISER
70  A$="***** "
80  X=5 :Y=X+2 :Z=Y+44
90  B0$=" "

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100 T=0
110 FL$="DATABASE1"
120 W=3
130 LOCATE 2,20:INPUT "SPECIFY SPECIES ";B$
140 AA=ASC(B$):BB$=MID$(B$,2,1):CC=ASC(BB$)
150 IF AA>96 THEN :BEEP:PRINT "First letter capital please":W=W+1:GOTO
    130
160 IF CC<=90 THEN PRINT "First letter capital, all others small
    ":W=W+1:GOTO 130
170 LOCATE W,20:INPUT "SSP,VAR.,FORM.,NONE ";VR$
180 IF VR$<>"NONE" OR VR$<>"none" THEN B7$=B$+B0$+VR$
    :L0=LEN(B7$)
190 LOCATE W+1,15:INPUT "AUTHORITY ";B2$
200 LOCATE W+2,15:INPUT "SPECIFY FAMILY ";C$
210 LOCATE W+3,15:INPUT "HABIT ";B1$
220 LOCATE W+4,15:INPUT "FLOWER COLOUR ";B3$
230 LOCATE W+5,15:INPUT "ADDITIONAL INFORMATION ";B6$
240 LOCATE W+6,15:INPUT "SPECIFY LOCALITY ";D$
250 LOCATE W+7,15:INPUT "SPECIFY HABITAT ";E$
260 LOCATE W+8,15:INPUT "SPECIFY ALTITUDE ";F$
270 LOCATE W+9,15:INPUT "SPECIFY COLLECTION NO.";G$
280 LOCATE W+10,15:INPUT "SPECIFY DATE OF COLLECTION ";G1$
290 LOCATE W+11,15:INPUT "SPECIFY COLLECTOR NAME ";H$
300 M$="KARACHI UNIVERSITY HERBARIUM (KUH)"
310 LOCATE W+12,15:INPUT "HOW MANY LABELS REQUIRED ";N
320 FL$="DATABASE1"
330 Z1=LEN(B$)
340 Z1=Z1+1
350 Z2=LEN(B2$)
360 B4$=B$+B0$+B2$
370 Z4=Z1+Z2
380 LPRINT TAB(5);A$;A$;A$;A$;A$;"* * * *"
390 LPRINT TAB(X);"*";TAB(Z);"*"
400 LPRINT TAB(X);"*";TAB(Y+3);M$;TAB(Z);"*"
410 LPRINT TAB(X);"*";TAB(Z);"*"
420 IF VR$="NONE" OR VR$="none" THEN 440
430 IF VR$<>"NONE" OR VR$<>"none" THEN 480
440 IF Z4<=28 THEN 520
450 LPRINT TAB(X);"*";TAB(Y);"SPECIES...";TAB(21);B$;TAB(Z);"*"
460 LPRINT TAB(X);"*";TAB(Y);B2$;TAB(Z);"*"
470 GOTO 560
480 IF L0<=28 THEN 540
490 LPRINT TAB(X);"*";TAB(Y);"SPECIES...";TAB(21);B$;TAB(Z);"*"
500 LPRINT TAB(X);"*";TAB(Y);VR$;" ";B2$;TAB(Z);"*"
510 GOTO 560

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520 LPRINT TAB(X);"*";TAB(Y);"SPECIES....";TAB(21);B4$;TAB(Z);"*"
530 GOTO 560
540 LPRINT TAB(X);"*";TAB(Y);"SPECIES ";TAB(18);B7$;TAB(Z);"*"
550 LPRINT TAB(X);"*";TAB(Y);B2$;TAB(Z);"*"
560 LPRINT TAB(X);"*";TAB(Y);"FAMILY.....";TAB(21);C$;TAB(Z);"*"
570 LPRINT TAB(X);"*";TAB(Y);"HABIT.....";TAB(21);B1$;TAB(Z);"*"
580 LPRINT TAB(X);"*";TAB(Y);"FLOWER
    COLOUR";TAB(21);B3$;TAB(Z);"*"
590 LPRINT TAB(X);"*";TAB(Y);"ADDIT. INFO.";TAB(21);B6$;TAB(Z);"*"
600 LPRINT TAB(X);"*";TAB(Y);"HABITAT....";TAB(21);E$;TAB(Z);"*"
610 LPRINT TAB(X);"*";TAB(Y);"ALTITUDE...";TAB(21);F$;TAB(Z);"*"
620 LPRINT TAB(X);"*";TAB(Y);"LOCALITY...";TAB(21);D$;TAB(Z);"*"
630 LPRINT TAB(X);"*";TAB(Y);"COLLECTION
    NO.";TAB(21);G$;TAB(29);"DATE";
640 LPRINT TAB(34);G1$;TAB(Z);"*"
650 LPRINT TAB(X);"*";TAB(Y);"COLLECTOR..";TAB(21);H$;TAB(Z);"*"
660 LPRINT TAB(X);"*";TAB(Z);"*"
670 LPRINT TAB(X);A$;A$;A$;A$;A$;"* * * * *"
680 PRINT :PRINT:PRINT:PRINT
690 IF T=0 THEN PRINT "IF LABEL IS OK TYPE 1 FOR MORE ELSE TYPE 2
    ":INPUT KK
700 IF KK > 1 THEN 30
710 T=T+1
720 IF T < N THEN 380
730 OPEN FL$ FOR APPEND AS #1
740 WRITE #1,B$,B2$,C$,B1$,B3$,E$,F$,D$,G$,G1$,H$
750 CLOSE #1
760 CLS
770 PRINT
780 PRINT TAB(10);"PRESS ANY KEY TO CONTINUE "
790 IF INKEY$="" THEN 790
800 PRINT TAB(18);A$;A$;A$;A$;A$;"* * * * *"
810 PRINT TAB(18);"*";TAB(64);"*"
820 PRINT TAB(18);"*";TAB(34);"O P T I O N S";TAB(64);"*"
830 PRINT TAB(18);"*";TAB(22);"1. PRINT MORE LABELS ";TAB(64);"*"
840 PRINT TAB(18);"*";TAB(64);"*"
850 PRINT TAB(18);"*";TAB(22);"2. RETRIEVE INFORMATION
    ";TAB(64);"*"
860 PRINT TAB(18);"*";TAB(64);"*"
870 PRINT TAB(18);"*";TAB(22);"3. EDIT INFORMATION ";TAB(64);"*"
880 PRINT TAB(18);"*";TAB(64);"*"
890 PRINT TAB(18);"*";TAB(22);"4. GOTO MAIN MENU ";TAB(64);"*"
900 PRINT TAB(18);"*";TAB(64);"*"
910 PRINT TAB(18);"*";TAB(22);"5. END SESSION ";TAB(64);"*"
920 PRINT TAB(18);"*";TAB(64);"*"

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930 PRINT TAB(18);A$;A$;A$;A$;A$;"* * * * *"
940 PRINT
950 PRINT TAB(25);"PROVIDE OPTION NUMBER ";:INPUT N2
960 ON N2 GOTO 970,980,990,1000,1010
970 RUN "LABELS"
980 RUN "RETRIEVE"
990 RUN "EDITINF"
1000 RUN "MAIN"
1010 CLS:END

                                RETRIEVE

10  CLS
20  REM PROGRAMMER :S. SHAHID SHAUKAT
30  REM COPYRIGHT (C):S.SHAHID SHAUKAT & M.QAISER
40  REM PRGRAM TO RETRIEVE INFORMATION STORED
50  DIM U$(1000),V$(1000),W$(1000),X$(1000),Z$(1000)
60  DIM M$(12)
70  FL$="DATABASE1"
80  OPEN "I",1,FL$:REM DATA IN FILE DATABASE1
90  AA$="* * * * * * * * *"
100 PRINT TAB(18);AA$;AA$;AA$
110 PRINT TAB(18);"*";TAB(32);"O P T I O N S ";TAB(64);"*"
120 PRINT TAB(18);"*";TAB(22);"1. INFORMATION ON FAMILY
    ";TAB(64);"*"
130 PRINT TAB(18);"*";TAB(64);"*"
140 PRINT TAB(18);"*";TAB(22);"2. INFORMATION ON GENUS ";TAB(64);"*"
150 PRINT TAB(18);"*";TAB(64);"*"
160 PRINT TAB(18);"*";TAB(22);"3. INFORMATION ON SPECIES
    ";TAB(64);"*"
170 PRINT TAB(18);"*";TAB(64);"*"
180 PRINT TAB(18);"*";TAB(22);"4. GOTO MAIN MENU ";TAB(64);"*"
190 PRINT TAB(18);"*";TAB(64);"*"
200 PRINT TAB(18);"*";TAB(22);"5. END SESSION ";TAB(64);"*"
210 PRINT TAB(18);"*";TAB(64);"*"
220 PRINT TAB(18);AA$;AA$;AA$
230 LOCATE 15,27 :INPUT "TYPE THE OPTION NUMBER ";N1
240 IF N1=1 THEN LOCATE 17,27 :INPUT "WHICH FAMILY ";Q$
250 IF N1=2 THEN LOCATE 17,27 :INPUT "WHICH GENUS ";Q$
260 IF N1=3 THEN LOCATE 17,27 :INPUT "WHICH SPECIES ";Q$
270 IF N1=4 THEN CLS:RUN "MAIN"
280 IF N1=5 THEN CLS :END
290 CLS :PRINT:PRINT:PRINT
300 PRINT TAB(25);"L I S T O F V A R I A B L E S"
310 PRINT TAB(10);"1. SPECIES";TAB(30);"2. AUTHORITY";TAB(50);"3.
    FAMILY"
320 PRINT TAB(10);"4. HABIT";TAB(30);"5. FLOWER COL.";TAB(50);"6.

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680 IF J=0 AND N1=2 THEN PRINT "NO DATA ON THE GENUS ";Q$
690 IF J=0 AND N1=3 THEN PRINT "NO DATA ON THE SPECIES ";Q$
700 RETURN
710 REM SHELL SORT (Algorithm of D.A.Shell)
720 M=N
730 M=INT(M/2)
740 IF M=0 THEN 870
750 P=1
760 K=N-M
770 I=P
780 L=I+M
790 IF U$(I)<=U$(L) THEN 840
800 SWAP U$(I),U$(L): SWAP V$(I),V$(L):SWAP W$(I),W$(L)
810 SWAP X$(I),X$(L):SWAP Z$(I),Z$(L)
820 I=I-M
830 IF I>0 THEN 780
840 P=P+1
850 IF P>K THEN 730
860 GOTO 770
870 PRINT TAB(10);"THE REQUIRED LIST IS":PRINT
880 FOR I=1 TO N
890 TT=0
900 PRINT U$(I); " ";V$(I); " ";W$(I); " ";X$(I); " ";Z$(I)
910 TT=TT+1 :IF TT<=15 THEN 940
920 PRINT TAB(10);"PRESS ANY KEY TO CONTINUE " :TT=0
930 !F INKEY$=" " THEN 930
940 NEXT I
950 PRINT
960 PRINT "TOTAL SPEICIMENS OF THIS TAXON=";N :PRINT
970 PRINT TAB(10);"PRESS ANY KEY TO CONTINUE "
980 IF INKEY$=" " THEN 980
990 AG=AG+1
1000 J=0 :N=0
1010 RETURN

```

EDITINF

```

10 CLS
20 REM PRGRAMMER:S. SHAHID SHAUKAT
30 REM COPYRIGHT (C):S. SHAHID SHAUKAT & M. QAISER
40 REM PRGRAM TO EDIT INFORMATION STORED
50 REM IN DATA FILE DATBAS1....
60 AA$="*****"
70 PRINT TAB(18);AA$;AA$;AA$
80 PRINT TAB(18);"*";TAB(24);"E D I T O P T I O N S ";TAB(64);"*"
90 PRINT TAB(18);"*";TAB(22);"1. INFORMATION ON FAMILY
";TAB(64);"*"

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HABITAT"
330 PRINT TAB(10);"7. ALTITUDE";TAB(30);"8. LOCALITY ";TAB(50);"9.
    CLLECTION #"
340 PRINT TAB(10);"10. DATE ";TAB(30);"11. COLLECT. NAME"
    :PRINT:PRINT
350 PRINT TAB(10);"ON WHICH VARIABLES INFORMATION IS TO BE
    RETRIEVED "
360 PRINT TAB(10)"GIVE 4 VARIABLE NUMBERS ,EXCLUDING
    VARIABLE 1: "
370 FOR I=2 TO 5
380 PRINT "PROVIDE VAR. # ";:INPUT A(I)
390 IF A(I)> 11 THEN PRINT "NO SUCH VARIABLE, TRY AGAIN.
    ":GOTO 380
400 IF A(I)=1 THEN PRINT "SPECIES INCLUDED, TRY ANOTHER.
    ":GOTO 380
410 NEXT I :A(1)=1
420 IF N1=2 THEN L=LEN(Q$)
430 IF AG >= 1 THEN 510
440 INPUT #1,XX$
450 T=T+1
460 IF NOT EOF(1) THEN 440
470 PRINT "TOTAL ELEMENTS= ";T
480 R=T/11
490 PRINT "TOTAL # OF RECORDS=" ;R :PRINT:PRINT
500 CLOSE #1
510 GOSUB 550
520 GOSUB 710
530 IF N1 < > 4 THEN CLS :GOTO 90
540 END
550 OPEN "1",1,FL$
560 FOR I=1 TO R
570 INPUT #1,A$,B$,C$,D$,E$,F$,G$,H$,I$,J$,K$
580 M$(2)=B$:M$(3)=C$:M$(4)=D$:M$(5)=E$:M$(6)=F$:M$(7)=G$:M$(8)=H$
590 M$(9)=I$:M$(10)=J$:M$(11)=K$
600 Y$=LEFT$(A$,L)
610 IF N1=1 AND Q$=C$ THEN J=J+1:U$(J)=A$:V$(J)=M$(A(2)):W$(J)=
    M$(A(3)):X$(J)=M$(A(4)):Z$(J)=M$(A(5))
620 IF N1=2 AND Q$=Y$ THEN J=J+1:U$(J)=A$:V$(J)=M$(A(2)):W$(J)
    =M$(A(3)):X$(J)=M$(A(4)):Z$(J)=M$(A(5))
630 IF N1=3 AND Q$=A$ THEN J=J+1:U$(J)=A$:V$(J)=M$(A(2)):W$(J)
    =M$(A(3)):X$(J)=M$(A(4)):Z$(J)=M$(A(5))
640 NEXT I
650 CLOSE #1
660 N=J
670 IF J=0 AND N1=1 THEN PRINT "NO DATA ON THE FAMILY ";Q$

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100 PRINT TAB(18);"*";TAB(64);"*"
110 PRINT TAB(18);"*";TAB(22);"2. INFORMATION ON GENUS ";TAB(64);"*"
120 PRINT TAB(18);"*";TAB(64);"*"
130 PRINT TAB(18);"*";TAB(22);"3. INFORMATION ON SPECIES
    ";TAB(64);"*"
140 PRINT TAB(18);"*";TAB(64);"*"
150 PRINT TAB(18);"*";TAB(22);"4. GOTO MAIN MENU ";TAB(64);"*"
160 PRINT TAB(18);"*";TAB(64);"*"
170 PRINT TAB(18);AA$;AA$;AA$
180 LOCATE 13,27 :INPUT "TYPE THE OPTION NUMBER ";N1
190 IF N1=4 THEN CLS:RUN "MAIN"
200 F1$="DATABASE1":F2$="TEMPF"
210 OPEN "I",1,F1$
220 OPEN "O",2,F2$
230 ON N1 GOSUB 280,470,700
240 CLOSE #1,2
250 KILL "DATABASE1"
260 NAME "TEMPF" AS "DATABASE1"
270 END
280 LOCATE 15,27 :INPUT "WHICH FAMILY ";Q$
290 PRINT
300 LOCATE 17,15 :INPUT "FOR WHICH GENUS DO YOU WANT TO
    CHANGE THE FAMILY ";G1$
310 L1=LEN(G1$)
320 LOCATE 19,15 :INPUT "ENTER THE NEW FAMILY NAME FOR THIS
    GENUS ";F2$
330 IF EOF(1) THEN 460
340 INPUT #1,A$,B$,C$,D$,E$,F$,G$,H$,I$,J$,K$
350 P$=LEFT$(A$,L1)
360 IF G1$=P$ THEN C$=F2$
370 IF G1$<>P$ THEN 440
380 PRINT TAB(10);"THE NEW RECORD IS:"
390 PRINT A$,B$,C$,D$,E$,F$,G$,H$,I$,J$,K$
400 INPUT "DO YOU WISH TO RETAIN THE OLD FAMILY NAME
    (Y/N) ";AN$
410 IF AN$="Y" OR AN$="y" THEN C$=Q$:PRINT TAB(15);"THE RECORD
    IS ":PRINT A$,B$,C$,D$,E$,F$,G$,H$,I$,J$,K$
420 PRINT TAB(15);"PRESS ANY KEY TO CONTINUE"
430 IF INKEY$="" THEN 430
440 WRITE #2,A$,B$,C$,D$,E$,F$,G$,H$,I$,J$,K$
450 GOTO 330
460 RETURN
470 LOCATE 15,27 :INPUT "WHICH GENUS ";Q$
480 L3=LEN(Q$)
490 IF EOF(1) THEN 690

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500 INPUT #1,A$,B$,C$,D$,E$,F$,G$,H$,I$,J$,K$
510 L4=LEN(A$):L5=L4-(L3+1)
520 P1$=LEFT$(A$,L3)
530 IF P1$=Q$ THEN LOCATE 13,27:PRINT A$,B$,C$,D$,E$,F$,
    G$,H$,I$,J$,K$
540 PRINT : IF P1$ < > Q$ THEN 660
550 LOCATE 19,27 :INPUT "DO YOU WANT TO CHANGE THE GENUS
    (Y/N) ";AN$
560 IF AN$="N" OR AN$="n" THEN 660
570 LOCATE 20,27 :INPUT "PROVIDE THE NEW NAME FOR THE
    GENUS ";Q2$
580 LOCATE 21,27 :INPUT "PROVIDE THE AUTHORITY ";Q3$
590 PRINT
600 A$=Q2$+" "+RIGHT$(A$,L5)
610 B$=Q3$
620 PRINT TAB(10);"THE NEW RECORD IS:":PRINT
630 LOCATE 21,27:PRINT A$,B$,C$,D$,E$,F$,G$,H$,I$,J$,K$
640 PRINT TAB(15);"PRESS ANY KEY TO CONTINUE "
650 IF INKEY$="" THEN 650
660 WRITE #2,A$,B$,C$,D$,E$,F$,G$,H$,I$,J$,K$
670 CLS
680 GOTO 490
690 RETURN
700 LOCATE 15,27 :INPUT "WHICH SPECIES : WRITE FULL NAME ";Q5$
710 PRINT
720 LOCATE 16,27 :INPUT "DO YOU WANT TO CHANGE SPECIES EPITHET
    (Y/N) ";ANS$
730 IF ANS$="Y" OR ANS$="y" THEN OP=1:GOTO 760
740 LOCATE 16,27 :INPUT "DO YOU WANT TO CHANGE THE ENTIRE
    NAME (Y/N) ";ANW$
750 IF ANW$="Y" OR ANW$="y" THEN 790
760 LOCATE 17,27 :INPUT "PROVIDE THE NEW SPECIES EPITHET ";SP$
770 LOCATE 18,27:INPUT "AUTHORITY OF THIS SPECIES ";AU$
780 GOTO 820
790 LOCATE 17,27 :INPUT "PROVIDE NEW SPECIES NAME ";PP$:OP=2
800 OP=2:LOCATE 18,27:INPUT "AUTHORITY OF THIS SPECIES ";AU$
810 GOTO 880
820 L5=LEN(Q5$)
830 FOR J=1 TO L5
840 Z$=MID$(Q5$,J,1):IF Z$="" THEN L6=J-1
850 NEXT J
860 A1$=LEFT$(Q5$,L6)+" "+SP$
870 IF EOF(1) THEN 990
880 INPUT #1,A$,B$,C$,D$,E$,F$,G$,H$,I$,J$,K$
890 IF A$ < > Q5$ THEN 960

```

```
900 PRINT TAB(10); "THE NEW RECORD IS ":PRINT
910 IF QS$=A$ AND OP=1 THEN A$=A1$:B$=AU$
920 IF QS$=A$ AND OP=2 THEN A$=PP$:B$=AU$
930 LOCATE 21,27:PRINT A$,B$,C$,D$,E$,F$,G$,H$,I$,J$,K$
940 PRINT TAB(10); "PRESS ANY KEY TO CONTINUE "
950 IF INKEY$="" THEN 950
960 WRITE #2,A$,B$,C$,D$,E$,F$,G$,H$,I$,J$,K$
970 CLS
980 GOTO 870
990 RETURN
```

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