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Program for use in mollusc analysis

MOLCALC : A PET microcomputer program for use in mollusc analysis

By

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Mollusc analysis involves a number of calculations most of which are simple but time consuming. This microcomputer program written by D.Maguire is designed to speed up these tasks. Mollusc counts are recorded on duplicated sheets (Appendix 1) on which species names are also coded according to a numbered list which follows the order of Walden (1976). The same numbers are used for the reference collection at Bristol and the use of numbers cuts down the characters that have to be typed into the PET. Most numbers are prefixed by a letter which designates membership of an ecological group as originally defined by Evans (1972) :

A - Woodland
B - Catholic
C - Open Country

These groupings give a good general guide to broad ecological changes which is particularly convenient for graphical presentation. Attribution to one or other of these broad groupings should not, however, be taken in too literal a way. Recent research has shown that restricted groupings of "woodland" species are found in certain specilized types of "open" environment, e.g. tall grassland (Cameron and Morgan-Huws 1975), or rock rubble (Evans and Jones 1973).

The following calculations are made by the program:-

(i) The proportion of each species (Cecilioides acicula, a burrowing species excluded).

(ii) The percentage of each species (Cecilioides acicula, a burrowing species excluded).

(iii) The percentage of C.acicula calculated over and above the rest of the assemblage.

$$\frac{\text{No. of C.acicula}}{\text{No.of all sp. + C.acicula}} \times 100$$

(iv) Total percentages in the 3 ecological groups.

Most of the above calculations are a prelude to construction of a mollusc diagram. In addition the program calculates the index of species diversity, the method employed being the Shannon-Wiener function:-

$$H' = -\sum_{i=1}^{S} (pi)(\log pi)$$

H' = index of species diversity
S = Number of species
pi = Proportion of total sample belonging to i^{th} species

The use of this function has been described by Krebs (1978, pp.449-487) and by Pielou (1969, pp.221-235). Calculation of the function is an aid to interpretation because, regardless of the individual ecological preferences of the species involved, we can predict that a complex ecosystem with a range of micro-habitats (e.g. broad leaved woods with several storeys of vegetation) will have a high index of diversity compared to a simple ecosystem with few micro-habitats (e.g. arable land). Useful as it is to have some measure of diversity we must clearly exercise caution in applying it to sub-fossil assemblages where, depending on the context, we face varying levels of uncertainty as to whether all the species lived together as an ecological community at one time and place.

Operating the program

The program is designed to run on Commodore 3000 and 4000 series PET microcomputers and an option is available for printer output if a line printer, such as the PET tractor printer 3022, is connected. A printout of the complete program is given below in Appendix 2. Copies of the program on magnetic tape can be obtained from the authors. The following is the procedure to operate the program:-

(i) Switch on power to machine and line printer.
(ii) Insert rewound cassette containing program - side naming program uppermost.
(iii) Type 'LOAD' followed by < RETURN >

(iv) Press < PLAY > button on cassette player.

(v) When the machine prints 'READY' stop rewind, eject and store cassette.

(vi) Type 'RUN' < RETURN > - repeat this command for each new sample.

Use of the program is illustrated by a worked example (Appendix 3) which is taken from the analysis of Coneybury Henge Mollusca (Bell and Shackleton 1982); the original count sheets are given in Appendix 4.

Conclusions

The program took only two or three days to prepare and modify and has reduced to a fraction the time taken to calculate mollusc results and has in addition made possible calculation of the Shannon-Wiener function. Various further modifications are desirable notably the calculation of standard errors for the Shannon-Wiener function since its reliability depends very much on the number of spices in each sample.

Acknowledgements

We are grateful to Dr. John Evans who originally suggested the use of indices of diversity in mollusc analysis and who has provided many helpful suggestions.

References

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Appendix 1

MOLLUSC ANALYSIS

Site: CONEYBURY

Sample: 140-150 cm

Wt. of soil: 2358 gms.

Code	Species	No.	%
B1	Pomatias elegans (Müller)	135	
A3	Acicula fusca (Montagu)		
A4	Carychium minimum Müller		
A5	Carychium tridentatum (Risso)	776	
8	Succinea putris (Linnaeus)		
9	Succinea oblonga Draparnaud		
10	Oxyloma pfeifferi (Rossmässler)		
11	Oxyloma sarsi (Esmark)		
B13	Cochlicopa lubrica (Müller)	13	
B14	Cochlicopa lubricella (Porro)	21	
B204	Cochlicopa spp.	81	
C24	Vertigo pygmaea (Draparnaud)	7	
C206	Vertigo spp.		
C30	Abida secale (Draparnaud)		
C31	Pupilla muscorum (Linnaeus)	18	
A33	Lauria cylindracea (Da Costa)		
C35	Vallonia costata (Müller)	74	
C36	Vallonia pulchella (Müller)		
C37	Vallonia excentrica Sterki	17	
C205	Vallonia spp.		
A38	Acanthinula aculeata (Müller)	67	
A40	Ena montana (Draparnaud)		
A41	Ena obscura (Müller)	17	
A42	Punctum pygmaeum (Draparnaud)	29	
A43	Discus rotundatus (Müller)	267	
	Arionidae		
A54	Vitrina pellucida (Müller)	7	
A58	Vitrea crystallina (Müller)	9	
A59	Vitrea contracta (Westerlund)	163	
A60	Nesovitrea hammonis (Ström)	40	
A61	Aegopinella pura (Alder)	195	

Code	Species	No.	%
A62	Aegopinella nitidula (Draparnaud)	51	
63	Oxychilus draparnaudi (Beck)		
A64	Oxychilus cellarius (Müller)	44	
A65	Oxychilus alliarius (Miller)		
B201	Limacidae	17	
A82	Euconulus fulvus (Müller)		
84	Cecilioides acicula (Müller)		
A85	Cochlodina laminata (Montagu)		
A86	Macrogastra rolphii (Turton)		
A87	Clausilia bidentata (Ström)	40	
A90	Balea perversa (Linnaeus)		
A202	Clausiliidae		
C95	Candidula intersecta (Poiret)		
C96	Candidula gigaxii (L.Pfeiffer)		
C97	Cernvella virgata (Da Costa)		
C98	Helicella itala (Linnaeus)	48	
C99	Cochlicella acuta (Müller)		
C100	Monacha cartusiana (Müller)		
C101	Monacha cantiana (Montagu)		
A106	Trichia striolata (C.Pfeiffer)		
B108	Trichia hispida (Linnaeus)	29	
A110	Helicodonta obvoluta (Müller)		
B111	Arianta arbustorum (Linnaeus)		
A112	Helicigona lapicida (Linnaeus)	1	
B114	Cepaea nemoralis (Linnaeus)		
B115	Cepaea hortensis (Müller)		
B203	Cepaea spp.	29	
116	Helix aspersa (Müller)		

No. of Taxa = 26 Total (minus C.acicula)= 2195

Appendix 2

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READY.

 1 REM DJM MOLCALC WRITTEN BY D.J. MAGUIRE, UNIVERSITY OF BRISTOL, DEPT. GEO
 2 REM 11/6/82
 3 REM---
 4 PRINT"■■■■    ■■■■■              DJM"
 5 PRINT"        ■■         (■MOLCALC■)"
 6 PRINT
 7 PRINT"              ■■■■■**PLEASE WAIT**"
 8 FOR L=1 TO 2000:NEXT L
 9 REM---
10 SUM=0:SPE=0:SWO=0:SBE=0:SOP=0:SPO=0:SXP=0:SZ=0:AB=0
11 DIM M$(200):DIM V(200):DIM PRO(200):DIM PER(200):DIM XPI(200)
12 PRINT"■"
13 PRINT
14 PRINT"YOU WILL NEED TO ENTER THE FOLLOWING"
15 PRINT"■SAMPLE CODE (CHALK 2 22-23 CM)"
16 PRINT"MOLLUSC TYPE (A1),COUNT(26)"
17 PRINT"NUMBER OF MOLLUSC TYPES (22) EXCLUDING  C.ACICULA"
18 PRINT"NUMBER OF C. ACICULA
19 PRINT"■YOU WILL THEN BE GIVEN THE CHANCE TO    CORRECT ANY MISTAKES"
20 PRINT"■■■■■■■":    GOSUB 253
21 REM---
22 PRINT
23 W$="SAMPLE CODE ":PRINT W$:INPUT VB$
24 PRINT"NUMBER MOLLUSC TYPES=":INPUT N
25 IF N <200 THEN GOTO 29
26 PRINT"NUMBER OF TYPES MUST BE<100"
27 GOTO 24
28 PRINT
29 PRINT"NUMBER OF C. ACICULA":INPUT NAP
30 FOR I=1 TO N
31 PRINT
32 INPUT"MOLLUSC NAME,NUMBER    ";M$(I),V(I)
33 SUM=SUM+V(I)
34 NEXT I
35 REM ---
36 GOSUB 243
37 PRINT"■***** CALCULATING ***"
38 REM---
39 FOR J= 1 TO N
40 PRO(J)=(V(J)/SUM)
41 PER(J)=PRO(J)*100
42 SPE=SPE+PRO(J)
43 SPO=SPO+PER(J)
44 AB=PRO(J)
45 JLO=(LOG(AB))
46 XPI(J)=(PRO(J)*(JLO))
47 SZ=NAP+SUM
48 TCA=((NAP/SZ)*100)
49 SXP=SXP+XPI(J)
50 NEXT J
51 SXP=ABS(SXP)
52 FOR J=1TON
53 IF LEFT$(M$(J),1)="A"THEN GOSUB 112
54 IF LEFT$(M$(J),1)="B"THEN GOSUB 114
55 IF LEFT$(M$(J),1)="C"THEN GOSUB 116
56 NEXT J
57 FOR J=1TON:GOSUB 119:NEXTJ
58 GOTO 277
59 OPEN 3,4
60 OPEN 2,4,1
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61 OPEN 8,4,2
62 OPEN 4,4,4
63 F$="AAAAAAAAAAAAAAAAAAAAAAAAAAAA   999      Z.9999    999.99    99.999"
64 PRINT#4
65 PRINT#8,F$
66 PRINT#3,
67 PRINT#3,
68 PRINT#3,CHR$(1)"MOLCALC. (DJM OCT. 81)"CHR$(129)
69 PRINT#3,
70 PRINT#3,
71 Z$="------------------------------------------------------------------------
72 PRINT#3,
73 PRINT#3,W$;VB$
74 PRINT#3,
75 PRINT#3,
76 PRINT#3,"NAME                                    COUNT      PROP          %
77 PRINT#3,
78 FOR J= 1 TO N
79 PRINT#2,M$(J),CHR$(29),V(J),PRO(J),PER(J),XPI(J)
80 NEXT J
81 CLOSE 2,4,1
82 PRINT#3,
83 PRINT#3,Z$
84 PRINT#3,"% C. ACICULA=";TCA,"COUNT=";NAP
85 PRINT#3,Z$
86 PRINT#3,"SUM MOLLUSC COUNTS=";SUM,"NO. TAXA=";N
87 PRINT#3,"SUM MOLLUSC PROPORTIONS=";SPE
88 PRINT#3,"SUM MOLLUSC PERCENTAGES=";SPO
89 SAB=ABS(SXP)
90 PRINT#3,Z$
91 PRINT#3,"SHANNON-WIENER FUNCTION=";SXP
92 PRINT#3,Z$
93 OPEN 9,4,2
94 OPEN 7,4,1
95 JJ$="AAAAAAAAAAAAAAAA 99.99"
96 PRINT#9,JJ$
97 PRINT#7,"% WOODLAND=",CHR$(29),SWO
98 PRINT#7,"% INTERMEDIATE=",CHR$(29),SBE
99 PRINT#7,"% OPEN COUNTRY=",CHR$(29),SOP
100 PRINT#3,
101 CLOSE 9,4,2
102 CLOSE 7,4,1
103 GOTO 110
104 REM---
105 PRINT"■■DO YOU WANT LINE PRINTER OUTPUT"
106 PRINT"ANS(Y OR N)"
107 INPUT LP$:IF LP$ <>"Y" AND LP$<>"N" GOTO 106
108 IF LP$="Y" THEN GOTO 59
109 REM---
110 PRINT"■■TYPE RUN <RETURN> FOR ANOTHER SAMPLE"
111 STOP
112 SWO=SWO+PER(J)
113 RETURN
114 SBE=SBE+PER(J)
115 RETURN
116 SOP=SOP+PER(J)
117 RETURN
118 REM---
119 IF M$(J)="C30"THEN M$(J)="ABIDA SECALE":PRINT"■■IN SUB "
120 IFM$(J)="A38"THENM$(J)="ACANTHINULA ACULEATA"
121 IF M$(J)="A3"THENM$(J)="ACICULA FUSCA"
122 IF M$(J)="A62"THENM$(J)="AEGOPINELLA NITIDULA"
123 IF M$(J)="A61"THENM$(J)="AEGOPINELLA PURA"
124 IF M$(J)="B111"THENM$(J)="ARIANTA ARBUSTORUM"
125 IF M$(J)="45"THENM$(J)="ARION ATER"
126 IF M$(J)="49"THENM$(J)="ARION CIRCUMSCRIPTUS"
127 IFM$(J)="51"THENM$(J)="ARION FASIATUS"
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128 IF M$(J)="52"THENM$(J)="ARION HORTENSIS"
129 IFM$(J)="53"THENM$(J)="ARION INTERMEDIUS"
130 IF M$(J)="47"THENM$(J)="ARION LUSITANICUS"
131 IF M$(J)="46"THEN M$(J)="ARION RUFUS
132 IF M$(J)="50"THENM$(J)="ARION SILVATICUS"
133 IF M$(J)="48"THENM$(J)="ARION SUBFUSCUS"
134 IFM$(J)="102"THENM$(J)="ASHFORDIA GRANULATA"
135 IFM$(J)="2"THEN$(J)="ASSIMINEA GRAYANA"
136 IFM$(J)="12" THENM$(J)="AZECA GOODALLI"
137 IF M$(J)="A90" THEN M$(J)="BALEA PERVERSA"
138 IFM$(J)="94" THEN M$(J)="BRADYBAENA FRUTICUM"
139 IFM$(J)="C96" THEN M$(J)="CANDIDULA GIGAZII"
140 IFM$(J)="C95" THEN M$(J)="CANDIDULA INTERSECTA"
141 IF M$(J)="A4" THEN M$(J)="CARYCHIUM MINIMUM"
142 IF M$(J)="A5" THEN M$(J)="CARYCHIUM TRIDENTATUM "
143 IF M$(J)="7" THEN M$(J)="CATINELLA ARENARIA"
144 IFM$(J)="84" THEN M$(J)="CECILIOIDES ACICULA"
145 IFM$(J)="B203" THEN M$(J)="CEPAEA SPP."
146 IFM$(J)="B115"THEN M$(J)="CEPAEA HORTENSIS"
147 IFM$(J)="B114"THEN M$(J)="CEPAEA NEMORALIS"
148 IFM$(J)="C97" THEN M$(J)="CERNUELLA VIRGATA"
149 IFM$(J)="A87" THEN M$(J)="CLAUSILIA BIDENTATA"
150 IFM$(J)="88" THEN M$(J)="CLAUSILIA DUBIA"
151 IF M$(J)="A202" THEN M$(J)="CLAUSILIIDAE"
152 IF M$(J)="C99" THEN M$(J)="COCHLICELLA ACUTA"
153 IF M$(J)="B204" THEN M$(J)="COCHLICOPA SPP."
154 IFM$(J)="B13" THEN M$(J)="COCHLICOPA LUBRICA"
155 IFM$(J)="B14" THEN M$(J)="COCHLICOPA LUBRICELLA"
156 IFM$(J)="A85" THEN M$(J)="COCHLODINA LAMINATA"
157 IFM$(J)="17" THEN M$(J)="COLUMELLA ASPERSA"
158 IFM$(J)="A16" THEN M$(J)="COLUMELLA EDENTULA"
159 IFM$(J)="18" THEN M$(J)="COLUMELLA"
160 IF M$(J)="81"THEN M$(J)="DEROCERAS"
161 IFM$(J)="79" THEN M$(J)="DEROCERAS AGRESTE"
162 IF M$(J)="78" THEN M$(J)="DEROCERAS LAEVE"
163 IF M$(J)="80" THEN M$(J)="DEROCERAS RETICULATUM"
164 IF M$(J)="A43" THEN M$(J)="DISCUS ROTUNDATUS"
165 IFM$(J)="A40" THEN M$(J)="ENA MONTANA"
166 IF M$(J)="A41" THEN M$(J)="ENA OBSCURA"
167 IFM$(J)="83" THEN M$(J)="EUCONULUS ALDERI"
168 IF M$(J)="A82" THEN M$(J)="EUCONULUS FULVUS"
169 IF M$(J)="44" THEN M$(J)="GEOMALACUS MACULOSUS"
170 IF M$(J)="C98" THEN M$(J)="HELICELLA ITALA"
171 IF M$(J)="A112" THEN M$(J)="HELICIGONA LAPICIDA"
172 IF M$(J)="A110" THEN M$(J)="HELICODONTA OBVOLUTA"
173 IF M$(J)="116" THEN M$(J)="HELIX ASPERSA"
174 IF M$(J)="117" THEN M$(J)="HELIX POMATIA"
175 IF M$(J)="104" THEN M$(J)="HYGROMIA CINCTELLA"
176 IFM$(J)="105" THEN M$(J)="HYGROMIA LIMBATA"
177 IF M$(J)="89" THEN M$(J)="LACINIARIA BIPLICATA"
178 IF M$(J)="A33" THEN M$(J)="LAURIA CYLINDRACEA"
179 IF M$(J)="34" THEN M$(J)="LAURIA SEMPRONII"
180 IFM$(J)="32" THEN M$(J)="LEIOSTYLA ANGLICA"
181 IF M$(J)="B201" THEN M$(J)="LIMACIDAE"
182 IFM$(J)="73" THEN M$(J)="LIMAX CINEREONIGER"
183 IF M$(J)="74" THEN M$(J)="LIMAX FLAVUS"
184 IF M$(J)="75" THEN M$(J)="LIMAX GROSSUI"
185 IF M$(J)="77" THEN M$(J)="LIMAX MARGINATUS"
186 IF M$(J)="72" THEN M$(J)="LIMAX MAXIMUS"
187 IF M$(J)="76" THEN M$(J)="LIMAX TENELLUS"
188 IF M$(J)="A86" THEN M$(J)="MACROGASTA ROLPHII"
189 IF M$(J)="71" THEN M$(J)="MILAX BUDAPESTENSIS"
190 IF M$(J)="69" THEN M$(J)="MILAX GAGATES"
191 IF M$(J)="70" THEN M$(J)="MILAX SOWERBYI"
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192 IF M$(J)="101" THEN M$(J)="MONACHA CANTIANA"
193 IF M$(J)="C100" THEN M$(J)="MONACHA CARTUSIANA"
194 IFM$(J)="A60" THEN M$(J)="NESOVITREA HAMMONIS"
195 IFM$(J)="6" THEN M$(J)="OVATELLA MYOSOTIS"
196 IF M$(J)="A65" THEN M$(J)="OXYCHILUS ALLIARIUS"
197 IF M$(J)="A64" THEN M$(J)="OXYCHILUS CELLARIUS"
198 IF M$(J)="63" THEN M$(J)="OXYCHILUS DRAPARNAUDI"
199 IF M$(J)="A66" THEN M$(J)="OXYCHILUS HELVETICUS"
200 IF M$(J)="10" THEN M$(J)="OXYLOMA PFEIFFERI"
201 IF M$(J)="11" THEN M$(J)="OXYLOMA SARSI"
202 IF M$(J)="56" THEN M$(J)="PHENACOLIMAX MAJOR"
203 IF M$(J)="B1" THEN M$(J)="POMATIAS ELEGANS"
204 IF M$(J)="109" THEN M$(J)="PONENTINA SUBVIRESCENS"
205 IF M$(J)="A42" THEN M$(J)="PUNCTUM PYGMAEUM"
206 IF M$(J)="C31" THEN M$(J)="PUPILLA MUSCORUM"
207 IF M$(J)="C15" THEN M$(J)="PYRAMIDULA RUPESTRIS"
208 IF M$(J)="55"THEN M$(J)="SEMILIMAX PYRENAICUS"
209 IF M$(J)="A39" THEN M$(J)="SPERMODEA LAMELLATA"
210 IF M$(J)="9" THEN M$(J)="SUCCINEA OBLONGA"
211 IFM$(J)="8" THEN M$(J)="SUCCINEA PUTRIS"
212 IF M$(J)="92" THEN M$(J)="TESTACELLA HALIOTIDEA"
213 IF M$(J)="91" THEN M$(J)="TESTACELLA MAUGEI"
214 IF M$(J)="93" THEN M$(J)="TESTACELLA SCUTULUM"
215 IF M$(J)="113" THEN M$(J)="THEBA PISANA"
216 IF M$(J)="B108" THEN M$(J)="TRICHIA HISPIDA"
217 IF M$(J)="107" THEN M$(J)="TRICHIA PLEBEIA"
218 IF M$(J)="A106" THEN M$(J)="TRICHIA STRIOLATA"
219 IFM$(J)="20" THEN M$(J)="TRUNCATELLINA CALLICRATIS BRITANNICA"
220 IFM$(J)="C19" THEN M$(J)="TRUNCATELLINA CYLINDRICA"
221 IF M$(J)="C205"THEN M$(J)="VALLONIA SPP."
222 IFM$(J)="C35" THEN M$(J)="VALLONIA COSTATA"
223 IF M$(J)="C37" THEN M$(J)="VALLONIA EXCENTRICA"
224 IF M$(J)="C36" THEN M$(J)="VALLONIA PULCHELLA"
225 IF M$(J)="206" THEN M$(J)="VERTIGO SPP."
226 IF M$(J)="A27" THEN M$(J)="VERTIGO ALPESTRIS"
227 IF M$(J)="29" THEN M$(J)="VERTIGO ANGUSTIOR"
228 IF M$(J)="22" THEN M$(J)="VERTIGO ANTIVERTIGO"
229 IF M$(J)="28" THEN M$(J)="VERTIGO GEYERI"
230 IF M$(J)="26"  THEN M$(J)="VERTIGO LILLJEBORGI"
231 IF M$(J)="25" THEN M$(J)="VERTIGO MOULINSIANA"
232 IF M$(J)="A21" THEN M$(J)="VERTIGO PUSILLA"
233 IF M$(J)="C24" THEN M$(J)="VERTIGO PYGMAEA"
234 IF M$(J)="A23" THEN M$(J)="VERTIGO SUBSTRIATA"
235 IF M$(J)="A59" THEN M$(J)="VITREA CONTRACTA"
236 IFM$(J)="A58" THEN M$(J)="VITREA CRYSTALLINA"
237 IF M$(J)="57" THEN M$(J)="VITREA SUBRIMATA"
238 IF M$(J)="A54" THEN M$(J)="VITRINA PELLUCIDA"
239 IF M$(J)="103" THEN M$(J)="ZENOBIELLA SUBRUFESCENS"
240 IF M$(J)="A67" THEN M$(J)="ZONITOIDES EXCAVATUS"
241 IF M$(J)="68" THEN M$(J)="ZONITOIDES NITIDUS"
242 RETURN
243 REM---
244 PRINT"□DATA CHECKING PHASE"
245 PRINT"■THE MOLLUSC NAME AND COUNT WILL"
246 PRINT"BE PRINTED ON THE SCREEN"
247 PRINT"PLEASE CHECK THEM FOR ERRORS"
248 PRINT"REMEMBER THE NUMBER OF ANY LINES"
249 PRINT"WITH MISTAKES"
250 GOSUB 253:FORJ=1TON:PRINT J,"■■■■■";M$(J):PRINT"□";TAB(25);V(J)
251 GOSUB 259:NEXTJ:GOSUB 253:GOSUB 263
252 RETURN
253 PRINT"■** HIT 'C' KEY TO CONTINUE **"
254 GETC$
255 IF C$<>"C" GOTO 254
256 COU=0
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257 PRINT"□"
258 RETURN
259 COU=COU+1
260 IF COU<19 THEN GOTO 258
261 GOSUB 253
262 RETURN
263 REM---EDITING SUB ROUTINE
264 PRINT"□■EDITING PHASE"
265 PRINT"■DO YOU WISH TO CHANGE A NAME OR COUNT   (Y OR N)?"
266 INPUT Y$
267 IF Y$="N" THEN RETURN
268 IF Y$<>"Y" THEN GOTO 265
269 PRINT"■WHICH NUMBER WAS THE NAME/COUNT"
270 INPUT J
271 IF J<1 OR J>N THEN GOTO 269
272 PRINT"■ITS CURRENT NAME AND COUNT ARE":PRINT M$(J),V(J)
273 PRINT"■NOW TYPE THE CORRECT NAME AND COUNT"
274 INPUT M$(J),V(J)
275 GOTO 265
276 REM---
277 GOSUB 253
278 PRINT"□NAME                    %        %P"
279 PRINT"■"
280 FOR J=1TON
281 PRINTM$(J)
282 PRINT"□";TAB(20);PER(J)
283 PRINT"□";TAB(26);SXP
284 COU=COU+1
285 GOSUB 259
286 NEXT J
287 PRINT"-----------------------------------------"
288 PRINT"SHANNON-WEINER FUCTION=";SXP
289 PRINT"■% WOODLAND=";SWO
290 PRINT"% INTERMEDIATE=";SBE
291 PRINT"% OPEN COUNTRY=";SOP
292 PRINT"■% C. ACICULA=";TCA,"COUNT=";NAP
293 GOSUB 253
294 GOTO 104
READY.
```

Appendix 3

MOLCALC. <DJM OCT. 81>

SAMPLE CODE CONEYBURY 140-150 CM

NAME	COUNT	PROP	%	MPI
POMATIAS ELEGANS	135	0.0615	6.15	.171
CARYCHIUM TRIDENTATUM	776	0.3535	35.35	.367
COCHLICOPA LUBRICA	13	0.0059	.59	.030
COCHLICOPA LUBRICELLA	21	0.0095	.95	.044
COCHLICOPA SPP.	81	0.0369	3.69	.121
VERTIGO PYGMAEA	7	0.0031	.31	.018
PUPILLA MUSCORUM	18	0.0082	.82	.039
VALLONIA COSTATA	74	0.0337	3.37	.114
VALLONIA EXCENTRICA	17	0.0077	.77	.037
ACANTHINULA ACULEATA	67	0.0305	3.05	.106
ENA OBSCURA	17	0.0077	.77	.037
PUNCTUM PYGMAEUM	29	0.0132	1.32	.057
DISCUS ROTUNDATUS	267	0.1216	12.16	.256
VITRINA PELLUCIDA	7	0.0031	.31	.018
VITREA CRYSTALLINA	9	0.0041	.41	.022
VITREA CONTRACTA	163	0.0742	7.42	.193
NESOVITREA HAMMONIS	40	0.0182	1.82	.072
AEGOPINELLA PURA	195	0.0888	8.88	.215
AEGOPINELLA NITIDULA	51	0.0232	2.32	.087
OXYCHILUS CELLARIUS	44	0.0200	2.00	.078
LIMACIDAE	17	0.0077	.77	.037
CLAUSILIA BIDENTATA	40	0.0182	1.82	.072
HELICELLA ITALA	48	0.0218	2.18	.083
TRICHIA HISPIDA	29	0.0132	1.32	.057
HELICIGONA LAPICIDA	1	0.0004	.04	.003
CEPAEA SPP.	29	0.0132	1.32	.057

% C. ACICULA= 0 COUNT= 0

SUM MOLLUSC COUNTS= 2195 NO. TAXA= 26
SUM MOLLUSC PROPORTIONS= 101
SUM MOLLUSC PERCENTAGES= 101

SHANNON-WIENER FUNCTION= 2.40280316

% WOODLAND= 77.72
% INTERMEDIATE= 14.80
% OPEN COUNTRY= 7.47