

## PERSATUAN GEOLOGI MALAYSIA

# WARTA GEOLOGI

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DIKELUARKAN DWIBULANAN  
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# CATATAN GEOLOGI (GEOLOGICAL NOTES)

## AN X - Y GRAPH PLOTTING SYSTEM

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### Introduction

Analyses of large amounts of geochemical data, during the course of a recently completed research project, prompted the development of the x-y graph plotting system presented in this note. The system proved extremely useful since numerous plots needed to be viewed and especially since each graph involved the plotting of a large number of points. The computer generated x-y graphs are not only time saving but also free of misplots.

Any APPLE II compatible microcomputer with 64 K RAM plus 80' - column and X - 80 plug - in peripheral cards will run the plotting system. Installation of the X - 80 card is necessary since the CP/M operating system is used. Two 5.25 inch floppy disk drives and an EPSON - type 80/132 column dot matrix printer are required. The ubiquity of micro-computer systems of similar configuration in Malaysia is one of the main reasons for publishing the developed plotting system.

Although many APPLE ccompatible x-y graph plotting routines are commercially available, none are suitable for the plotting of geochemical variation diagrams and other similar applications. Most of the commercial plotting systems are business orientated and do not incorporate features which are necessary for the earth scientist's applications.

### Special features

1. The plotting system has been written to interface with the popular and powerful, microcomputer-based dBASE II data management program. That is, all plotted data are accessed from dBASE II data files. As such, part of the system is written in the dBASE II programming language (see Appendix for program listings). The main output routine is, however, in BASIC (MICROSOFT MBASIC). There are many advantages to interfacing the plotting routine with dBASE II. Firstly, data need not be reentered each time the plotting system is used. Most importantly, the full power of dBASE II can be utilized to select, edit or otherwise manipulate the data to be plotted. In effect, any 2 variables or arithmetic combinations of variables within a chosen dBASE II data file may be plotted against each other. The only disadvantage is that a rudimentary knowledge of dBASE II is necessary in order to use the plotting system. Since familiarity with only a few dBASE II commands is necessary (eg. CREATE, APPEND, EDIT, COPY, MODIFY, REPLACE), the required knowledge can be easily acquired by working through the relevant sections in the dBASE II user manual. In fact for straight forward plots all that is needed is to CREATE a dBASE II data file and enter the data that is to be plotted.

2. Numerous points can be plotted per graph. The limit is currently set at 500 points though this can be increased.

3. The x-y graphs are produced on a dot matrix printer rather than on more expensive x-y plotters. However, resolution is not sacrificed, with 288 divisions on the x-axis and 100 divisions on the y-axis. This fine resolution ensures minimal overlapping of points.
4. Different data sets may be distinguished by plotting a different symbol for each. Any valid single character may serve as the plotting symbol. This plotting symbol is stored in each record of the data file as a separate field. Additionally, any number of symbol fields may be created so that each record may have more than one symbol field perhaps named SYMBOL 1, SYMBOL 2, etc. The symbols held in SYMBOL 1 will define different data sets from the symbols held in SYMBOL 2 etc. The user is allowed to select the specific symbol field to be used during each plotting session.
5. Treatment of overlapping points is elaborate. Overlapping points are indicated by the numerals 2 to 9 with a '\$' sign for overlaps of 10 or more points. The x - and y - axis values of all overlapping points plus their corresponding symbols are printed out in a list below the graph.
6. The width of the y-axis can be reduced if required. The normal width is set at 100 divisions comprising 100 character spaces in the compressed printing mode. A smaller width may be useful for plots where there is need to suppress exaggeration in the y-axis.
7. Producing high resolution graphs with a printer results in some loss of speed. For the impatient user who wants to plot several graphs, the few minutes wait between plots (depending on the number of points and printer speed) may prove too much. To override this problem the program allows the user to preselect up to 20 plots via an input screen. No user intervention is necessary from the time the plots have been selected until the successful completion of all the chosen plots.

#### Using the x-y graph plotting system

When using the system, drive A must hold an unprotected copy of dBASE II while drive B holds the following files: (a) MBASIC.COM, (b) PLOT.CMB, (c) SYPLOT.CMB, (d) XYSCR.FAU, (e) SYSCR.10, (f) XYPLOT.BAS, (g) The dBASE II data file ( .DBF file) that is to be accessed by the plotting routine.

The dBASE II data file to be accessed must contain at least 2 extra fields called TEST and SYMBOL. Structures for these 2 fields are as follows:

<u>Name</u>	<u>Type</u>	<u>WIDTH</u>	<u>DECIMAL</u>
SYMBOL	C	1	
TEST	N	3	0

Additional symbol fields may also be created. The purpose of the symbol field has already been discussed. The TEST field is necessitated by program design. SYMBOL and TEST fields may be added at the time of first creating the data file. Alternatively, an existing data file may be modified by adding the TEST and SYMBOL fields, without destroying the stored data using procedures outline in the dBASE II user manual. Once the SYMBOL field has been created its content, that is a single character, can be easily entered by using the EDIT or REPLACE commands. No data is entered into the TEST field. As an example, Figure 1 illustrates the structure of a dBASE II data file which can be accessed by the plotting system.

To run the plotting system, from the 'A>' prompt type `dBASE B:PLOT`. A choice menu (Fig. 2) is displayed. Select option (A) `RUN THE X - Y PLOTTING PROGRAM` by typing A. This will result in the main input screen being displayed (Fig. 3). A maximum of 20 plots may be preselected via this input screen. A major convenience of the input screen is that entered data can be easily edited by following the cursor control instructions given at the bottom of the screen. The start and end of each input field is indicated by colons. Initially, the cursor will be positioned at the start of the first input field. Following the prompt enter the name of the `dBASE II` field which you intend to access. In the example in Figure 3 the file is `MAJ`. Press `RETURN` and the cursor moves to the start of the second input field which, in turn, requires the name of the database field holding the set of symbols to be plotted (e.g. `SYMBOL`). The third input field provides the user added flexibility by allowing the option of selecting, for plotting, only those records which satisfy a given condition or conditions. This is of course in addition to any record selection (or other manipulation) which can be made prior to running the plotting system. In response to the third prompt '`WHICH RECORDS DO YOU WANT TO PLOT`', enter `ALL`, if you require all records to be plotted, or specify the conditions for record selection. To do the latter type `FOR` followed by the conditions. In the example in Figure 3 the conditions are `FOE BELT = 'E' .AND. SLO2 < 70` (see also Fig. 1 for the structure of the data file accessed in the example). Reference to the appropriate section in the `dBASE II` user manual should equip the user with the necessary familiarity to fully utilize this very useful option. The next data to be entered are the names of the fields which will serve as the x- and y-axis variables for each plot. To complete the selection of plots and proceed to graph generation follow the instructions at the bottom of the screen.

If there should be a need to interrupt plotting at any time, press the `ESCAPE` key during the execution of a `dBASE` command file. Plotting can then be resumed from the point of interruption by reentering the plotting system (`DBASE B: PLOT`) and choosing the B option (`CONTINUE INTERRUPTED PLOTS`) from the choice menu. The input screen together with the entered data will be displayed in case any changes are to be made. This is because a usual reason for interrupting plotting is to correct data wrongly entered into the input screen. `Control - W` will cause plotting to resume.

The end product of the x-y plotting system is an x-y graph with plotted points denoted by the character stored in the chosen symbol field of each record (Fig. 4). Where the plot is a number (e.g. 2 or 3 etc) this means that the corresponding number of points overlapped at that particular spot. A check of the overlapping points printout at the bottom of the graph will reveal the coordinates and symbols of the responsible points.

The width of the x-axis can be changed by altering line 155 in program `XYPLOT.BAS`. The normal width of 100 character spaces in the compressed printing mode can be changed to 10, 20, 30, 40, 50, 60, 70, 80 or 90. To do this first break into `XYPLOT.BAS` and then type `155 QQ = 10` or `20` or whatever you want it to be. Save the change by typing `SAVE "B:XYPLOT"`. If you should wish to revert to the normal width of 100 then break into `XYPLOT.BAS` again and repeat the procedure as above.

Copies of the x-y plotting system on disk are available from the author.

\*\*\*\*\*

STRUCTURE FOR FILE: B:MAJ.DBF  
 NUMBER OF RECORDS: 00132

FIELD	NAME	TYPE	WIDTH	DEC
001	TEST	N	003	
002	SYMBOL	C	001	
003	RK:TYPE	C	002	
004	BELT	C	001	
005	SAMPLE	C	007	
006	SI02	N	005	002
007	TI02	N	005	002
008	AL203	N	005	002
009	FE203	N	005	002
010	MNO	N	005	002
011	MGO	N	005	002
012	CAO	N	005	002
013	NA2O	N	005	002
014	K2O	N	005	002
015	P2O5	N	005	002
016	LOI	N	005	002
017	TOTAL	N	006	002
018	NUMBER	N	003	
** TOTAL **			00079	

FIGURE 1. Structure of a dBASE II data file which can be accessed by the x - y plotting system. This particular file holds major element compositional data for rock samples.

```

*****
*                                     *
*      +-----+                       *
*      ! THE X-Y GRAPH PLOTTING PROGRAM ! *
*      !           by S. CHANDRA KUMAR           ! *
*      +-----+                       *
*                                     *
*                                     *
*      PLEASE CHOOSE ONE                *
*                                     *
*                                     *
*      A) RUN THE X-Y PLOTTING PROGRAM    *
*      B) CONTINUE INTERRUPTED PLOTS     *
*      C) CANCEL THE PLOTTING PROGRAM    *
*                                     *
*                                     *
*                                     *
*****
    
```

FIGURE 2. The choice menu for the x - y plotting system.

```

*****
WHICH DATABASE FILE DO YOU WANT TO USE :MAJ      ;
WHICH SYMBOL FIELD DO YOU WISH TO USE :SYMBOL    ;
WHICH RECORDS DO YOU WANT TO PLOT ( Either type ALL or FOR plus conditions )
:FOR BELT = "E" .AND. SI02 < 78                ;
-----
!***** CHOOSE X AXIS AND Y AXIS VARIABLES TO BE PLOTTED *****!
!
! (1) X = :TI02      :Y = :P205      : (2) X = :SI02      :Y = :NA2O      : !
! (3) X = :SI02      :Y = :AL203     : (4) X = :END       :Y = :      : !
! (5) X = :          :Y = :          : (6) X = :          :Y = :          : !
! (7) X = :          :Y = :          : (8) X = :          :Y = :          : !
! (9) X = :          :Y = :          : (10) X = :         :Y = :          : !
! (11) X = :         :Y = :          : (12) X = :         :Y = :          : !
! (13) X = :         :Y = :          : (14) X = :         :Y = :          : !
! (15) X = :         :Y = :          : (16) X = :         :Y = :          : !
! (17) X = :         :Y = :          : (18) X = :         :Y = :          : !
! (19) X = :         :Y = :          : (20) X = :         :Y = :          : !
!*****
When finished choosing plots type END in the following input field ( X = END ).
Follow this with a Control - W. To edit the input data use Ctrl. - E (previous
field), Ctrl. - X (next field), Ctrl. - S (char. left), Ctrl. - D (char. right).
    
```

FIGURE 3. The main input screen. Example user entered data are in italics. The structure of the accessed data file is given in Figure 1.

DATABASE FILE IN USE IS: MAJ

SYMBOL FIELD USED IS: SYMBOL

RECORDS SELECTED ARE: ALL

Y-AXIS IS: NA2O

X-AXIS IS: SiO2

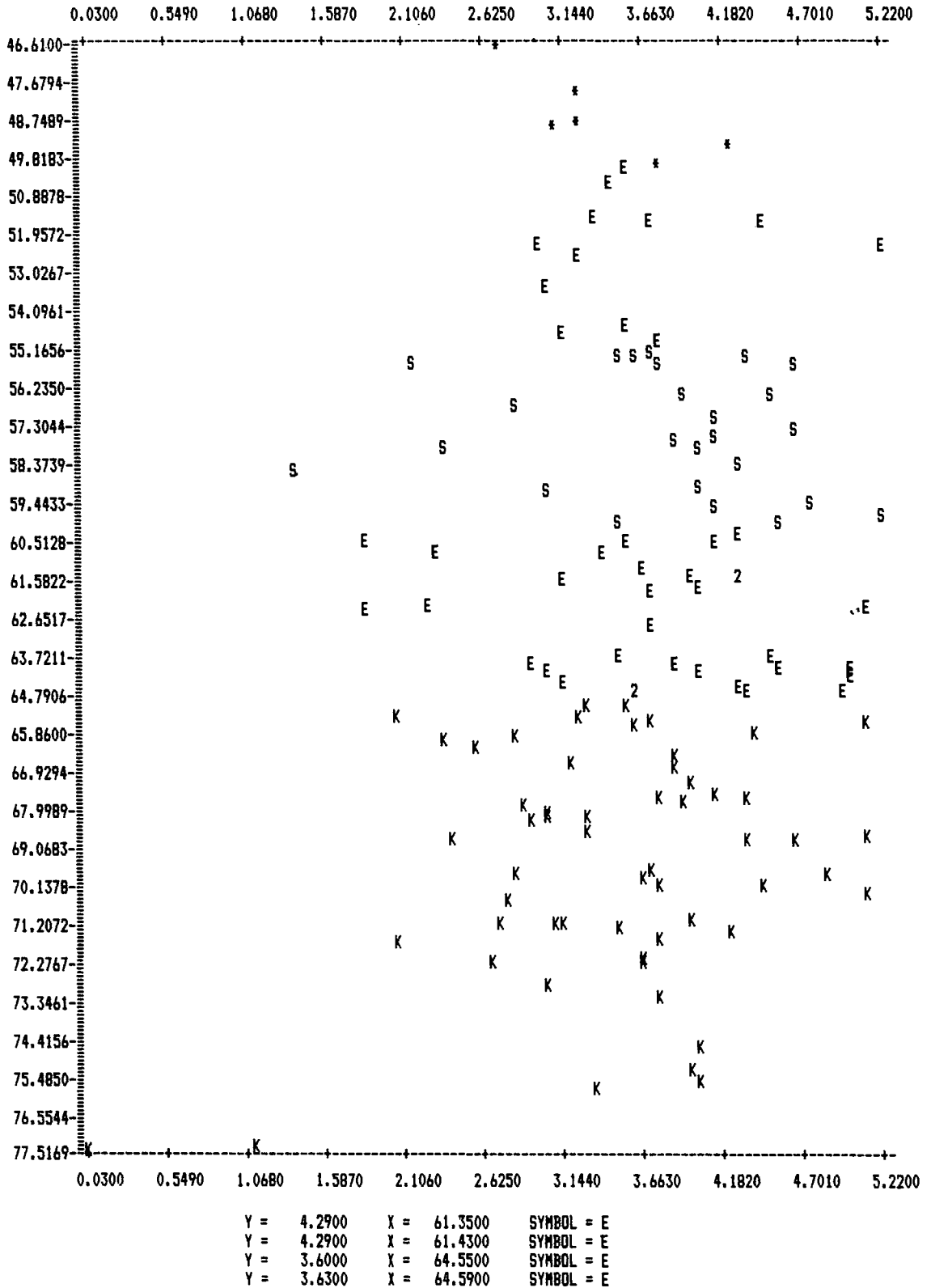


FIGURE 4. Sample output from the x - y plotting system. The longer axis is the x - axis so that the graph should be appropriately orientated when viewed.

APPENDIX

Listings of MBASIC and dBASE II programs for the x - y plotting system.

```
10 REM PROGRAM NAME B:XYPLOT.BAS - MBASIC PROGRAM TO DRAW A SCATTER DIAGRAM FROM
DATA IN A SDF SEQUENTIAL FILE B:DPLLOT.TXT .THE DATA MUST BE PRESENTED IN THE O
RDER Y COORDINATE, X COORDINATE AND SYMBOGL. THE DATA MUST BE SORTED FIRST ON Y T
HEN ON TEST.
20 POKE 56623!,49
30 OPEN "I",#1,"B:DPLLOT.TXT"
40 REM THE MAXIMUM POINTS THAT CAN BE PLOTTED DEPENDS ON THE DIMENSIONS IN LINE
50. FOR NOW THE MAXIMUM IS 500 POINTS. THIS CAN BE INCREASED IF NECESSARY. THE
PROGRAM WILL CRASH IF THERE ARE MORE THAN 250 CASES OF OVERLAPPING POINTS.
41 REM CONT. THIS ALSO CAN BE INCREASED IF NECESSARY.
50 DIM PT(2,500),FPT(2,500),S*(500),OLY(250),OLX(250),V*(250)
60 A=1:MAXY=0:MINY=10000:MAXX=0:MINX=10000
70 INPUT #1,PT(1,A)
80 REM LINES 90 AND 100 ARE FOR DETECTING THE MAX. AND MIN. VALUES OF Y FOR SCAL
ING.
90 IF PT(1,A)>MAXY THEN MAXY=PT(1,A)
100 IF PT(1,A)<MINY THEN MINY=PT(1,A)
110 INPUT #1,PT(2,A)
114 IF PT(2,A)>MAXX THEN MAXX=PT(2,A)
116 IF PT(2,A)<MINX THEN MINX=PT(2,A)
120 INPUT #1,S*(A)
130 IF EOF(1) THEN GOTO 155
140 A= A + 1
150 GOTO 70
155 QQ=100
160 FACY = (MAXY-MINY)/QQ
170 FACX=(MAXX-MINX)/288
180 REM QQ IS THE NUMBER OF DIVISIONS FOR THE Y AXIS. 288 IS THE NUMBER OF DIVIS
IONS FOR THE X AXIS. 288 MEANS A LINE SPACING OF 2/72 IS BEING USED.
200 LPRINT
205 LPRINT CHR$(15)
210 LPRINT TAB(16);
220 FOR X= 0 TO QQ/10
230 LPRINT USING "####.#### ";(MINY+(X*10*FACY));
240 NEXT X
250 LPRINT
260 LPRINT CHR$(27);CHR$(65);CHR$(2)
270 LPRINT TAB(19);
280 LPRINT "--";
283 FOR X= 1 TO QQ/10
285 FOR XX= 1 TO 8:LPRINT "--";:NEXT XX
295 LPRINT "+-";
300 NEXT X
310 LPRINT
313 LPRINT TAB(9);:LPRINT USING "###.###";MINX;:LPRINT "--";
315 LPRINT TAB(19) "--";
330 PT(2,0)=PT(2,1)
340 FOR X= 1 TO A
350 FPT(1,X)=CINT((PT(1,X)-MINY)/FACY)
360 FPT(2,X)=CINT(PT(2,X)/FACX)-CINT(PT(2,(X-1))/FACX)
370 NEXT X
380 REM
385 W=0:Z=0
390 FOR X= 1 TO A
400 FOR LF=1 TO FPT(2,X)
410 LPRINT
413 REM LINE 413 IS FOR PRINTING VALUES ALONG THE X AXIS
415 W=W+1:IF W=10 THEN W=0:Z=Z+1:LPRINT TAB(9);:LPRINT USING "####.####";MINX+Z*
10*FACX;:LPRINT "--";
420 LPRINT TAB(19) "--";
430 NEXT LF
435 GOSUB 1000
```



```
437 REM B:XYPLOT.BAS CONTINUED
440 LPRINT TAB(FPT(1,X)+20) S*(X);
443 IF K<>0 THEN GOSUB 2000
445 X= X+K:REM TO SKIP PROCESSING THOSE POINTS THAT OVERLAP SO THAT THE PRINTER
DOES NOT TRY TO MOVE BACK A SPACE
450 NEXT X
452 LPRINT:LPRINT TAB(9);:LPRINT USING "####.####";(MAXX+FACX);:LPRINT "--";
455 LPRINT TAB(19);
456 LPRINT "-+-";
457 FOR G= 1 TO QQ/10
458 FOR GG= 1 TO 8:LPRINT "--";:NEXT GG
459 LPRINT "+-";
460 NEXT G
461 LPRINT
463 LPRINT:LPRINT:LPRINT:LPRINT:LPRINT:LPRINT
464 LPRINT TAB(16);:FOR G= 0 TO QQ/10:LPRINT USING "####.#### ";(MINY+(G*10*FACY
));:NEXT G:LPRINT
465 LPRINT CHR*(27);CHR*(65);CHR*(10)
466 LPRINT
467 FOR R= 1 TO Q
468 LPRINT TAB(40);
469 LPRINT "Y = ";:LPRINT USING "####.####";OLY(R);:LPRINT "      X = ";:LPRINT U
SING "####.####";OLX(R);:LPRINT "      SYMBOL = ";:LPRINT V*(R)
470 NEXT R
478 LPRINT CHR*(27);CHR*(50);:LPRINT CHR*(10)
480 SYSTEM
1000 REM SUBROUTINE HANDLES OVERLAP UP TO 9. 10 AND ABOVE OVERLAPS ARE INDICATED
BY A *.
1010 K=0
1020 FOR M= 1 TO 1000
1030 IF X+M>A THEN RETURN
1040 IF FPT(2,(X+M))<>0 THEN RETURN
1050 IF FPT(1,(X+(M-1)))<>FPT(1,(X+M)) THEN RETURN
1060 K= K+1
1065 IF K=1 THEN E*=S*(X)
1070 S*(X)=RIGHT$(STR$(M+1),1)
1080 IF M>8 THEN S*(X)="*"
1090 NEXT M
1100 RETURN
2000 Q=Q+1
2010 OLY(Q)=PT(1,X):OLX(Q)=PT(2,X):V*(Q)=E*
2012 FOR P= 1 TO K
2014 Q= Q+1
2016 OLY(Q)=PT(1,X+P):OLX(Q)=PT(2,X+P):V*(Q)=S*(X+P)
2020 NEXT P
2030 RETURN
```

```

* B:PLOT.CMD - dBASE II COMMAND FILE
STORE T TO MQ:UMORE
DO WHILE MQ:UMORE
  ERASE
  @ 04,00 SAY '*****'
  @ 04,20 SAY '*****'
  @ 04,40 SAY '*****'
  @ 04,60 SAY '*****'
  @ 05,00 SAY '*'
  @ 05,22 SAY '+-----+'
  @ 05,42 SAY '-----+'
  @ 05,79 SAY '*'
  @ 06,00 SAY '*'
  @ 06,22 SAY '! THE X-Y GRAPH PLOT'
  @ 06,42 SAY 'TING PROGRAM !'
  @ 06,79 SAY '*'
  @ 07,00 SAY '*'
  @ 07,22 SAY '!          by S. CHANDRA'
  @ 07,43 SAY 'KUMAR          !'
  @ 07,79 SAY '*'
  @ 08,00 SAY '*'
  @ 08,22 SAY '+-----+'
  @ 08,42 SAY '-----+'
  @ 08,79 SAY '*'
  @ 09,00 SAY '*'
  @ 09,79 SAY '*'
  @ 10,00 SAY '*'
  @ 10,31 SAY 'PLEASE CHOOSE ONE'
  @ 10,79 SAY '*'
  @ 11,00 SAY '*'
  @ 11,79 SAY '*'
  @ 12,00 SAY '*'
  @ 12,79 SAY '*'
  @ 13,00 SAY '*'
  @ 13,22 SAY 'A) RUN THE X-Y GRAPH'
  @ 13,43 SAY 'PLOTING PROGRAM'
  @ 13,79 SAY '*'
  @ 14,00 SAY '*'
  @ 14,22 SAY 'B) CONTINUE INTERRUPT'
  @ 14,42 SAY 'TED PLOTS'
  @ 14,79 SAY '*'
  @ 15,00 SAY '*'
  @ 15,22 SAY 'C) CANCEL THE PLOTTI'
  @ 15,42 SAY 'NG PROGRAM'
  @ 15,79 SAY '*'
  @ 16,00 SAY '*'
  @ 16,79 SAY '*'
  @ 17,00 SAY '*'
  @ 17,79 SAY '*'
  @ 18,00 SAY '*'
  @ 18,79 SAY '*'
  @ 19,00 SAY '*****'
  @ 19,20 SAY '*****'
  @ 19,40 SAY '*****'
  @ 19,60 SAY '*****'
  SET CONSOLE OFF
  WAIT TO MQ:DUMMY
  SET CONSOLE ON
  IF MQ:DUMMY = 'A' .OR. MQ:DUMMY = 'a'
    RELEASE MQ:UMORE
    RELEASE MQ:DUMMY
    STORE 0 TO KOUNT
    STORE "N" TO CONTIN
    SAVE TO B:MEMVAR
    DO B:XYPLOT.CMD
  ELSE
    IF MQ:DUMMY = 'B' .OR. MQ:DUMMY = 'b'
      RESTORE FROM B:MEMVAR
      STORE KOUNT - 1 TO KOUNT
      STORE "Y" TO CONTIN
      SAVE TO B:MEMVAR
      DO B:XYPLOT.CMD
    ELSE
      IF MQ:DUMMY = 'C' .OR. MQ:DUMMY = 'c'
        RELEASE MQ:UMORE
        RELEASE MQ:DUMMY
        CANCEL
      ENDIF
    ENDIF
  ENDIF
ENDDO WHILE MQ:UMORE

```

```

* B:XYSCR.FAU - dBASE II COMMAND FILE
STORE ' ' TO MFILE
STORE ' ' TO MSYM
* A total of 77 blanks are stored to MCON
STORE ' '
STORE ' ' TO MCON
STORE ' ' TO X1
STORE ' ' TO Y1
STORE ' ' TO X2
STORE ' ' TO Y2
STORE ' ' TO X3
STORE ' ' TO Y3
STORE ' ' TO X4
STORE ' ' TO Y4
STORE ' ' TO X5
STORE ' ' TO Y5
STORE ' ' TO X6
STORE ' ' TO Y6
STORE ' ' TO X7
STORE ' ' TO Y7
STORE ' ' TO X8
STORE ' ' TO Y8
STORE ' ' TO X9
STORE ' ' TO Y9
STORE ' ' TO X10
STORE ' ' TO Y10
STORE ' ' TO X11
STORE ' ' TO Y11
STORE ' ' TO X12
STORE ' ' TO Y12
STORE ' ' TO X13
STORE ' ' TO Y13
STORE ' ' TO X14
STORE ' ' TO Y14
STORE ' ' TO X15
STORE ' ' TO Y15
STORE ' ' TO X16
STORE ' ' TO Y16
STORE ' ' TO X17
STORE ' ' TO Y17
STORE ' ' TO X18
STORE ' ' TO Y18
STORE ' ' TO X19
STORE ' ' TO Y19
STORE ' ' TO X20
STORE ' ' TO Y20

```

```
* B:XYPLOT.CMD
* dBASE II COMMAND FILE
POKE 56623,49
SET DEFA TO B:
RESTORE FROM MEMVAR
STORE KOUNT + 1 TO KOUNT
SAVE TO MEMVAR
DO CASE
CASE CONTIN = "Y"
DO XYSCR.IO
STORE "N" TO CONTIN
SAVE TO MEMVAR
CASE KOUNT = 1
DO XYSCR.FAU
DO XYSCR.IO
SAVE TO MEMVAR
ENDCASE
DO CASE
CASE KOUNT = 1
STORE Y1 TO YAXIS
STORE X1 TO XAXIS
CASE KOUNT = 2
STORE Y2 TO YAXIS
STORE X2 TO XAXIS
CASE KOUNT = 3
STORE Y3 TO YAXIS
STORE X3 TO XAXIS
CASE KOUNT = 4
STORE Y4 TO YAXIS
STORE X4 TO XAXIS
CASE KOUNT = 5
STORE Y5 TO YAXIS
STORE X5 TO XAXIS
CASE KOUNT = 6
STORE Y6 TO YAXIS
STORE X6 TO XAXIS
CASE KOUNT = 7
STORE Y7 TO YAXIS
STORE X7 TO XAXIS
CASE KOUNT = 8
STORE Y8 TO YAXIS
STORE X8 TO XAXIS
CASE KOUNT = 9
STORE Y9 TO YAXIS
STORE X9 TO XAXIS
CASE KOUNT = 10
STORE Y10 TO YAXIS
STORE X10 TO XAXIS
CASE KOUNT = 11
STORE Y11 TO YAXIS
STORE X11 TO XAXIS
CASE KOUNT = 12
STORE Y12 TO YAXIS
STORE X12 TO XAXIS
CASE KOUNT = 13
STORE Y13 TO YAXIS
STORE X13 TO XAXIS
CASE KOUNT = 14
STORE Y14 TO YAXIS
STORE X14 TO XAXIS
CASE KOUNT = 15
STORE Y15 TO YAXIS
```

```
* B:XYPLOT.CMD CONTINUED
STORE X15 TO XAXIS
CASE KOUNT = 16
STORE Y16 TO YAXIS
STORE X16 TO XAXIS
CASE KOUNT = 17
STORE Y17 TO YAXIS
STORE X17 TO XAXIS
CASE KOUNT = 18
STORE Y18 TO YAXIS
STORE X18 TO XAXIS
CASE KOUNT = 19
STORE Y19 TO YAXIS
STORE X19 TO XAXIS
CASE KOUNT = 20
STORE Y20 TO YAXIS
STORE X20 TO XAXIS
CASE KOUNT = 21
STORE "END" TO XAXIS
ENDCASE
IF XAXIS = "END" .OR. XAXIS = "end"
RELEASE ALL
CANCEL
ENDIF
SET PRINT ON
EJECT
? 'DATABASE FILE IN USE IS: '+MFILE
? 'SYMBOL FIELD USED IS: '+MSYM
? 'RECORDS SELECTED ARE: '+MCON
? '          Y-AXIS IS: '+YAXIS+'      X-AXIS IS: '+XAXIS
? '
SET PRINT OFF
IF MCON = "ALL" .OR. MCON = "all"
STORE " " TO MCON
ENDIF
USE &MFILE
COPY TO DATA FIELD &YAXIS,&XAXIS,&MSYM,TEST &MCON
USE DATA
STORE 0.00 TO MAX
STORE 10000 TO MIN
GOTO TOP
DO WHILE .NOT. EOF
IF &XAXIS > MAX
STORE &XAXIS TO MAX
ENDIF
IF &XAXIS < MIN
STORE &XAXIS TO MIN
ENDIF
SKIP
ENDDO
? 'MAX=',MAX
? 'MIN=',MIN
STORE INT((MAX-MIN)/288.0000000*1000000+.5)/1000000.000000 TO FACX
? 'FACX=',FACX
REPLACE ALL TEST WITH INT(&XAXIS/FACX+.5)-INT(MIN/FACX+.5)
SORT ON &YAXIS TO DATA1
USE DATA1
SORT ON TEST TO DATA
USE DATA
COPY TO D:PLOT.TXT FIELD &YAXIS,&XAXIS,&MSYM DELIMITED WITH "
QUIT TO 'B:MBASIC B:XYPLOT.BAS ','DBASE B:XYPLOT.CMD'
```

```
* B:XYSCR.IO - dBASE II COMMAND FILE
ERASE
@ 01,00 SAY '*****'
@ 01,20 SAY '*****'
@ 01,40 SAY '*****'
@ 01,60 SAY '*****'
@ 02,00 SAY 'WHICH DATABASE FILE'
@ 02,20 SAY 'DO YOU WANT TO USE'
@ 02,39 GET MFILE
@ 03,00 SAY 'WHICH SYMBOL FIELD D'
@ 03,20 SAY 'O YOU WISH TO USE'
@ 03,38 GET MSYM
@ 04,00 SAY 'WHICH RECORDS DO YOU'
@ 04,21 SAY 'WANT TO PLOT ( Either'
@ 04,41 SAY 'r type ALL or FOR pl'
@ 04,61 SAY 'us conditions )'
@ 05,01 GET MCON
@ 06,00 SAY '-----'
@ 06,20 SAY '-----'
@ 06,40 SAY '-----'
@ 06,60 SAY '-----'
@ 07,00 SAY '!***** CHOO'
@ 07,20 SAY 'SE X AXIS AND Y AXIS'
@ 07,41 SAY 'VARIABLES TO BE PLOT'
@ 07,61 SAY 'TED *****!'
@ 08,00 SAY '!'
@ 08,79 SAY '!'
@ 09,00 SAY '! (1) X ='
@ 09,11 GET X1
@ 09,23 SAY 'Y ='
@ 09,27 GET Y1
@ 09,42 SAY '(2) X ='
@ 09,50 GET X2
@ 09,62 SAY 'Y ='
@ 09,66 GET Y2
@ 09,79 SAY '!'
@ 10,00 SAY '! (3) X ='
@ 10,11 GET X3
@ 10,23 SAY 'Y ='
@ 10,27 GET Y3
@ 10,42 SAY '(4) X ='
@ 10,50 GET X4
@ 10,62 SAY 'Y ='
@ 10,66 GET Y4
@ 10,79 SAY '!'
@ 11,00 SAY '! (5) X ='
@ 11,11 GET X5
@ 11,23 SAY 'Y ='
@ 11,27 GET Y5
@ 11,42 SAY '(6) X ='
@ 11,50 GET X6
@ 11,62 SAY 'Y ='
@ 11,66 GET Y6
@ 11,79 SAY '!'
@ 12,00 SAY '! (7) X ='
@ 12,11 GET X7
@ 12,23 SAY 'Y ='
@ 12,27 GET Y7
@ 12,42 SAY '(8) X ='
@ 12,50 GET X8
@ 12,62 SAY 'Y ='
@ 12,66 GET Y8
@ 12,79 SAY '!'
@ 13,00 SAY '! (9) X ='
@ 13,11 GET X9
@ 13,23 SAY 'Y ='
@ 13,27 GET Y9
@ 13,41 SAY '(10) X ='
@ 13,50 GET X10
```

```
* B:XYSCR.IO CONTINUED
@ 13,62 SAY 'Y ='
@ 13,66 GET Y10
@ 13,79 SAY '!'
@ 14,00 SAY '! (11) X ='
@ 14,11 GET X11
@ 14,23 SAY 'Y ='
@ 14,27 GET Y11
@ 14,41 SAY '(12) X ='
@ 14,50 GET X12
@ 14,62 SAY 'Y ='
@ 14,66 GET Y12
@ 14,79 SAY '!'
@ 15,00 SAY '! (13) X ='
@ 15,11 GET X13
@ 15,23 SAY 'Y ='
@ 15,27 GET Y13
@ 15,41 SAY '(14) X ='
@ 15,50 GET X14
@ 15,62 SAY 'Y ='
@ 15,66 GET Y14
@ 15,79 SAY '!'
@ 16,00 SAY '! (15) X ='
@ 16,11 GET X15
@ 16,23 SAY 'Y ='
@ 16,27 GET Y15
@ 16,41 SAY '(16) X ='
@ 16,50 GET X16
@ 16,62 SAY 'Y ='
@ 16,66 GET Y16
@ 16,79 SAY '!'
@ 17,00 SAY '! (17) X ='
@ 17,11 GET X17
@ 17,23 SAY 'Y ='
@ 17,27 GET Y17
@ 17,41 SAY '(18) X ='
@ 17,50 GET X18
@ 17,62 SAY 'Y ='
@ 17,66 GET Y18
@ 17,79 SAY '!'
@ 18,00 SAY '! (19) X ='
@ 18,11 GET X19
@ 18,23 SAY 'Y ='
@ 18,27 GET Y19
@ 18,41 SAY '(20) X ='
@ 18,50 GET X20
@ 18,62 SAY 'Y ='
@ 18,66 GET Y20
@ 18,79 SAY '!'
@ 19,00 SAY '!*****'
@ 19,20 SAY '*****'
@ 19,40 SAY '*****'
@ 19,60 SAY '*****!'
@ 21,00 SAY 'When finished choosi'
@ 21,20 SAY 'ng plots type END in'
@ 21,40 SAY ' the following input'
@ 21,60 SAY ' field ( X = END ). '
@ 22,00 SAY 'Follow this with'a C'
@ 22,20 SAY 'ontrol - W. To edit '
@ 22,40 SAY 'the input data use C'
@ 22,60 SAY 'trl.- E (previous '
@ 23,00 SAY 'field), Ctrl.- X (ne'
@ 23,20 SAY 'xt field), Ctrl.- S '
@ 23,40 SAY '(char. left), Ctrl.-'
@ 23,60 SAY ' D (char. right).'
READ
ERASE
```

# A MIDDLE TRIASSIC FAUNA FROM THE BT. JERAM PADANG RIDGE AT BAHAU, N. SEMBILAN, PENINSULAR MALAYSIA

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## Introduction

The NNW-trending Bt. Jeram Padang Ridge is a prominent topographic feature near Bahau Town (Fig. 1). The Ridge is underlain by sedimentary rocks and the general geology has been previously described by Ng (1970) and Khoo (1972, 1973). No fossils, however, were reported from the Ridge by these workers. Consequently, the age and stratigraphic position of the Ridge sediments remained somewhat uncertain and were tentatively interpreted mainly on the basis of the occurrence of the Lower Permian Kepis Beds to the west and Middle to Upper Triassic Gemas Beds to the east. Khoo (1972, 1973) regarded the sediments of this Ridge as a distinct stratigraphic unit (which he termed 'Bahau arenites') of Upper Permian to Lower Triassic age conformably overlying the Kepis Beds. Subsequently he grouped it under the Gemas Beds as 'basal conglomerate', unconformably overlying the Kepis Beds and assigned a Middle to Upper Triassic age (Khoo, 1974, 1975). The latter age of the Ridge sediments was accepted in a recent study by Cheah (1985) who also mentioned that the reddish shales in the Ridge contained bivalves. Unfortunately, however, no taxonomic, descriptive or illustrative details of these fossils were given. The fossils described in this paper have recently been collected from the excavated section of the Ridge near Bahau town (Fig. 1). The fossils were found only in the upper part of the excavated section.

## General aspects

The part of the Ridge under study is made up mainly of sandstone and shale/mudstone with minor interbeds of conglomerate. The conglomerates comprise subangular to subrounded clasts (a few millimeters to a few centimeters in size) of mainly quartz, chert and quartzite in a sandy matrix (for petrographic descriptions of the rock types see Ng, 1970 and Cheah, 1985). Conglomerates are apparently absent in the upper part of the section and in view of the minor proportions of the conglomerate and other characteristics it seems inappropriate to term these sediments 'basal conglomerate' (cf. Khoo, 1975).

Primary sedimentary structures are not abundant in the Ridge sediments. However, sole marks, scour and fill structures and graded bedding (fining upwards may occasionally be observed, and where seen, they suggest that the beds are right way up. Structural complexities are evident in the excavated part of the Ridge. The beds show steeper ( $60^{\circ}$  -  $70^{\circ}$ ) south-westerly and relatively gentler ( $40^{\circ}$  -  $50^{\circ}$ ) northeasterly dips suggesting a synclinal structure. Also, the beds of the upper and lower parts of the section are separated by a thrust with associated dragfolds. A number of mutually interfering faults, both normal and reverse, further complicate the structural pattern.

### Faunal assemblage and discussion

All the fossils here reported come from northeasterly dipping shale and fine sandstone beds in the upper part of the section. The fossils are preserved as moulds and casts and are in general fairly well preserved. They are seen as shell accumulations or *coquinas* and appear to have fairly random orientations consistent with accumulation in a relatively high energy near shore environment. Bivalves, gastropods and arthropods were recorded as follows (see Plates):

*Costatoria malayensis* (Newton)  
*Costatoria chegarperahensis* Kobayashi and Tamura  
*Neoschizodus ovatus elongatus* Giebel

Unidentified gastropods  
Arthropod carapace fragment?

*N. ovatus elongatus* occurs in the Lower Muschelkalk in Germany and in the Middle Triassic (Anisian-Ladinian) of Southeast Asia (Kobayashi and Tamura, 1968; 1984). The genus *Costatoria* occurs widely in the Middle-Upper Triassic of Southeast Asia and *C. malayensis* and *C. chegarperahensis* have only been recorded in Anisian - basal Ladinian strata (Kobayashi and Tamura, 1968). The age of the sediments of the Bt. Jeram Padang Ridge is therefore interpreted to be Middle Triassic (Anisian or early Ladinian).

The Myophoriidae and trigonacean bivalves in general are indicative of a shallow marine inner neritic environment. The occurrence in Malaysia of two distinct Triassic bivalve biofacies, the *Daonella-Halobia* and *Myophoria* (s.l.) biofacies, has been demonstrated by Kobayashi *et al.* (1967). These two biofacies may represent contemporaneous deeper water and near shore facies respectively in the Triassic basin of sedimentation. The Bt. Jeram Padang Ridge fauna may be classified under the *Myophoria* (s.l.) biofacies.

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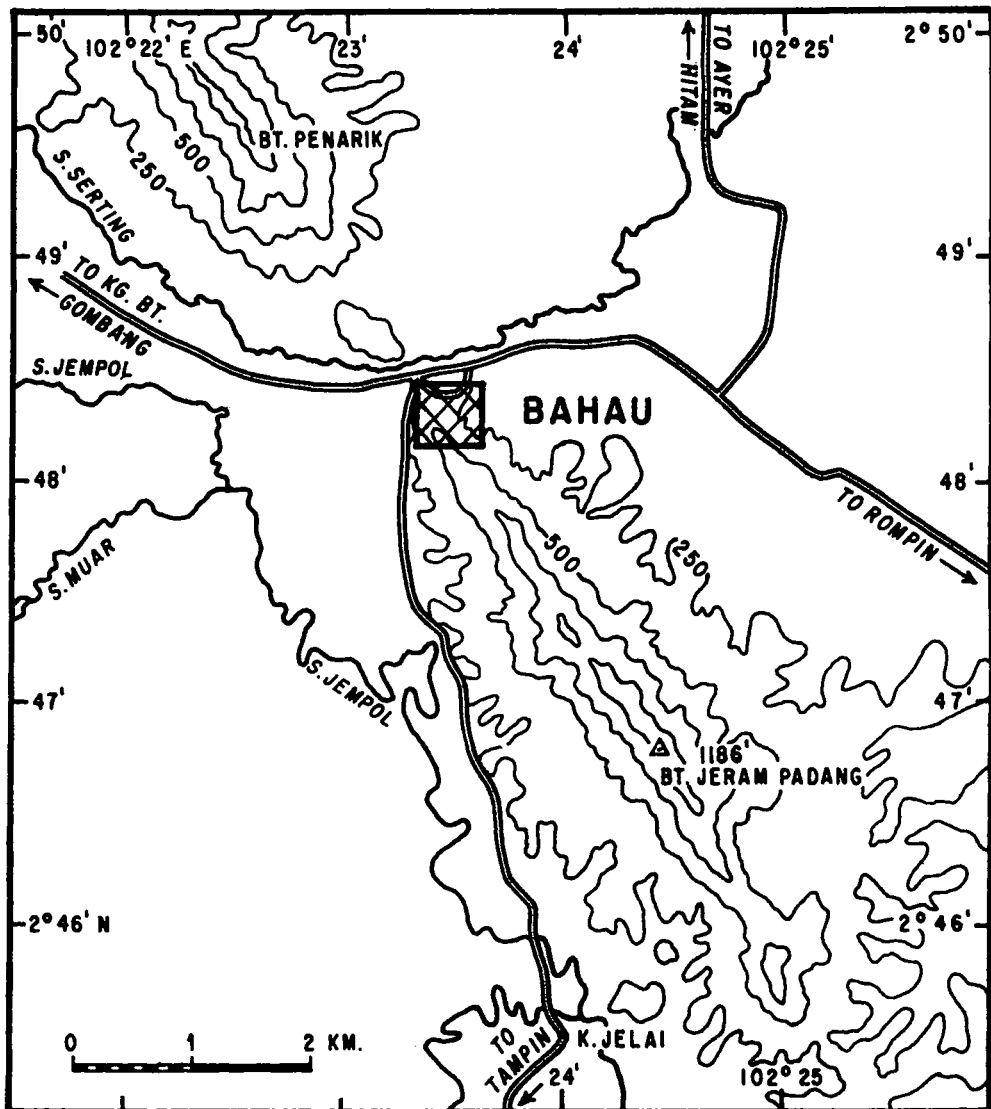


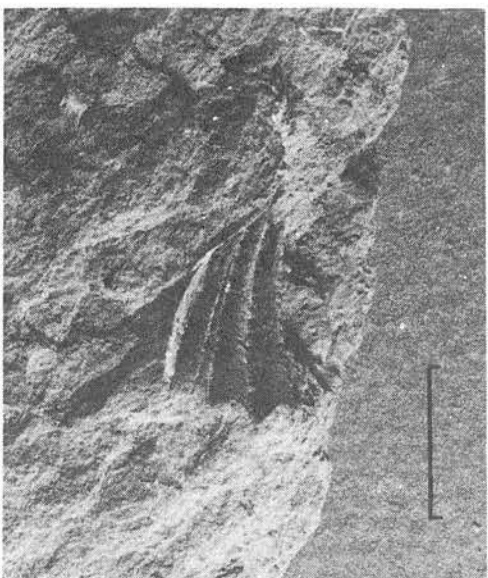
Fig. 1. Sketch map showing the location of the Bt. Jeram Padang Ridge and the portion of the Ridge described in this paper (cross-hatched).

PLATE EXPLANATION

Scale bars represent 1 cm.

1. *Costatoria chegarperahensis* Kobayashi and Tamura
2. *Neoschizodus ovatus elongatus* Giebel
3. *Costatoria malayensis* (Newton)
4. *Costatoria malayensis* (Newton)
5. Arthropod carapace?
6. *Costatoria malayensis* (Newton) and  
unidentified gastropod (upper right hand corner)

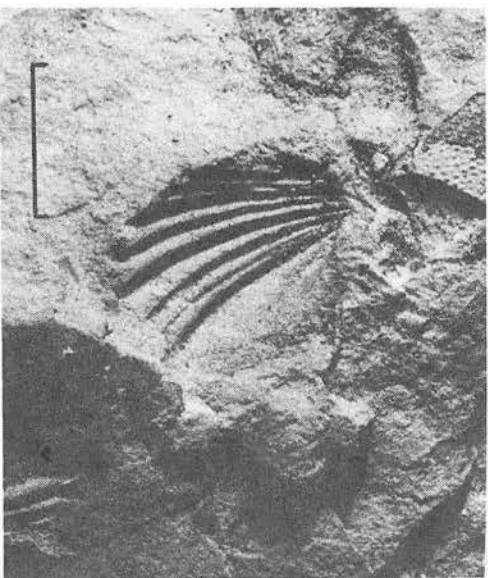




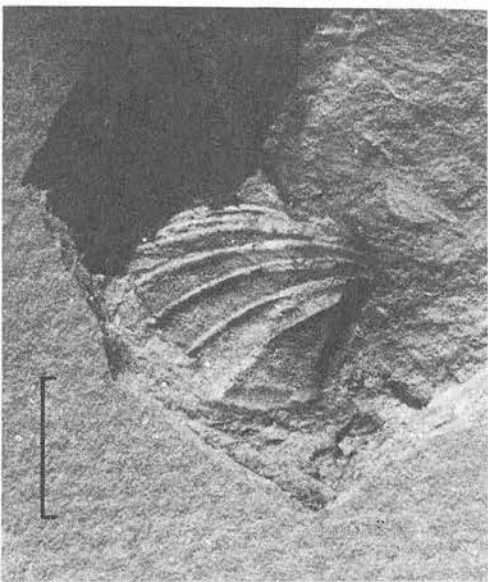
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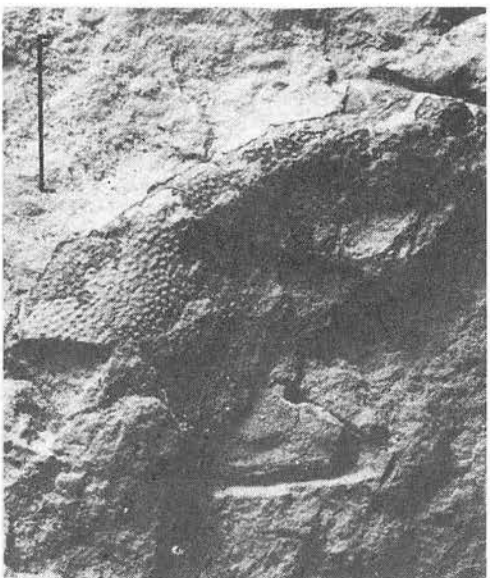
2



3



4



5



6

# PRELIMINARY NOTE ON THE OCCURRENCE OF CARBONIFEROUS-AGE COALS AND IN SITU PLANT FOSSILS IN EASTERN PENINSULAR MALAYSIA

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## Abstract

*Carboniferous-age coals and stigmarian rooted zones have been discovered in Carboniferous rocks of eastern Pahang and Terengganu, Peninsular Malaysia. The distribution of these suggests that non-marine swamp conditions were widely distributed in eastern Peninsular Malaysia during the Carboniferous. Discovery of previously unreported fossil plants makes it possible to date the carbonaceous horizons as Late Mississippian (late Lower Carboniferous). The terrestrial deposits are most common in outcrops near the coast and are much less so farther west.*

Neither coal nor *in situ* stigmarian rooted horizons have been reported previously and, indeed, very few fossil plants have yet been described from Carboniferous-age rocks of Malaysia. Edwards (1948) described some poorly-preserved lycopod stems of apparently Lower Carboniferous age from Sungei Terepai near the town of Sungei Lembing in eastern Pahang. He also described (Edwards, 1926) a small flora from Sungei Chiku in Kelantan and assigned it to the Upper Carboniferous, although the flora is not really diagnostic and may alternatively be Permian (Jones, *et al.*, 1966). The only other described Carboniferous plants from Malaysia were reported by Asama (1974) who described fragmentary plant fossils from localities near Gambang and near Panching, though, unfortunately, he did not give the exact locations. He suggested that his fossil plants belonged to the Lower Carboniferous. Jones *et al.* (1966) report a few Carboniferous plants from Tanjong Mat Amin and Kampong Menerong while Chand (1978) reported Carboniferous plant materials from Ulu Paka, although neither publication figured or described.

We have examined various outcrops in Pahang and Terengganu in an attempt to find new fossil plant forms and to refine these previous biostratigraphic age determinations. Outcrops near Chukai, Gambang, Panching, Kijal, and Kampong Menerong were found to contain carbonaceous beds with stigmarian rooted zones (Fig. 1; Plate 1, Figs. 4, 5, 6), and the outcrops near Chukai, Kijal, and Kampong Menerong also contain associated coal (Fig. 1; Plate 1, Figs. 1, 2, 3). Some other outcrops in Pahang and Terengganu are too highly metamorphosed, to determine whether coals or stigmarian rooted zones were originally present, but have zones of graphite schist that may suggest that they were. The coals appear in the field to have the rank of anthracite to meta-anthracite and are greatly sheared. Because of this shearing, a large amount of tectonic thickening and thinning has taken place, and exact thicknesses are difficult to determine. Approximate thicknesses were measured, however, and the coal zones vary from carbonaceous streaks less than a centimeter thick up to beds a meter or more in thickness. The thickest exposed coal is present in excavations in the Chukai area (Plate 1; Fig. 3).

Most of the coal encountered during the field work is present in outcrops very near the coast. Only very thin carbonaceous zones were observed

further to the west, and even these are much less frequent in a given thickness of strata. Associated stigmarian rooted horizons can be taken as evidence for the origin of the coals *in situ*, and also can be useful as a top and bottom indicator since the enclosing sequences are highly deformed. The coals with rooted zones show, furthermore, that terrestrial swamp conditions existed, and the geographical distribution of the rooted horizons (Fig. 5) suggests that they may have been widespread during the Carboniferous in eastern Peninsular Malaysia. Previously, in many outcrops, an entire sequence has been assumed to be marine on the basis of scattered occurrences of invertebrate fossils, and the Charu Fm. (Metcalf, *et al.*, 1980) of the Panching area is a good example. In these outcrops, however, there are rooted zones interspersed with fossiliferous marine horizons, sometimes only a few centimeters apart (Plate 1; Fig. 4).

Interestingly, the fossil plants found associated with the coals are strikingly similar to well-known Euramerican forms. Because the specimens are more extensive and more diversified than those reported previously, the objective of refining the biostratigraphy has already been accomplished using preliminary field identifications, though further refinement should be possible ultimately. In addition to previously described species, the flora at Gambang contains cf. *Lepidodendron*, cf. *Archaeocalamites* sp., *Sphenophyllum tenerrimum*, *Sphenopteris hibberti*, *Sphenopteris fragilis*, and *Wardia* sp., in addition to some small seeds that are not yet identified. The localities near Chukai contain cf. *Lepidodendron* sp., *Stigmaria ficoides*, *Archaeocalamites radiatus sensu* Stur, '*Rhodea*' sp., and *Cardiopteridium* sp. The localities near Panching contain only lycopod material. The specimens are similar to those at Chukai, but are not, by themselves, sufficiently diagnostic to assign an accurate age. In the Panching area, however (see Metcalfe *et al.*, 1980 for a summary), invertebrates closely associated with the plants suggest a late Visean to Namurian age. This is equivalent to the late Mississippian strata present in parts of North America. Unfortunately, the lycopod remains from the Panching area described by Asama (1973) as *Lepidodendropsis* and *Lepidodendron volkmannianum* appear to represent other taxa, based on the published illustrations and on new collections in the Panching area. *Lepidodendron volkmannianum* is, however, characteristic of strata of Late Mississippian age in North America (Jennings, 1984). The locality near Kijal contains cf. *Lepidodendron* sp., *Archaeocalamites*, sp., '*Rhodea*' sp., *Sphenopteris* (*Sphenopteridium*) cf. *S. crassa*, and *Cardiopteridium* sp.

These fossil plants indicate similar Late Mississippian (late Lower Carboniferous) ages for the strata at all of these locations, although the Gambang locality may possibly be very slightly younger than the others. On the other hand, Upper Carboniferous strata have not yet been clearly identified anywhere in Peninsular Malaysia. There is no clearly evident biostratigraphic age difference between strata of the interior and strata near the coast, although the gross lithology appears somewhat different particularly with regard to the content of pyroclastics and coal beds.

Because the difference in lithology cannot be attributed to age differences, it can only be assumed that they are facies related. If so, there was a general landward trend toward the east during this time.

#### Acknowledgements

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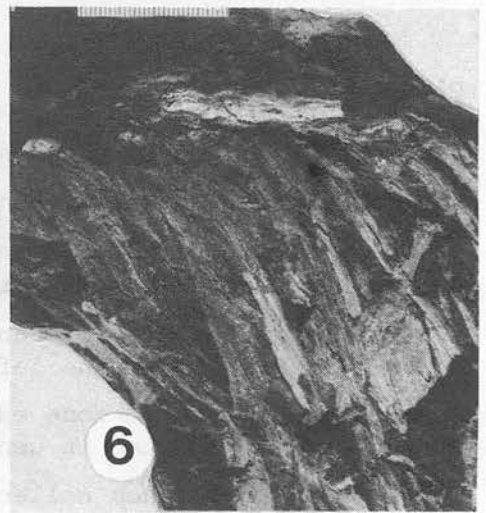
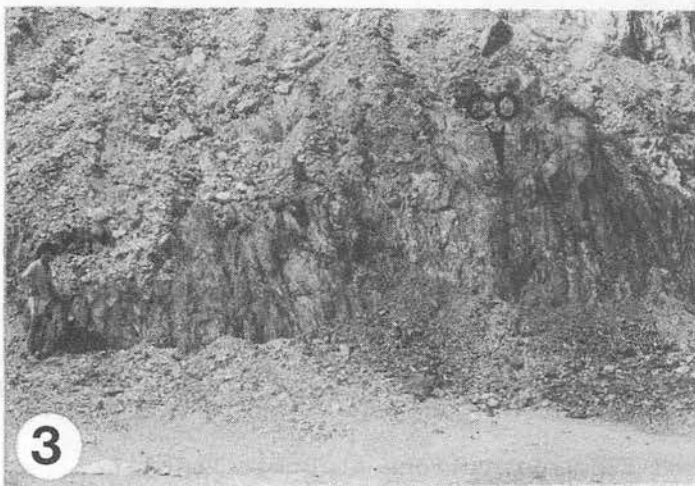
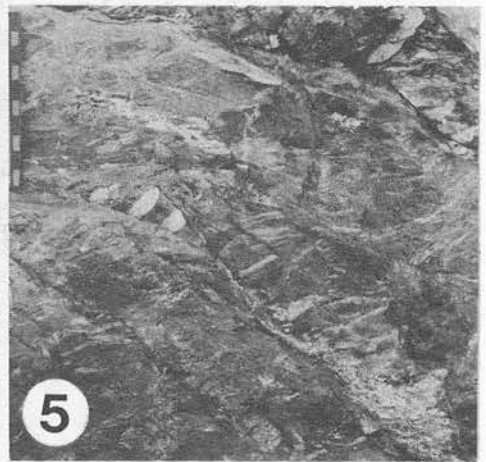
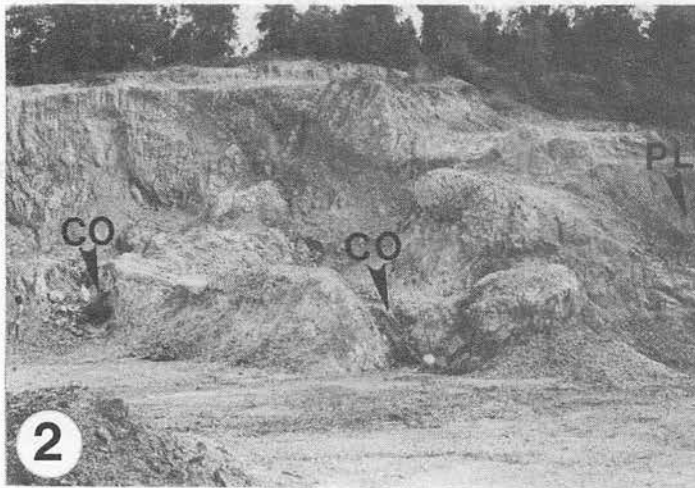
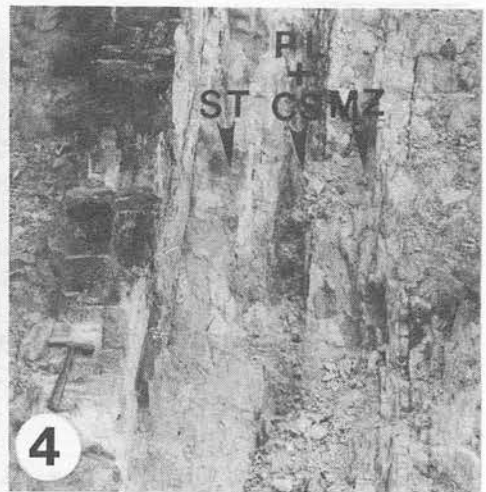
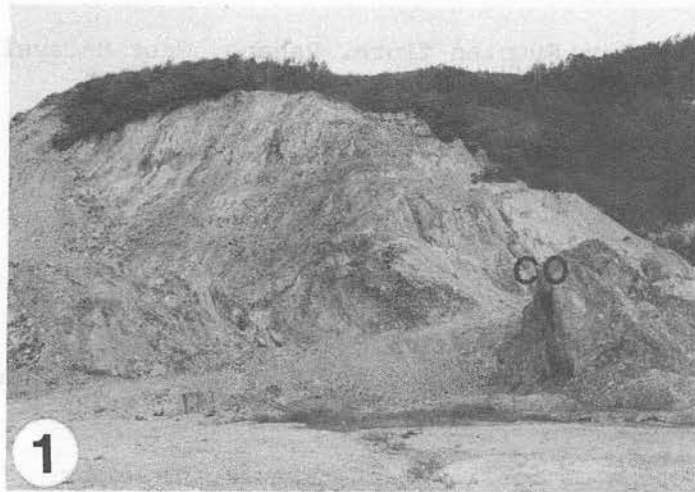
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*Manuscript received 26th June 1985*

Plate 1.

1. Coal-bearing strata in an excavation at Bukit Pejajat near Chukai.
2. Coal-bearing strata in an excavation north of road 4K east of Kijal.
3. Coal-bearing strata in an excavation on northeast side of highway to Kuala Terengganu at Kilometer 6.8 north of Chukai.
4. Roadcut 4.4 k east of Panching on the south side of Sungei Lembing Road. Base is to the left (west).
5. Stigmarian rooted zone exposed in excavations north at Bukit Pajajong. Scale is graduated in centimeters.
6. *Stigmaria ficoides* collected from excavations at Bukit Pejajat. Scale is graduated in millimeters.

SZ = stigmarian rooted horizon; CO = coal; CS = carbonaceous shale, Pl = plant fossil-bearing horizon, MZ = marine zone.



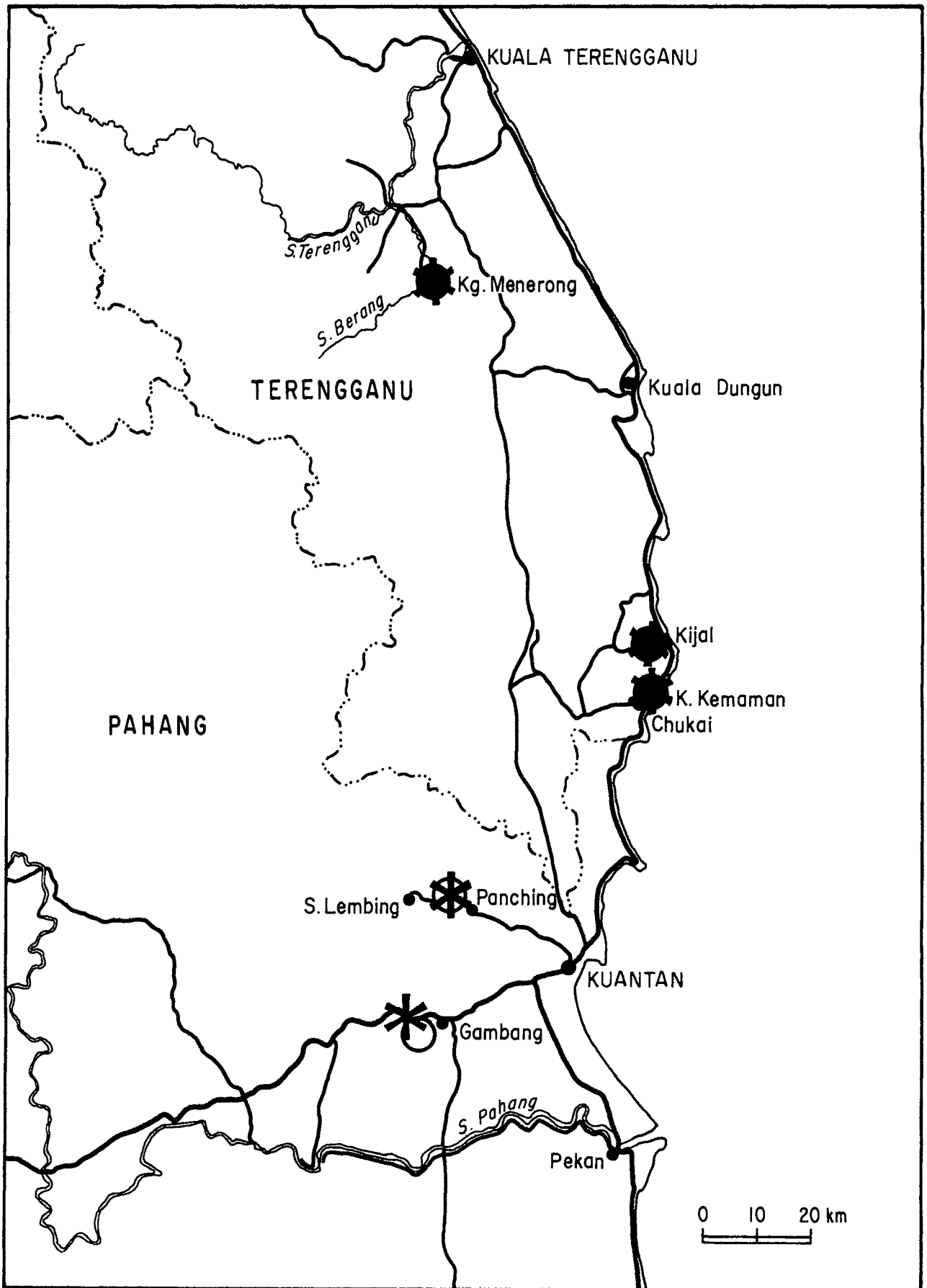


Figure 1.

Map of part of West Malaysia showing localities with stigmarian rooted horizons (○), coals (●), and plant megafossils (\*).

## OCCURRENCES OF WOOD-TIN IN PENINSULAR MALAYSIA

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In 1982, the writer examined some 100 samples of heavy mineral concentrates from various tin-fields of Peninsular Malaysia. The concentrates were obtained either as crude ore concentrate from mines or as panned concentrate from streams. In the course of the examination, the presence of wood-tin was noted in several samples.

Wood-tin is distinctly rare in occurrence within the Southeast Asian Tin Belt, and very little of it is presently known from this region. It is hoped that this short note will shed more light on the nature of the wood-tin occurrence in the region and improve our understanding on the nature of tin mineralization of the tin belt.

### Distribution of wood-tin

From over 100 samples examined, wood-tin was seen in only nine concentrates coming from five tin-fields of the peninsula, namely, Bukit Payung, Pahang; Air Putih, Terengganu; Gambang, Pahang; Pelepah Kanan, Johor, and Ulu Selim, Perak (Figure 1). Earlier on, Smith and Hosking (1974) have reported an occurrence of wood-tin from Sungai Reman, Pahang, and this is entered as locality X in the Figure 1. Their discovery is significant as it is the first reported occurrence of wood-tin in the peninsula. As can be seen from the above figure, wood-tin is fairly widespread in occurrence. The reason for it not being noticed before will be apparent later. It can be seen that wood-tin is mainly found in the Eastern Tin Belt. This pattern probably reflects the relatively high level of tin mineralization in the Eastern Tin Belt (epizonal) compared to the Western Tin Belt.

### Description of wood-tin

The heavy mineral concentrates examined from the five tin-fields bearing wood-tin consist mainly of cassiterite, with variable amounts of ilmenite, monazite, rutile, zircon, pyrite, struverite and sometimes, odd grains of corundum and wolframite. In the nine samples, wood-tin is rare and would pass unnoticed to the unwary observer. The writer's first encounter with wood-tin was a few greyish spherulites, each measuring about 2 mm across in the sample from Yee Mun Mine, Ulu Selim and would have passed it off as some 'concretion', if not for Dr. O. von Knorring of Leeds University who suggested that the spherulite be 'tinned' using zinc dish. On tinning, the spherulites become coated with grey metallic skin, giving a positive indication of cassiterite. The spherulite also peeled off in thin concentric layers, revealing colloform texture typical of wood-tin. The wood-tin is rare since in the concentrate of about 400 gm, less than 10 such spherulites were found.

A yet better form and higher percentage of wood-tin was seen in the concentrate from Bukit Payung area. Here the 'woody' colloform texture of wood-tin can be seen as most grains appear as fragments. The core usually consist of tan-coloured cryptocrystalline cassiterite. Colour zoning from tan, grey to dark brown appears as parallel bands of variable width around the core area.

A thick polish section of one grain, made for micro-probe analysis



(Fig. 2) shows tiny cassiterite needles radiating from a nucleus. In a number of grains the acicular cassiterite grew sufficiently coarse, so that the needle-shaped outlines are clearly seen.

The concentrates from Air Putih, Gambang and Pelepah Kanan areas contain only few grains of wood-tin, found after thorough search. Their shapes vary from tiny fragment of spherulite to a coarse bunch of radiating acicular cassiterite. In all the samples, the grains seldom exceed 3 mm in maximum dimension. Sketches of wood-tin grain fragments are presented in Figure 3.

#### Chemical composition of wood-tin

Samples of the wood-tin from Bukit Payung, Air Putih and Gambang were analysed by an electron probe microanalyser. The results (Table 1) show that they consist mainly of  $\text{SnO}_2$ , with substantial (up to 1.78 wt.%) amount of FeO. An earlier study of Mexican wood-tin by Lufkin (1977) showed a close relationship between iron-content and darkness of colour bands in wood-tin. Colour variation in the colloform bands of the present sample is probable caused by a similar behaviour in iron content.

#### Conclusion

From the present finding it is evident that wood-tin is not as rare as it was thought to be. The only reason it was not noticed before is that it is so small and escapes detection. Workers used to coarse pebbles of wood-tin, similar to those described in Lufkin (1977) or Hosking (1969) would certainly be unaware of its presence.

#### Acknowledgements

The writer has benefited through discussions with Dr. O. von Knorring of Leeds University. Electron probe microanalyses and microphotography were made at the Dept. of Earth Sciences, University of Leeds. Finally the writer thanks Dr. S.S. Almashoor for his comments on the manuscript.

#### References

- Hosking, K.F.G., 1969. The primary tin ores of the South west of England. In A Technical Conference on Tin, London, 1967. International Tin Council, London, 1157-1242.
- Lufkin, J.L., 1977. Chemistry and mineralogy of wood-tin, Balck Range, New Mexico. Amer. Min., 62, 100-106.
- Smith, C.W.E.H., and Hosking, K.F.G., 1974. Wood-tin from Peninsular Malaysia. Geol. Soc. M'sia Newsletter, no. 46, 1-7.

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*Manuscript received 7th June 1985*



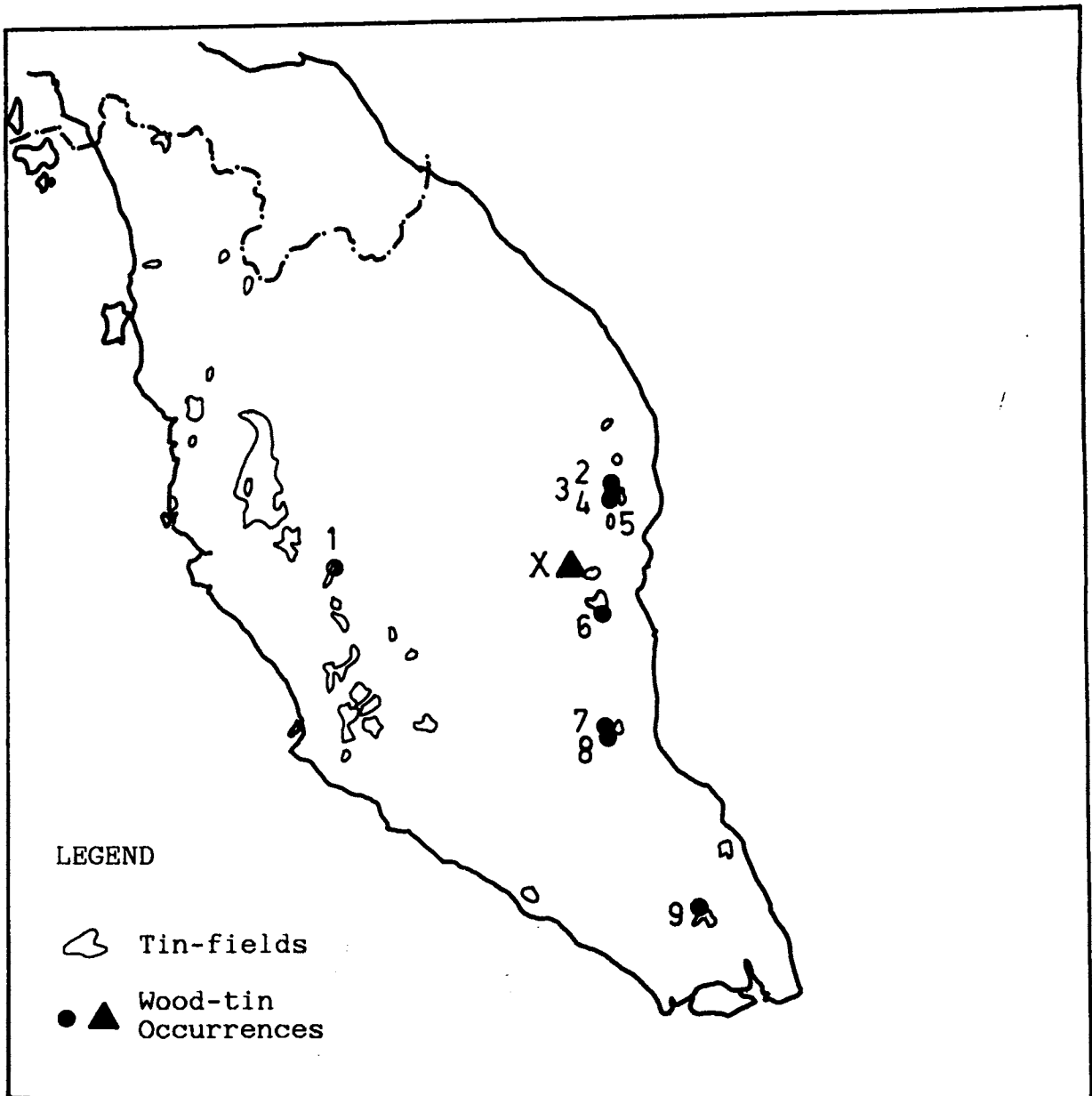


Figure 1. Distribution of Wood-tin occurrences in Peninsular Malaysia.

- |                        |   |
|------------------------|---|
| Ulu Selim, Perak:      | 1. Yee Mun Mine.                        |
| Air Putih, Terengganu: | 2. Galian Chung Ling;                   |
|                        | 3. Yen Fong Mine;                       |
|                        | 4. Hock Ann Mine and                    |
|                        | 5. Ban Hoe Mine.                        |
| Gambang, Pahang:       | 6. Yuen Lee Mine                        |
| Bukit Payung, Pahang:  | 7. Ming Soon Mining and                 |
|                        | 8. Liang Seng Mining.                   |
| Pelepah Kanan, Johor:  | 9. Waterfall Mine                       |
|                        | X. Sg. Anak Reman, Sg. Lembing, Pahang. |

Wood-tin occurrence marked X is from Smith and Hosking (1974).

Table 1: Composition of wood-tin from electron probe microanalyses

Sample Number	1	2	3	4	5
<u>Oxides</u>					
TiO <sub>2</sub>	0.00	0.00	0.00	0.00	0.00
MnO	0.00	0.00	0.00	0.02	0.04
FeO	0.62	1.78	1.73	0.85	0.71
Nb <sub>2</sub> O <sub>5</sub>	0.02	0.02	0.07	0.00	0.00
SnO <sub>2</sub>	98.87	97.89	97.18	99.64	99.05
Ta <sub>2</sub> O <sub>5</sub>	0.00	0.00	0.00	0.01	0.00
WO <sub>3</sub>	0.30	0.55	0.22	0.10	0.08
Total	100.81	100.24	99.20	100.66	99.88

Samples No. 1,2 and 3: Ming Soon Mining,  
Bukit Payung, Pahang.  
4: Galian Chung Ling,  
Air Putih, Trengganu.  
5: Yuen Lee Mine,  
Gambang, Pahang.

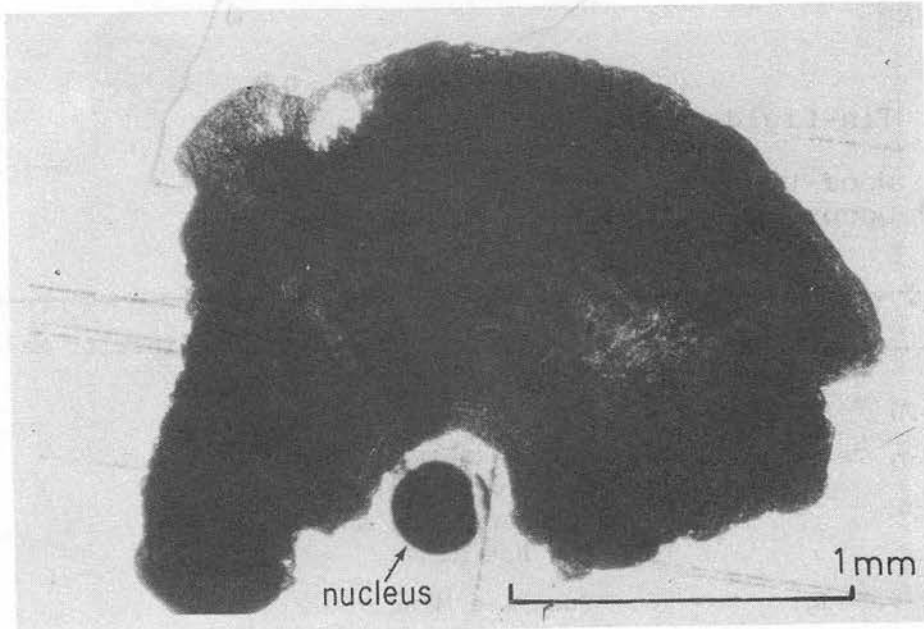


Figure 2. A thick polished-section of wood-tin from Bukit Payung, Pahang.

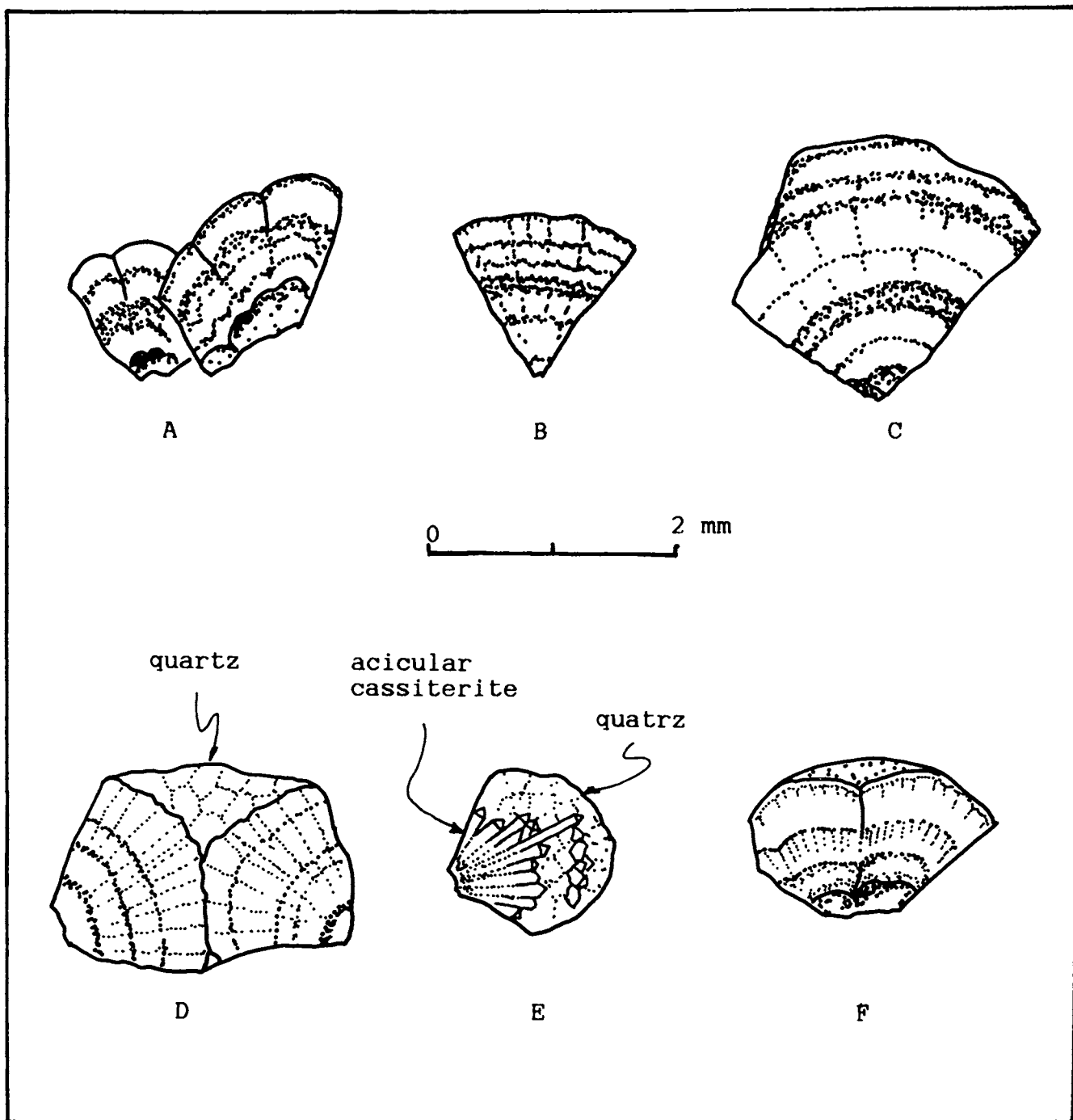


Figure 3. Sketches of wood-tin fragments.

A, B, C, & D: from Liang Seng Mining, Bukit Payung

E: from Galian Chung Ling, Air Putih

F: from Yuen Lee Mine, Gambang.

## ENCLAVES OF PENINSULAR MALAYSIAN GRANITOIDS

S. Chandra Kumar, Maktab Sains MARA, Kilometer 8, Jalan Gambang, Kuantan, Pahang, Malaysia

### Abstract

*Enclaves of Peninsular Malaysian granitoids may be categorised into the following types on the basis of detailed field, chemical and especially petrographic studies:*

1. *Microgranular enclaves*
2. *Quartzo - feldspathic enclaves*
3. *Clinopyroxene - amphibole enriched enclaves*
4. *Surmicaceous enclaves*
5. *Aluminous enclaves and other obvious xenoliths*

*Of the 5 enclave varieties identified, only the first 3 are common. Surmicaceous enclaves and obvious xenoliths tend to be rare.*

*The microgranular enclaves are examples of a class of enclaves which are now recognised worldwide. They are small, rounded and always finer grained and more mafic than their host granitoids. Their  $\text{SiO}_2$  and  $\text{K}_2\text{O}$  contents never exceeds that of their host. The unique and spectacularly enclave-rich 'globular rock' from the southern Malay Peninsula demonstrates that microgranular enclaves represent quenched globules of basic magma within commingled granitoid magma. This important rock also reveals that the microgranular enclave-granitoid association represents a stage in the mixing of two magmas of contrasted composition, arrested before completion. Microgranular enclave or globule, formation is a vital stage in this magma-mixing process since it greatly increases the area of interface between the commingling magmas.*

*The globule magma is believed to be directly related to the magma of associated batholithic gabbro intrusions. Upon forming globules this magma is modified by hybridization with the commingling host granitoid magma resulting in magma-mixing. Hybridization occurs by interliquid diffusion, the engulfing of droplets of the host magma and the exchange of suspended phenocrysts. The recognition of microgranular enclaves as agents of magma-mixing provides an explanation for the well documented positive correlation between microgranular enclave abundance and basicity of host granitoid. After final quenching, further modification occurs by reaction between solidified enclave and still fluid host magma. The reaction process involves an early stage of 'reciprocal reaction' followed by the intergranular penetration of melt from the host into the enclave. This melt eventually crystallizes to poikilitic quartz and K-feldspar producing what is termed a 'reaction texture'. Thus the ultimate petrographic and chemical character of most microgranular enclaves is determined by solidified enclave-granitoid magma reaction superimposed on a previous globule magma-granitoid magma hybridization event. This work provides the first documentation of the operation of magma mixing processes within Peninsular Malaysia.*

*Quartzo-feldspathic and clinopyroxene-amphibole enriched enclaves are interpreted as country rock xenoliths which have suffered the same processes of reaction with the host magma, as have microgranular enclaves. The mica-rich surmicaceous enclaves are most likely restite.*

*It is suggested that megacrysts within all varieties of enclaves originate mainly by the mechanical introduction of phenocrysts from the host magma into fluid enclaves. This is possible for even xenolithic enclaves since enclave - host magma reaction is believed to result in the xenolithic enclaves acquiring a fluid condition.*

*Biotite and amphibole within all enclave types almost always possess lower Fe/Mg ratios than the same phases in the host granitoids. Trace elements typically show generally similar abundance levels in enclaves and corresponding hosts indicating equilibration.*

Details of the investigation will be published subsequently.

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*Manuscript received 28th June 1985*

# PERTEMUAN PERSATUAN (MEETINGS OF THE SOCIETY)

## TECHNICAL TALK

### B. Nelson: Environmental trace element geochemistry of the Kelang Basin

The above talk was presented to about 15 members of the Society on 12th June 1985 at 5.00 p.m. in the Department of Geology, University of Malaya. Prof. Nelson, who is with the Department of Environmental Sciences at the University of Virginia, presented results of his research work on the trace element concentrations of rivers in Selangor State. This research was started in 1982 during Prof. Nelson's sabbatical leave at the Department of Geology, University of Malaya and continued during a recent six-month attachment to the Institute of Advanced Studies, University of Malaya.

Prof. Nelson started by pointing out the absence of data on the natural background concentrations of trace elements in the rivers of most temperate countries in view of their long histories of industrialization. It thus becomes difficult to assess the influence of human activities on the present day concentrations of trace elements in these rivers. Prof. Nelson then noted that Peninsular Malaysia offered a unique example for assessing the influence of human activities on trace element concentrations in its rivers as their upper reaches flowed through areas little affected by human activity though the lower reaches flowed through industrial and commercial areas and/or urban centres.

Prof. Nelson then stated that of the three major rivers in Selangor State i.e. the Sungai Kelang, the Sungai Selangor and the Sungai Langat, only the Sungai Kelang showed considerably higher concentrations of trace elements in its lower reaches when compared with the natural background concentrations of its upper reaches. Prof. Nelson, however, noted that although several trace element concentrations were determined only those of Zn, Pb and Cu were significant being in the Sungai Kelang estuary about two to three times the natural background concentrations. These high Zn, Pb and Cu concentrations were similar to those of rivers in the temperate areas and were considered by Prof. Nelson to have been contributed by human activities as the Sungai Kelang flows through large industrial, commercial and urban centres in its middle reaches.

In the lively discussion which followed the talk, it was noted that in view of the high concentrations of Zn, Pb and Cu in the Sungai Kelang estuary it would be ill-advised to splurge on cockles from this estuary.

J.K. Raj

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# BERITA - BERITA PERSATUAN (NEWS OF THE SOCIETY)

## SOCIETY'S PUBLICATIONS - PROGRESS REPORT

### 1. Bulletin no. 17

Bulletin no. 17 has finally been published and members should have

received it by now. The Acting Editor wishes to apologise for the delay in the release of this Bulletin. This was due to some technical problems which took some time to solve. Members should be glad to know that the GSM Council has agreed to give each member a FREE copy of this voluminous Bulletin. Additional copies will be sold at M\$35.00 (US\$17.00) each.

2. Bulletin no. 18 - Special Bulletin on Petroleum

The GSM Council decided that the Special Bulletin on Petroleum should be published quickly. Hence this will now be Bulletin no. 18. The reviews of the seven papers received to-date is completed but only six papers have been accepted for publication. However another paper may be dropped as the authors are unable to provide originals of diagrams to-date. This Bulletin has already been submitted for typesetting and we are hopeful that it can be released by September.

3. GEOSEA V Proceedings (Bulletin Nos. 19 & 20)

More than half the papers in Bulletin 19 are ready for typesetting. The Acting Editor would like to appeal to authors who have received comments on their papers to reply as soon as possible so that this volume can also be sent to the printers. Authors whose papers have been edited will be receiving a letter informing them which Bulletin their paper is scheduled for. In general the Editorial Board decided that papers received first will be in number 19. However where an author has more than one papers the second paper will be number 20.

4. Bulletin no. 21

The Editor is ready to receive papers for publication in Bulletin 21 scheduled for 1986. An early submission of papers would facilitate the editorial process to begin and for us to release the Bulletin earlier.

5. WARTA GEOLOGI

The Editor would like to appeal for more short articles/notes, etc. for publication in the Warta. As members can see from this issue every effort has been made to publish the contributions without any delay.

6. Border Correlation (Volume II)

The Editor is still unable to obtain one or two reports of the sub-committees. If these are not available shortly, the publication will be completed without these.

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## PERTUKARAN ALAMAT (CHANGE OF ADDRESS)

The following members have informed the Society of their new addresses:

1. Cathy L. Connor, 745 5th Street, Douglas, Ak. 99824, USA.
2. N. Tate, 7/28 Nelson St., South Townsville, Qld. 4810, Australia.
3. Lee Chiong Ting, Osborne & Chappel, 114, Jalan Belfield, Ipoh, Perak.
4. George Pun, P.O. Box 23, Mareeba, Qld. 4880, Australia.
5. Y. Nakashima, Kiso-Jiban Consultants Co. Ltd., Mimua Bldg., 3 Fl.,  
1-34 Kanda Jimbo-cho, Chiyoda-ku, Tokyo 101, Japan.
6. Amerizal Djafar, No. 11, Jln. SS2/59, Petaling Jaya.
7. Mustapha Kamal Shahrom, 25, Jalan H 10, Taman Melawati, Setapak, Kuala Lumpur.

8. Chandra Kumar, Maktab Sains MARA, Kilometer 8, Jalan Gambang, Kuantan, Pahang.
9. A. Hamid Mohamad, Sarawak Shell Bhd., ITS, Lutong, Sarawak.

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## PERTAMBAHAN BARU PERPUSTAKAAN (NEW LIBRARY ADDITIONS)

The following publications were added to the Library:

1. Seatrad Centre, annual report 1984
2. Science Reports of the Institute of Geoscience, University of Tsukuba, vol. 6, 1985
3. AGID News, no. 43, 1985
4. Directory of Malaysian standards, 1985
5. RMRDC, Newsletter no. 9, 1985.
6. Asian Oil & Gas, January & April, 1985
7. Episodes, vol. 8, no. 1, 1985
8. Annales Academiae Scientiarum Fennicae Series A, no. 138, 1984
9. Geophysical Research, Bull. vol. 23, no. 1, 1985
10. National Library, Singapore, Feb, March & April 1985
11. AAPG Explorer, April & May, 1985
12. Seatrad Bulletin, vol. VI, no. 1, 1985
13. Commonwealth Science Council, May/June 1985
14. IMM Bulletin nos. 942 & 943, 1985
15. IMM Transaction, Section A, vol. 94, Jan & April 1985
16. Annual Report, Chinese Academy of Geological Sciences, 1981
17. Bulletin of the Chinese Academy of Geological Sciences, nos. 8, 9 & 10, 1984
18. Southeast Asia Regional Network of Geosciences Newsletter, July 1984
19. Oklahoma Geology Notes, vol. 44, nos. 4-6, 1984
20. American Museum Novitates, nos. 2804 - 2806 & 2812 - 2813, 1985
21. Geological Literature of USSR. Bibliographical yearbook for 1980 year, vols. 1 & 2, 1984.

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## PETROLEUM GEOLOGY SEMINAR 1985 - FIRST ANNOUNCEMENT

6th December 1985, Ming Court Hotel, Kuala Lumpur.

### Papers

Many outstanding papers have been presented at the eight previous Seminars and the Geological Society of Malaysia would greatly appreciate your contribution of a paper to the Seminar this year. Papers on any topic relevant to the understanding of the petroleum geology of the region and to petroleum exploration would be most welcome. Please inform us of your intention to present a paper at this Seminar before 30th September 1985. Abstracts should be submitted by 31st October 1985.

### Registration and general information

All intending participants are advised to register early for the Seminar as a large turnout will again be expected this year. Advance registration for the Seminar will be accepted until 30th November 1985. Late registration will be accepted at the Geological Society of Malaysia's Registration



Desk in the Ming Court Hotel.

	<u>Advance registration fee</u>	<u>Late registration fee</u>
Full Members	MR40.00	MR50.00
Non-Members	MR70.00	MR100.00
Student Members	Free	Free
Student Non-Members	MR5.00	MR6.00

Only speakers at the Seminar will be exempted from payment of registration fees.

Payment by crossed cheques, banks or cashiers orders is acceptable and should be made payable to the Geological Society of Malaysia. Outstation cheques should include sufficient bank charges.

Lunch will be provided for all registered participants except student participants.

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## BERITA - BERITA LAIN ( OTHER NEWS )

### IUGS PUBLICATIONS

The International Union of Geological Sciences has just announced their release of Publication No. 13:

SOUTHEAST ASIA: Tectonic Framework, Earth Resources  
and Regional Geological Programs

by John A. Katili and John A. Reinemund

July 1984

The highlights and results of a seminar held in Bangkok, Thailand, January 1983.

Contains: \* A review of regional geological organizations and programs  
\* A well-illustrated summary of the regional tectonics and mineral resources of Indonesia, Malaysia, the Philippines and surrounding areas.

72 pages.                      \$11.00.                      ISBN 0-930423-08-09

Also due for release shortly is their Publication No. 17.

Petroleum Resource Assessment edited by  
Charles D. Masters  
1984

An introduction to the methods and procedures of assessing petroleum resources, especially as used by the geological surveys of Canada and the USA.

This latest IUGS publication contains a series of papers ranging from probability and statistical methods to geochemical studies and the size distribution of oil fields in relation to basin characteristics. The publication concludes with the application of resource assessment data to policy decisions in developing countries.

With its emphasis on specific working examples, this volume provides a solid base for those wishing to learn more about the 'art and science' of petroleum resource assessment.

157 pages.

\$20.00.

ISBN 0-930423-09-7

Both these publications are available from either of the following:

EPISODES Secretariat  
601 Booth Street  
Room 177, Ottawa  
Canada K1A 0E8

IUGS Secretariat  
Dept. of Geology  
Norwegian Institute of Technology  
7034 Trondheim, Norway

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## TECTONIC MAP OF SOUTH AND EAST ASIA

This map set (published 1982) consists of seven sheets and an explanatory text, with individual sheet breakdown as follows: four sheets of tectonic maps, which combine to form the entire geographic area of coverage (1:5 million scale); one sheet showing gravity anomalies, epicenters and heat flow (1:10 million scale) with total-area coverage; one sheet showing major tectonic units, dislocations, and fault-plane solutions of earthquakes (1:10 million scale) with total-area coverage; and a final sheet containing the legend for all the sheets, and the tectonic columns for the different tectonic blocks.

### Specific land-area coverage

Western border - runs along a straight line that cuts through the countries of Saudi Arabia, Iraq, and eastern Turkey. (This line follows closely along the 40° longitude line).

Northern border - runs (from west to east) along the southern Soviet border, thereby following the northern border of Iran, Afghanistan, China, and Mongolia to the Sea of Japan.

Eastern border - includes the Japanese islands, Taiwan, the Philippine islands, and all of Indonesia with the exception of eastern (Papua) New Guinea.

Southern border - includes all land areas extending into the Indian Ocean, including Ceylon and the entire Indonesian chain as described above.

Price: US\$75 (Catalog: 673)

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## GEOLOGIC WORLD ATLAS

This a large-format atlas (completed 1984), designed to cover the world's geology with 22 sheets, the first of which is a general legend sheet with text. All 22 sheets are complete and housed in an attractive hard-cover binder (the binder can be opened to allow removal of selected sheets or addition of related sheets, if needed). Individual sheet breakdown is as follows:

General Legend - 1 sheet  
North America - 2 sheets  
South America - 2 sheets

Australia - 2 sheets  
Antarctica - 1 sheet  
Antarctic Ocean - 1 sheet

Africa - 3 sheets  
Europe - 1 sheet  
Asia - 4 sheets  
South-east Asia - 1 sheet

Arctic Region - 1 sheet  
Pacific Ocean - 1 sheet  
Indian Ocean - 1 sheet  
Atlantic Ocean - 1 sheet

Continental sheets are drafted at a scale of 1:10 million, other sheets may vary. Introductory text, and explanatory text that accompanies each mapping region is printed in both English and French.

Price: US\$245 (Catalog: 676)

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## AAPG COMPREHENSIVE INDEX 1976 - 1980

The Comprehensive Index of Publications of the American Association of Petroleum Geologists 1976-1980 is a compilation of the indexes from the Association's Bulletin and special publications program for the years 1976-1980.

In the Bulletin, all major paper titles are indexed, as well as keywords and author names. For special publications, major paper titles, keywords and author names are included. Only single line entries are listed. Lines are terminated after the last full word that space allows. 334 pages.

Price: AAPG members - US\$24; non-members - US\$28 (Catalog: 618)

\*\*\*\*\*

These three publications are available from:

AAPG Bookstore, P.O. Box 979, Tulsa, Ok. 74101, USA.

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## AGID PUBLICATIONS

The following list of AGID Publications are available for sale:

- no. 1 - GEOSCIENTISTS AND THE THIRD WORLD: A COLLECTIVE CRITIQUE OF EXISTING AND PROGRAMS. A.R. Berger (ed), Geological Survey of Canada Paper 74-57, 32 pages, 1975.  
Available from Geol. Surv. Canada, 601 Booth Street, Ottawa, K1A 0E8
- no. 2 - HIDDEN WATER IN ARID LANDS: Report of a workshop on groundwater research needs in arid and semi-arid zones - L.A. Heindl (ed), International Development Research Center, Ottawa, as IDRC-057e: 19 pages + 1 microfiche, 1975. Out of print.
- no. 3 - NEW DIRECTIONS IN MINERAL DEVELOPMENT POLICIES: Proceedings of an international workshop, held at Bagauda, Nigeria, - D.J. Laming and D.E. Ajakaiye (eds), 224 pages, 1977, US\$15.00. (\$10.00 to developing countries).
- no. 4 - PRELIMINARY BIBLIOGRAPHY ON GROUNDWATER IN DEVELOPING COUNTRIES, 1970 to 1976. By D.A.V. Stow, J. Skidmore and A.R. Berger, 305 pages, 1976. Out of print.
- no. 5 - GEOSCIENCE EDUCATION IN DEVELOPING COUNTRIES: Proceedings of an

international symposium, held at Sydney, Australia, 1976 - P.G. Cooray (ed), 56 pages, 1977. US\$5.00. (\$3.00 to developing countries)

- no. 6 - MINERAL RESOURCE MANAGEMENT IN DEVELOPING COUNTRIES: STATE PARTICIPATION, PRIVATE ENTERPRISE, OR BOTH? - Proceedings of an international symposium, held at Sydney, Australia, 1976 - M.E. Woakes (ed), 28 pages, 1978. US\$6.00. (\$3.00 to developing countries).
- no. 7 - MINERAL EXPLORATION TECHNIQUES IN TROPICAL RAIN FORESTS: Edited by D.J.C. Laming and A.K. Gibbs, 221 pages, 1977, US\$12.00.
- no. 8 - STRATEGIES FOR SMALL-SCALE MINING AND MINERAL INDUSTRIES: edited by J.M. Neilson, 200 pages, US\$12.00
- no. 9 - GEOCHEMISTRY IN ZAMBIA; Edited by D.C. Turner, 94 pages, US\$3.00
- no. 10 - AGID GUIDE TO MINERAL RESOURCES DEVELOPMENT FOR DEVELOPING COUNTRIES: Edited by Michael Woakes and John S. Carman, 504 pages, US\$25.00 (US\$8.50 to developing countries).

Note:- All orders except as otherwise noted should be sent to AGID Headquarters, AIF, GPO Box 2754, Bangkok 10501, Thailand. Please enclose payment, where applicable, in US\$ currency. Include US\$3.00 per publication to help cover cost of postage and handling via air-mail. Institutions, companies and libraries may request invoices.

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## NEW PUBLICATION - PALEOMAGNETIC RESEARCH IN SOUTHEAST AND EAST ASIA

The Proceedings of a workshop held in the Geology Department of the University of Malaya, Kuala Lumpur in March 1982, has recently been published under the title 'PALAEOMAGNETIC RESEARCH ON SOUTHEAST AND EAST ASIA'. It is obtainable as CCOP/TP 13 from the Office of the Project Manager, c/o ESCAP, United Nations Bldg., Bangkok 2, Thailand.

C.S. Hutchison

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## ASEAN JOURNAL ON SCIENCE AND TECHNOLOGY FOR DEVELOPMENT

### Object and scope

The ASEAN Journal on Science and Technology for Development is a publication of the ASEAN Committee on Science and Technology.

The ASEAN Journal on Science and Technology for Development is published semi-annually and reports on science and technology policies and programmes and research activities undertaken in support of social and economic development of the ASEAN member countries. Articles in the Journal do not necessarily represent the views of the editors or those of the publishers.

### Contributions

Contributions are invited from all policy makers, research personnel

and managers working in public institutions as well as those working in private organizations and industries.

Research papers must be factual and original, and must not have been published elsewhere, though papers whose biological or technological aspects have already been published may be accepted if previously unpublished chemical information, technological and/or biological information and conclusions are now included.

#### Types of contributions

The contributions that will be included are as follows:

- \* ASEAN science and technology policies and programmes
- \* Research papers
- \* Review articles
- \* Short communications
- \* Book Reviews
- \* Letters to the Editors

#### For further information

The Chief Editor, ASEAN Journal of Science & Technology for Development, Department of Chemistry, National University of Singapore, Kent Ridge, Singapore 0511.

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## SENARAI DISERTASI SESI 1984/85

Jabatan Geologi, Universiti Kebangsaan Malaysia (UKM)  
(List of Dissertations Session 1984/85, Dept. of Geology, UKM)

1. Law Seong Fook: Geologi struktur, stratigrafi dan arus keno lebuhraya pintasan, Mentakab-Temerloh, Pahang
2. Zulkafli bin Ismail: Sifat-sifat jujukan tanah kawasan Ganchong, Kuala Pilah, Negeri Sembilan
3. Mohd. Hamdan bin Abdullah: Geologi dan permineralan kawasan barat Gunung Jerai, Kedah
4. Lee Lam Seng: Geologi kawasan Bangi dan sekitarnya (Selangor) dengan penekanan terhadap geologi struktur.
5. Abd. Rashid Abd. Rahman: Petrografi batuan igneus Bukit Mor-Bukit Pengkalan, Muar, Johor
6. Md. Asmuri Saion: Hidrogeologi kawasan Johor Selatan, Johor
7. Mohd. Badzran Mat Taib: Geologi dan stratigrafi Genting Jengka-Bukit Gebok, Maran, Pahang
8. Md. Arshad Lateh: Kajian geokimia Granit Gunung Pulai
9. Razak Siamin: Kegagalan dan kestabilan cerun kawasan Bangi, Selangor
10. Hamdan bin Mohamad: Kajian petrografi dan penentuan secara statistik komposisi mineral batuan granit, Gunung Pulai, Johor
11. Ab. Rashid bin Ahmad: Geologi kawasan Lubok Paku, Maran, Pahang
12. Kasim bin Husain: Geologi kawasan Padang Tengku, Kuala Lipis, Pahang
13. Mustapa bin Che Muda: Geologi struktur dan stratigrafi kawasan Maran, Pahang
14. Kamar Shah Ariffin: Geologi dan graviti sepanjang Lebuhraya Tun Abd. Razak, Segamat-Kuantan
15. Joseph Theodore A. Thomas: Sifat fizik dan mekanik batuan igneus kawasan Temerloh, Pahang
16. Nor Azman bin Kusin: Geologi dan geofizik (kerintangan dan seismos) kawasan Kuala Pilah, Negeri Sembilan

17. Mogana Sundaram N: Geologi kejuruteraan kawasan Kuala Pilah, Negeri Sembilan
18. Hafit bin Husin: Geologi kawasan Benta, Kuala Lipis, Pahang
19. Che Aziz bin Ali: Geologi dan stratigrafi Kg. New Zealand dan kawasan sekitarnya, Pahang
20. Zaini bin Md. Desa: Hidrogeologi kawasan Kuala Pilah, Negeri Sembilan
21. Wan Mazlan bin Wan Mahmood: Geologi kawasan Kuala Lipis-Benta, Pahang
22. Yusuf bin Bujang: Geologi kawasan Kuala Lipis, Pahang
23. Mohd. Faisal Abdullah @ Teo Sui Hui: Geologi dan metamorfisme formasi Bukit Kenny, Kuala Lumpur
24. Che Ibrahim bin Mat Saman: Geologi dan permineralan kawasan Timur Gunung Jerai, Kedah.

Hamzah Mohamad

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## ACTIVITIES OF THE IGCP

Two forthcoming activities of the IGCP are as follows:

1. IGCP Project No. 218. Symposium/Training Course. Quaternary processes, environments and economic deposits in Southeast Asia: coastal lake ecosystems. (Songkhla Lake, Thailand). Field trip, training course, 3-day symposium, Haadyai, Thailand. Co-sponsored by the Geological Society of Malaysia, AGID, Department of Mineral Resources (Thailand), Department of Land Development (Thailand), Geological Society of Thailand and Chulalongkorn University. All enquires and offer of papers should be directed to Dr. John Rau, c/o AGID, P.O. Box 2754, Bangkok, Thailand.
2. IGCP Project No. 218. Quaternary Processes and Events in S.E. Asia. An inventory of all researchers with interest in any aspect of the Quaternary of Southeast Asia (including Applied Quaternary) is being prepared. All those who would like to be listed in this inventory or to receive the Project Circular are invited to write to Prof. B.K. Tan, c/o Department of Geology, University of Malaya, Kuala Lumpur, Malaysia.

B.K. Tan

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## INTERNATIONAL SEMINAR ON LATERITE

Tokyo, Japan, October 14-17, 1985

The Seminar is organized by the Japan National Committee for International Geological Cooperation Programme (IGCP) and the Mining and Metallurgical Institute of Japan (MMIJ) (Centennial Anniversary of MMIJ), and The International Working Group on IGCP Project Proposal.

The discussions will be grouped under the following sections:

1. The Behavior of Elements During Tropical and Sub-Tropical Weathering
  - 1) Genesis of Weathering Processes
    - A: Classification and standardization of technology
    - B: Mineralogy and geochemistry
    - C: Parageneses and mineral associations
    - D: Geochemical and geophysical exploration for concealed mineralization
    - E: Paleomagnetism, paleomorphology and paleoclimatology

- 2) Mineral composition of weathering profiles
    - A: Mineral deposits and genesis
    - B: Mineralogy and geochemistry
    - C: Geological mapping
  - 3) Soil formation
    - A: Characteristic and genetic processes
    - B: Geomorphology and pedology
    - C: Biological aspects
    - D: Interaction between lithosphere and biosphere
- II. Mineral processing and metallurgy for laterite ores
- 1) Mineral processing
    - A: Separation of valuable constituents
    - B: Sizing and dewatering
    - C: Agglomeration
    - D: Miscellaneous
  - 2) Metallurgy
    - A: Fundamental research
    - B: Pyrometallurgy
    - C: Hydrometallurgy
    - D: Segregation process
    - E: Miscellaneous

Some invited plenary lectures and special sessions are planned at the beginning of the scientific sessions.

IGCP field excursions are planned to be held outside of Japan under the close cooperation and support of Asian countries, and/or in Japan. Also excursions to mines and smelters in Japan will be held as post-session tours. The expenses will be charged to the participants. Detailed information will be provided in the Second Circular.

For information contact: Dr. Y. Ogura, International Seminar on Laterite, c/o The Mining and Metallurgical Institute of Japan, 5-4 Ginza, 8-chrome, Chuo-ku, Tokyo 104, Japan.

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## 13TH CONGRESS - THE COUNCIL OF MINING AND METALLURGICAL INSTITUTIONS, CANBERRA, AUSTRALIA - May 11-16, 1986

Theme: The Twenty-First Century - Mining for Mankind.

### Aim

To bring together all persons interested in the mineral industry for the presentation of information and discussion on the trends in technology and science in the minerals industry of the 21st century.

### Plenary and technical sessions

A number of plenary session addresses on the main theme of the Congress will be invited. The technical sessions of the Congress will include exploration and geology, mining, metallurgy, and miscellaneous topics within the scope of the theme and applying to all minerals including oil and gas. The deadline for receipt of synopses (not more than 250 words) is 1 May 1985. Authors will be notified of the provisional acceptance of their papers by 1 July 1985 and receipt of full text of papers is required by 1 October 1985.

### Tours

Pre-Congress and Post-Congress tours of approximately one week's duration will be arranged to a wide variety of mining and metallurgical activities in Australia and New Zealand.

### For details

For further details or enquiries regarding papers and copies of the 13th CMMI Congress Second Circular please contact: The Honorary Secretary, 13 CMMI Congress, c/o The Australasian Institute of Mining and Metallurgy, P.O. Box 310, Carlton South, Australia 3053. Telephone: (03) 347 3166; Telex: AA33552; International Telephone: (613) 347 3166.

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## MINE WATER CONGRESS, GRANADA, SPAIN, SEPT. 17-21, 1985

### General topics

1. Investigations concerning the origin of mine water
2. Surface mine dewatering techniques
3. Underground mine dewatering techniques
4. Role of water in the behaviour of excavations
5. Mine workings in the presence of water dangers
6. Special technics (freezing, injection, cementing, etc.)
7. Mathematical models applied to the prediction of mine water inflows
8. Environmental protection related to mine water discharges
9. Miscellaneous topics

For further details contact: Prof. R. Fernandez-Rubio, Dept. of Hydrogeology, School of Mines, Rios Rosas 21, 28003, Madrid, Spain.

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## CONFERENCE ON HIGH HEAT PRODUCTION GRANITES, HYDROTHERMAL CIRCULATION AND ORE GENESIS, ST. AUSTELL, CORNWALL, ENGLAND Sept. 22 - 26, 1985

Organized by the Institution of Mining and Metallurgy in association with the Royal Geological Society of Cornwall, DMG - Deutsche Mineralogische Gesellschaft, GDMB - Gesellschaft Deutscher Metallhütten- und Bergleute, SGA - Societe de Geologie Appliquee aux Gites Mineraux, the Mineral Deposits Studies Group and the Applied Mineralogy Group of the Mineralogical Society. The conference will provide an opportunity for discussion of research into the formation of the granites, their mineral and geothermal resources and related aspects of exploration.

Further details obtainable from The Conference Officer, The Institution of Mining and Metallurgy, 44 Portland Place, London W1N 4BR, England.

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## 3RD ASCOPE CONFERENCE AND EXHIBITION

Putra World Trade Centre, Kuala Lumpur, Malaysia, 2-5 December 1985

Theme: ASEAN: The Changing Energy Scene

More than 40 papers will be presented in the areas of petroleum exploration, petroleum engineering, natural gas utilisation, energy resources and



automotive fuels, the economics of energy development, and safety and environmental conservation.

Among the highlights of the Conference will be presentation of ASCOPE Council Policy papers. Foremost authorities in the petroleum industry will set the tone in their keynote addresses for the technical and general sessions which follows.

The Exhibition will feature technological advancements in the industry in support of the Conference theme. National representations are expected from France, Canada, the United Kingdom and Italy. Malaysia, the United States of America, South Korea and Japan form the bulk of individual exhibitors. Large stands are being taken by Petronas' principal partners in Malaysia, namely Esso, Shell, Elf Aquitaine and British Petroleum.

For further information, please contact: ASCOPE '85 Conference & Exhibition Secretariat, c/o Petronas, Menara Dayabumi, Jalan Sultan Hishamuddin, P.O. Box 11455, Kuala Lumpur, Malaysia. Telephone: 03-449507 & 03-448011; Telex: PETRON MA 31123, Telefax: 423908.

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## EMPLOYMENT CORNER

Mr. William W. Sharp of 7312 Mimosa Lane, Dallas, Texas 75230, USA, 1-214-363-6409 who has many years of experience both as a geologist and in the field oil oil exploration, is interested to work in this region. He is over 60 years old and is keen to work in the search for and production of oil and gas. Anyone interested in Mr. Sharp's services can contact him directly.

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## KURSUS-KURSUS LATIHAN DAN BENGKEL-BENGKEL (TRAINING COURSES AND WORKSHOPS)

### AMF Courses

The Australian Mineral (AMF) has been established as an independent national institution by the mining and petroleum industries operating in Australia. It is administered by a Council which includes representation from the professional institutes and organizations associated with the mining and petroleum industries, together with the Commonwealth Department of Resources and Energy, the C.S.I.R.O. and the Universities and Colleges of Advanced Education. It is a not-for-profit organization financed mainly by income from courses together with subscriptions from mining and petroleum companies and consultants.

The Foundation has the principal function of providing training and refresher courses for professional and other staff. In addition it offers a wide range of information services based on a specialist earth sciences library.

The headquarters building in Glenside, South Australia, is a magnificent and functional building and includes an auditorium, library and seminar rooms. Associated catering facilities adjoin.

Most courses are presented in Adelaide, but venues in other Australian centres are chosen as appropriate to the needs of the industries which are being served or where appropriate demonstrations or site visits are available. Programmes are also offered in Southeast Asia and New Zealand.

Suggestions for Courses or Seminars are welcomed.

1985 courses

Gas conditioning and processing (29 July - 9 August), Adelaide  
Structural Geology (5 - 9 August), Adelaide  
Mineral law (12 - 16 August), Sydney  
Application of petrology and mineragraphy to Wallrock Alterations and  
gossans - an aid to exploration (12 - 23 August), Adelaide  
Geophysics for geologists (26 August - 3 Sept), Brisbane  
Mineral/Commodity Economics (26 August - 4 Sept.), Adelaide  
Introduction to agglomeration (27 August), Adelaide  
Introduction to agglomeration (29 August), Sydney  
Production operations 1 - well completion, workover and stimulation  
(2 - 13 September), Adelaide  
Geology for geophysicists (16 - 20 September), Perth  
Introduction to exploration for oil and gas (23 September), Perth  
Introduction to exploration for minerals (23 - 24 Sept.), Perth  
Well log interpretation (23 - 27 September), Adelaide  
Well Testing (30 Sept. - 4 Oct.), Adelaide  
Introduction to mineral exploration (30 Sept. - 5 Oct.), Adelaide  
Management Training for senior geologists (16 - 25 Oct.), Adelaide  
Cost-effective drilling and blasting in surface coal mines (28 Oct. -  
1 Nov.), Brisbane  
Geology and geophysics in petroleum exploration of cratonic basins  
(28 Oct. - 2 Nov.), Adelaide  
New South Wales - the potential for development (5 - 6 Nov.), Sydney  
Petroleum law (11 - 15 Nov.), Perth  
Advanced remote sensing for geologists and geophysicists (18 - 22 Nov.),  
Adelaide  
Cost effective drilling and blasting in underground metal mines (25 - 29  
Nov.), Broken Hill  
Gas reservoir engineering fundamentals: reserves, performance and deli-  
verability (25 - 29 Nov.), Adelaide  
Natural gas flow systems: gathering, transmission and storage (2 - 6 Dec.),  
Adelaide  
Advanced geostatistics for the mining industry (2 - 6 Dec.), Adelaide  
Gas production operations and gas processing (9 - 13 December), Adelaide  
Introduction to seismic interpretation (9 - 11 Dec.), Adelaide  
Seismic stratigraphy (11 - 13 Dec.), Adelaide

1986 courses

Exploration management (5 - 21 March), Adelaide  
Geological interpretation of aerial photographs and satellite images  
(10 - 21 March), Adelaide

Further information:

Australian Mineral Foundation, Private Bag 97, Glenside, South Aust-  
ralia 5065. Tel. (08) 79 7821; Telex: AA 87437.

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**1985 COURSE IN ADVANCED QUARRY BLASTING TECHNIQUES**

9th - 12th September 1985

During the period between 9th and 12th September 1985, Tenaga Kimia  
Sdn. Bhd. will be organising its traditional 'Rock Blasting Course'. This  
year, we will be focussing our attention on Quarry Blasting, as in Malaysia,  
most rock blastings are done in the quarries.

### General information

Speakers: We have invited speakers from India, Philippines, Sweden, United States of America, as well as local speakers with vast experience in the subject matter.

Location: The course will be held in P.J. Hilton, one of Petaling Jaya's most prestigious hotels.

Payment: A nominal sum of M\$550.00 per participant will be charged. This includes all course material, light refreshment, lunch and transport for field trips.

Accommodation: We can arrange for accommodation at a discount rate at the P.J. Hilton.

Overseas applicants: Overseas applicants are required to self-arrange entry visa, or any other requirements of the Malaysian Government.

For further information, please do not hesitate to contact our Blasting Engineer at: 60B & C, Jalan SS22/21, Damansara Jaya, Petaling Jaya, Selangor. Tel: 793155 (5 lines).

Course media: English.

### Certificate of attendance

Upon completion of the course, all participants will be awarded with a certificate to signify that they have undergone complete training in Advanced Quarry Blasting. It would be a proud possession to the individual, as an indication of their knowledge in this subject.

### Scope of the course

The Advanced Quarry Blasting Techniques Course will cover adequately all the subjects that are related to quarry blastings. This would naturally begin with some talk on basic geology and proceed to subjects as drilling/blasting techniques, and other safety aspects of the operation.

All in all, the course is designed to present to the participants the most modern techniques/technology resulting in more efficient quarry operation.

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## OTHER COURSES

August 1985 - October 1985

GEOCHEMICAL PROSPECTING METHODS (Prague, Czechoslovakia). Certificate course organized every second year by the Geological Survey of Czechoslovakia and sponsored by Unesco, IAGC and Czechoslovakia. Language: English. For information: GEOCHIM Unesco CSSR, Geological Survey of Prague, Malostranske nam. 19, 11821 Prague 1, Czechoslovakia.

August 1985 - June 1987

SOIL SCIENCE AND WATER MANAGEMENT (Wageningen, The Netherlands). Two-year M.Sc. course designed for B.Sc graduates from developing countries. Language: English. For information: Director of Studies of the M.Sc. course in Soil Science and Water Management, P.O. Box 37, 6700 AA Wageningen, The Netherlands.

September 1985

SEMINAR ON DRILLING, SAMPLING AND BOREHOLE LOGGING (Wuxi, Jiangsu Province, China).

September 1985 - October 1985

GROUNDWATER TRACING TECHNIQUES (Graz, Austria). Five-week course organized every other year by the Institute of Technical Geology, Petrography and Mineralogy and sponsored by Unesco. Language: English. For information: Institute of Technical Geology, Petrography and Mineralogy of the University of Technology, A-8010 Graz, Austria.

September 1985 - October 1985

REMOTE SENSING: FUNDAMENTALS OF APPLICATIONS AND ANALYSIS TECHNIQUES, 24th International Workshop. (Sioux Falls, South Dakota, USA). Program of training workshops organized by the US Geological Survey for non-U.S. scientists, engineers and resources managers. For information: Training Section, Office of International Geology, U.S. Geological Survey, National Center (917), Reston, VA 22092, USA.

September 1985 - November 1985

DRILLING OF GEOTHERMAL WELLS (Mexicali, Mexico). Annual 12-week seminar organized for Latin Americans by the Latin American Organization for Energy with financial assistance from Unesco. Language: Spanish. For information: Organizacion Latinoamericana de Energia (OLADE), P.O. Box 199, Quito, Ecuador.

September 1985 - November 1985

GEOTHERMAL RESERVOIR ENGINEERING (Mexicali, Mexico). Annual 9-week course organized for Latin Americans by the Latin American Organization for Energy with financial assistance from Unesco. Language: Spanish. For information: Organizacion Latinoamericana de Energia (OLADE), P.O. Box 119, Quito, Ecuador.

September 1985 - November 1985

GEOTHERMAL ENERGY (Kyushu, Japan). Annual short course organized by the Government of Japan and sponsored by Unesco. Language: English. For information: Japan International Cooperation Agency (2nd Training Division, Training Affairs Dept.), P.O. Box 216, Shinjuku Mitsui Bldg., 2-1, Nishi-shinjuku, Shinkuku-ku, Tokyo 160, Japan.

September 1985 - August 1986

MINING EXPLORATION AND EXPLORATION GEOPHYSICS (Delft, The Netherlands). Annual diploma courses organized by the International Institute for Aerial Survey and Earth Sciences and sponsored by Unesco. Language: English. For information: ITC (ME), 3, Kanaalweg, 2628 Delft, The Netherlands.

October 1985 - November 1985

TECTONICS, SEISMOLOGY AND SEISMIC RISK ASSESSMENTS (Potsdam, East Germany). One-Month training course organized annually by East German Academy of Sciences in collaboration with Unesco. Language: English. For information: Prof. Dr. H. Kautzleben, Director, Central Earth's Physics Institute, Academy of Sciences of the German Democratic Republic, Telegraphenberg, DDR 1500 Postdam, German Democratic Republic.

October 1985 - September 1986

FUNDAMENTAL AND APPLIED QUATERNARY GEOLOGY (Brussels, Belgium). Annually organized training course leading to a Master's degree in Quaternary Geology by the Vrije Universiteit Brussel (IFAQ) and sponsored by Unesco. Languages: English and French. For information: Prof. Dr. R. Paepe, Director of IFAQ, Kwartairgeologie, Vrije Universiteit Brussel, Pleinlaan 2, B-1050, Brussels, Belgium.

October 1985 - September 1986

HYDRAULIC ENGINEERING AND HYDROLOGY (Delft, The Netherlands). Diploma courses organized annually by the International Institute for Hydraulic and Environmental Engineering and sponsored by Unesco for professionals from developing countries. Language: English. For information: International Institute for Hydraulic and Environmental Engineering (IHE), Oude Delft 95, P.O. Box 3015, 2601 Da Delft, The Netherlands.

November 1985 - December 1985

REMOTE SENSING APPLICATIONS COURSE FOR EARTH SCIENCES (Enschede, The Netherlands). Annual course organized by International Institute for Aerial Survey and Earth Sciences and sponsored by Unesco. Language: English. For information: ITC Student Registration Office, P.O. Box 6, 7500 AA Enschede, The Netherlands.

November 1985 - December 1985

SMALL MINE POTENTIAL AND TECHNOLOGY (Leoben, Austria). Annual training course sponsored by Austria and Unesco. Language: English. For information: Prof. Wolfbauer, Forschungsgesellschaft Joanneum, Roseggerstrasse 15, A-8700 Leoben, Austria.

November 1985 for two 11-month sessions

ENGINEERING GEOLOGY (Delft, The Netherlands). New post-graduate diploma course leading to M.Sc. degree in Engineering Geology. For information: ITC Student Registration Office, P.O. Box 6, 7500 AA Enschede, The Netherlands.

December 1985 - January 1986

METHODS AND TECHNIQUES IN EXPLORATION GEOPHYSICS (Hyderabad, India). Diploma course organized annually by the National Geophysical Research Institute of the Council of Scientific and Industrial Research, Hyderabad, India and sponsored by Unesco. Language: English. For information: The Director, International Training Course on Methods and Techniques in Geophysical Exploration, National Geophysical Research Institute, Hyderabad, 500 007 (A.P.) India.

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## KALENDAR (CALENDER)

\* denotes new entries

August 1985

TECTONICS AND GEOCHEMISTRY OF EARLY TO MIDDLE PROTEROZOIC FOLD BELTS (Conference and Field Excursions), Darwin, Australia. Sponsored by IGCP and ILP. (Dr. M.A. Etheridge, Bureau of Mineral Resources, GPO Box 378, Canberra ACT 2601, Australia).

August 5 - 16, 1985

COMPARATIVE STUDIES OF THE INNER PLANETS AND THE EVOLUTION OF CLIMATE AS RELATED TO CO<sub>2</sub> (IAMAP/IAPSO Joint Assembly), Honolulu, Hawaii, USA. (Joint Assembly, American Geophysical Union, 2000 Florida Avenue NW, Washington, D.C. 20009, USA).

August 5 - 17, 1985

INTERNATIONAL ASSOCIATION OF GEOMAGNETISM AND AERONOMY (5th Scientific Assembly), Prague, Czechoslovakia. (Michael Gadsden, Natural Philosophy Dept., Aberdeen University, Aberdeen AB9 2UE, Scotland, UK).

August 5 - 17, 1985

MAGNETIC ANOMALIES OVER MARGINS OF CONTINENTS AND PLATES (IAGA Symposium), Prague, Czechoslovakia. (Mr. Vaclav Bucha, Geophysical Institute, Acad. Sco., Bocni 11, 141 31 Prague 4, Czechoslovakia).

August 6 - 10, 1985

SCIENCE AND TECHNOLOGY EDUCATION AND THE QUALITY OF LIFE (International Conference), Bangalore, India. Sponsored by ICSU/CTS (J. Lewis, Physics Dept., Malvern College, Malvern, Worcs. U.K).

August 6 - 10, 1985

GROUND FREEZING (4th International Symposium), Sapporo, Japan. (ISGF 85, Institute of Low Temperature Science, Hokkaido University, Sapporo 060, Japan).

August 7 - 9, 1985

FLUVIAL SEDIMENTOLOGY (3rd International Conference), Fort Collins, Colorado, USA. (F.G. Ethridge, 3rd International Fluvial Sedimentology Conference, Colorado State University, Fort Collins, Co. 80523, USA).

August 11 - 15, 1985

INTERNATIONAL SOCIETY FOR SOIL MECHANICS AND FOUNDATION ENGINEERING (11th International Conference), San Francisco, California, USA. (K. Hyland, American Society of Civil Engineers, 345 East 47th Street, New York, NY 10017, USA).

August 12 - 14, 1985

HYDROTHERMAL REACTIONS (2nd International Symposium), University Park, Penn., USA. (Symposium on Hydrothermal Reactions, The Pennsylvania State University, Keller Conference Center, University Park, Pa 16802, USA).

August 13 - 16, 1985

PETROLEUM EXPLORATION IN THE SUBANDEAN BASINS (Symposium), Bogota, Colombia. (Roberto A. Leigh, Box 92500, Bogota, Colombia).

August 17 - 22, 1985

PRECAMBIRAN EXOGENIC PROCESS (International Symposium and Field Trip IGCP Project 160), Ottawa, Canada (A. Donaldson, Dept. of Geology, Carleton University, Ottawa, Canada K1S 5B6).

August 19 - 23, 1985

GONDWANA (6th Symposium), Columbus, Ohio, USA. Sponsored by IUGS and Geological Society of America. (D. Elliott, Institute of Polar Studies, Ohio State University, 103 Mendenhall, 125 South Oval Mall, Columbus, Oh 43210, USA).

August 20 - 29, 1985

TILL SYMPOSIUM 1985: GLACIGENIC DEPOSITS AS INDICATORS OF GLACIAL MOVEMENTS AND THEIR USE FOR INDICATOR TRACING IN THE SEARCH FOR ORE DEPOSITS, Finland. (INQUA- TILL Symposium, Geological Survey of Finland, SF-02150, Espoo, Finland).

August 21 - 23, 1985

PALEOENVIRONMENTAL RECONSTRUCTION OF THE LATE WISCONSIN DEGLACIATION AND THE HOLOCENE, Lethbridge, Alberta, Canada. (Dr. René W. Barendregt, Dept. of Geography, The University of Lethbridge, 4401 University Drive, Lethbridge, Alberta, Canada T1K 3M4)

August 22 - 26, 1985

COMPOSITION OF THE ARCHEAN MANTLE (NATO Workshop), Rudesheim, F.R.G. (Dr. N. Arnot, Max-Planck-Institute, Postfach 3060, 6500 Mainz, Federal Republic of Germany).

August 24 - September 2, 1985

GRAPTOLITES (3rd International Conference, Graptolite Working Group IPA), Helsingor, Denmark. (Dr. M. Bjerreskov, Institute of Historical Geology and Palaeontology, University of Copenhagen, Oster Voldgade 10, DK-1350, Copenhagen K, Denmark).

August 26 - 28, 1985

MODERN AND ANCIENT CLASTIC TIDAL DEPOSITS (Conference), Utrecht, The Netherlands. Co-sponsored by the IAS. (D.S. Nio, Comparative Sedimentology Division, Institute of Earth Sciences, Budapestlaan 4, 3508 TA Utrecht, The Netherlands).

August 26 - 29, 1985

CIRCUM-PACIFIC TERRANE (3rd Conference), Sydney, Australia. Sponsored by the Circum-Pacific Council for Energy and Mineral Resources. (Malcolm J. Lennox, Secretary, 3rd Circum-Pacific Terrane Conference, The Earth Resources Foundation, Edgeworth David Building, University of Sydney, NSW, Australia 2006).

August 27 - 30, 1985

INTERNATIONAL MINING HISTORY (Conference), Melbourne, Australia. (P. Richardson, Economic History Dept., University of Melbourne, Parkville, Vic. 3052, Australia).

September 1985

DEEP INTERNAL PROCESSES AND CONTINENTAL RIFTING (International Symposium), Chengdu, P.R. China. Co-sponsored by ICL and Chinese Lithospheric Committee. Languages: Chinese and English. (Claude Froidevaux, Universite Paris-Sud, Lab. Geophysique-Bat. 510, 91405 Orsay, France; Tan Tjong Kie, Institute of Geophysics, Academia Sinica, Beijing, People's Republic of China).

September - October 1985

KUROKO TYPE MINERALIZATION (Workshop), Tokyo and Akita, Japan. (RMRDC, Jalan Jenderal Sudirman 623, Bandung, Indonesia).

September 2 - 4, 1985

COASTAL GEOMORPHOLOGY SEDIMENTARY BUDGETS COASTAL AND RIVER HYDRAULICS (Symposium), Reykjavik, Iceland. (Guttormur Sigbjarnarson, National Energy Authority, Grensasvegur 9, IS-108 Reykjavik, Iceland).

September 2 - 4, 1985

ROLE OF ROCK MECHANICS IN MINING (International Symposium), Mexico City, Mexico (Sociedad Mexicana de Mecanica de Rocas AC, Camino a Santa Teresa 187, Villa Olimpica, MEX-14020 Mexico DF, Mexico).

September 3 - 5, 1985

EROSION DEBRIS FLOW AND DISASTER PREVENTION (IAHS International Symposium) Tsukuba, Japan. (Dr. S. Kobaski, ISEDD 1985, Dept. of Forestry, Kyoto University, Kyoto 606, Japan).

September 6 - 10, 1985

PROBLEMS OF THE STRATIGRAPHY AND PALEO GEOGRAPHY OF LOESSES (Joint Meeting INQUA Commissions on Loess and Paleogeographic Atlas), Lublin and Krakow, Poland. (Prof. Dr. H. Maruszczak, Dept. of Physical Geography, University Marie Curie-Sklodowska, Akademicka 19, PL-20-003, Lublin, Poland).

September 8 - 13, 1985

HYDROGEOLOGY IN THE SERVICE OF MAN (18th IAH Congress - International Symposium), Cambridge, U.K. (J. Day, Hydrogeology Unit, Maclean Building, Crowmarsh Gifford, Wallingford, OX10 8BB, U.K.).

September 9 - 12, 1985

EXTRACTION METALLURGY (International Symposium), London, U.K. (Conference Office, The Institution of Mining and Metallurgy, 44 Portland Place, London W1N 4BR, UK).

September 9 - 13, 1985

DEEP INTERNAL PROCESSES AND CONTINENTAL RIFTING (International Symposium), Chengdu, P.R. China. Co-sponsored by ICL and Chinese Lithospheric Committee. Languages: Chinese and English. (Claude Froidevaux, Universite Paris-Sud, Lab. Geophysique-Bat. 510, 91405 Orsay, France; Tan Tjong Kie, Institute of Geophysics, Academia Sinica, Beijing, People's Republic of China).

September 9 - 13, 1985

ADVANCED TECHNOLOGY FOR MONITORING AND PROCESSING GLOBAL ENVIRONMENTAL INFORMATION (International Conference), London, U.K. (CERMA, P.O. Box 2787, Springfield, VA 22152, USA).

September 9 - 13, 1985

INTERNATIONAL SOCIETY FOR MINE SURVEYING (6th International Congress), Harrogate, U.K. (Peter Gilbert, RICS, 12 Great George St., London, U.K.).

September 9 - 13, 1985

FOSSIL AND LIVING BRACHIOPODS (Meeting), Brest, France. (Congres Brachiopodes, Univ. Bretagne Occidentale, Laboratoire du Paleozoique-6, av. Le Gorgen, 29283 Brest Cedex, France).

September 10 - 11, 1985

NON-MARINE SOURCE ROCKS: ENVIRONMENTS OF DEPOSITION OF LACUSTRINE AND DELTACI SOURCE ROCKS (joint Meeting of Petroleum Group and IGCP Project 219), London, U.K. (K. Kelts, Geological Institute, ETH-Z, CH-8092 Zurich, Switzerland).

September 10 - 13, 1985

AFRICAN GEOLOGY (13th Colloquium), St. Andrews, Scotland, U.K. (Colloquium Secretary, Dept. of Geology, University of St. Andrews, Fife, KY16 9ST, Scotland, UK).

September 14 - 22, 1985

GRANITE-RELATED MINERAL DEPOSITS (International Symposium), Halifax, Nova Scotia, Canada. (Richard P. Taylor, Dept. of Geology, McMaster University, 1280 Main Street West, Hamilton, Ontario, Canada L8S 4M1).

September 15 - 20, 1985

FUNDAMENTALS OF ROCK JOINTS (International Symposium), Lapland, Sweden. (Fundamentals of Rock Joints, Centek Conference, 5-951 87 Lulea, Sweden).

September 15 - 20, 1985

BASEMENT TECTONICS (6th International Conference), Santa Fe, New Mexico, USA. (Dr. M. James Aldrich, Mail Stop D461, P.O. Box 1663, Los Alamos National Laboratory, Los Alamos, NM 87545, USA).

September 15 - 22, 1985

GEOMORPHOLOGY, RESOURCES, ENVIRONMENT AND THE DEVELOPING WORLD (International Conference), Manchester, U.K. Sponsored by INQUA. (Prof. Ian Douglas, School of Geography, University of Manchester, Manchester M13 9PL, UK).



September 16 - 20 1985

ORGANIC GEOCHEMISTRY (12th International Meeting), Julich, F.P.G. (KFA Julich GmbH, Conference Secretariat, P.O. Box 1913, D-5170 Julich, Federal Republic of Germany)

September 16 - 21 1985

GEOPHYSICAL AND PETROLOGICAL CONSTRAINTS TO MAGMA GENERATION including Symposia on Potassic Volcanism and Etna Volcano (IAVCEI Scientific Assembly), Catania, Italy. (G. Frazetta, Istituto Internazionale di Vulcanologia, Viale Regina Margherita 6, 95123 Catania, Italy)

September 22 - 26, 1985

HIGH HEAT PRODUCTION, GRAPHITES, HYDROTHERMAL CIRCULATION AND ORE GENESIS (Conference), St. Austell, Cornwall, U.K. (IMM, 44 Portland Place, London W1N 4BR, UK).

September 23 - 29, 1985

MAJOR NEW TRENDS IN QUANTITATIVE METHODS FOR PREDICTING AND RESOURCES EVALUATION OF MINERAL, OIL AND GAS DEPOSITS (International Symposium), Alma-Ata, Kazakh Soviet Socialist Republic. Co-sponsored by IAMG. Languages: English and Russian. (A.N. Bugaets, Organizing committee 'Symposium Alma-Ata - 1985', Kazims, K. Marx str. 105, Alma-Ata 480091, USSR).

September 23 - 30, 1985

ROCK DETERIORATION (5th International Congress), Lausanne, Switzerland. (E.P.F.L., 33 avenue de Cour, 1007 Lausanne, Switzerland).

September 23 - October 2, 1985

TECTONIC EVOLUTION OF THE TETHYAN REGIONS (NATO Advanced Studies Institute), Istanbul, Turkey. (Dr. B.C. Burchfiel, 54-1010, M.I.T., Cambridge, MA 02139, USA).

September 25 - 27, 1985

GEOTECHNICAL CONFERENCE (38th Annual), Edmonton, Alberta, Canada. Sponsored by Canadian Geotechnical Society. (Bob Wallace, Program Chairman, E.B.A. Engineering Consultants, 14535 - 118th Avenue, Edmonton, Alberta, Canada).

October 2 - 4, 1985

CONCENTRATION MECHANISMS OF URANIUM IN GEOLOGICAL ENVIRONMENTS (International Meeting), Nancy, France. (J. Leroy, CREGU, BP 23, 54501 Vandoeuvre-les-Nancy Cedex, France).

October 2 - 5, 1985

BAUXITE PROSPECTING AND MINING (International Symposium), Tapolca, Hungary, (Mr. J. Gebhardt, Director of Mining, President of the Organizing Committee, H-1387, Budapest, P.O. Box 30, Hungary).

October 3 - 5, 1985

COMPUTER APPLICATIONS IN OIL AND GAS EXPLORATION AND DEVELOPMENT (14th Annual Geochautauqua), Wichita, Kansas, USA. (D.F. Merriam, Dept. of Geology, Wichita State University, Ichita, KS 67208, USA).

October 4 - 6, 1985

OBSERVATION OF THE CONTINENTAL CRUST THROUGH DRILLING (4th Alfred-Wegener-Konferenz), Seeheim, F.P.G. Organized by ICL. (F. Goerlich, Conference Secretary, Ahrstrasse 45, D-5300 Bonn 2, Federal Republic of Germany).

October 5 - 16, 1985

LOESS RESEARCH (International Symposium), Xian, P.R. China. Sponsored by INQUA. (Institute of Geology, Academia Sinica, P.O. Box 634, Beijing, People's Republic of China).

October 7 - 11, 1985

INTRAPLATE EARTHQUAKES (Symposium), Winston Salem, N.C., USA. Sponsored by Association of Engineering Geologists. (Charles W. Welby, North Carolina State University, Box 8208, Raleigh, NC 27695, USA).

October 7 - 11, 1985

FIRST ASIAN WATER TECHNOLOGY EXHIBITION AND CONFERENCE, Putra World Trade Centre, Kuala Lumpur, Malaysia. (International Conferences & Exhibitions Ltd., 6 Porter Street, Baker Street, London W1M 1HZ, U.K. Tel. 01-487 2622; Telex: 21591, CONFEX G).

October 10 - 13, 1985

METALLOGENY OF THE EARLY PRECAMBRIAN (International Symposium), Changchun, People's Republic of China. Sponsored by China's National Committee of IGCP, Changchun College of Geology, and Chinese Work Group of IGCP Project 91. Languages: Chinese and English. (Prof. Zhang Qilusheng, Chinese College of Geology, Changchung, Jilin, People's Republic of China).

October 13 - 18, 1985

TYPE SECTIONS IN QUATERNARY STRATIGRAPHY (Symposium), Zurich, Switzerland. Sponsored by INQUA. (Dr. Ch. Schluchter, Institute of Foundation Engineering, ETH - Honggerberg, CH-8093, Zurich, Switzerland).

October 14 - 17, 1985

LATERITE (International Seminar), Tokyo, Japan. Co-sponsored by IGCP. (Dr. Y. Ogura, International Seminar on Laterite, c/o The Mining and Metallurgical Institute of Japan, 5-4 Ginza, 8-Chrome, Chuo-ku, Tokyo 104, Japan).

October 14 - 18, 1985

ANALYSIS OF EXTRAORDINARY FLOOD EVENTS (U.S.-China Bilateral Symposium), Nanjing, China. (Marshall E. Moss, Chief, Surface Water Branch, U.S. Geological Survey, 415 National Center, Reston, VA 22092, USA).

October 14 - 18, 1985

COAL RESEARCH (7th International Conference), Pretoria, South Africa. (W.G. Jensen, International Committee for Coal Research, Bte 11, B-1150 Bruxelles, Belgium).

October 14 - 18, 1985

MATHEMATICAL METHODS IN GEOLOGY (International Symposium), Pribram, Czechoslovakia. (Sekretariat symposia, Hornická Pribram ve vede a Technice, post. schranka 41, Pribram 261 02, Czechoslovakia).

\* October 28 - November 1 1985

SYMPOSIUM ON EVAPORITES & HYDROCARBONS, Banff, Alberta, Canada. Sponsored in cooperation with the Canadian Society of Petroleum Geologists. Contact: Mrs. Pat Larham, Faculty of Education, The University of Alberta, Edmonton, Alberta, Canada T6G 2G4.

October 28 - November 1, 1985

COAL SCIENCE (International Conference), Sydney, Australia. Sponsored by IEA (R.W. Hinde, CSIRO Div. of Fossil Fuels, Box 136, North Ryde, NSW 2113, Australia).

October 29 - November 2, 1985  
INDONESIAN MINING (International Exhibition), Jakarta, Indonesia. (Overseas Exhibition Services, 11 Manchester Square, London W1M 5AB, U.K.).

November 1985  
PETROLEUM GEOCHEMISTRY AND EXPLORATION IN AFRO-ASIAN REGION (International Conference), Dehradun, India. (Kuldeep Chandra, KDM Institute of Petroleum Exploration, Oil and Natural Gas Commission, 9, Kaulagarh Road, Dehradun-248195, India).

November 4 - 9, 1985  
PHYSICS AND GEODYNAMICS OF DEFORMATIONAL PROCESSES IN EARTHQUAKE FOCAL REGIONS (Meeting), Potsdam, G.D.R. (Prof. Knoll, Zentralinstitut für Physik der Erde, DDR-1500 Potsdam, German Democratic Republic).

November 4 - 10, 1985  
AFRICAN GEOLOGY - QUO VADIS? (7th Conference), Gaborone, Botswana. (GSA '85, c/o Rock View International, CEEI-ROCK VIEW, 11 rue Jean-Mermoz, 75008 Paris, France).

\* 4 November - 13 December 1985  
REMOTE SENSING APPLICATIONS COURSE FOR EARTH SCIENCES. Enschede, Netherlands. The Student Registration Office, ITC, P.O. Box 6, 7500 AA Enschede, Netherlands.

\* 26 November - 29 November 1985  
PETROLEUM TECHNOLOGY AUSTRALIA '85. (Energy Publications, 103 Scarborough Beach Road, Mount Hawthorn, Western Australia 6061.)

\* 26 - 30 November 1985  
OFFSHORE CHINA '85. (Wah Chang Int'l Marine Industry Co., Rm. 808 Harbor Crystal Center, 100 Granville Pk, Tsimshatsui East, Kowloon, Hong Kong. Tel: 3-7239818; Tlx: HX 43996 WAHCH.)

November 27 - 30, 1985  
BEACH EROSION (Meeting), Lome, Togo. Sponsored by the International Geographical Union and University of Benin. (Prof. Georges Rossi, Ecole des Lettres, Université du Bénin, E.P. 1515, Lome, Togo).

\* 2 - 5 December 1985  
ASCOPE '85. (Malaysia Exhibition Services Sdn. Bhd., 2 Floor, Wisma Socfin, Jln. Semantan, Kuala Lumpur, Malaysia. Tel: 953046; Tlx: MA 31156.

## 1986

January 28 - 31, 1986

OFFSHORE SOUTHEAST ASIA (6th Conference), Singapore. Sponsored by SE Asia Petroleum Exploration Society. Marathon Petroleum Exploration Ltd., P.O. Box 227, Tanglin Post Office, Singapore 9124).

February 1 - 9, 1986

INTERNATIONAL VOLCANOLOGICAL CONGRESS, (including symposium on PHREATOMAGMATIC ERUPTIONS AND THE ROLE OF WATER IN EXPLOSIVE VOLCANISM) Auckland, Hamilton, Rotorua, New Zealand. Sponsored by IAVCEL (P.E. Baker, Dept. of Earth Sciences, University of Leeds, Leeds LS2 9JT, U.K.).

February 16 - 21, 1986

EARTH RESOURCES IN TIME AND SPACE (8th Australian Geological Convention), Adelaide, Australia. (M.A. Cobb, Convener, Publicity and Promotion Committee, Bcx 292, Eastwood, SA 5063, Australia).

March 31 - April 4, 1986

RIVER SEDIMENTATION (3rd International Symposium), Jackson, Miss., USA. (S.Y. Wang, School of Engineering, University of Mississippi, University, MS 38677, USA).

April 2 - 5, 1986

GEOCHEMISTRY AND MINERALIZATION OF PROTEROZOIC VOLCANIC SUITES (International Symposium), Keyworth, Nottingham, U.K. Co-sponsored by IGCP Project 217 and ILP Working Group 3. (Dr. Tim Pharaoh, Deep Geology Research Group, British Geological Survey, Keyworth, Nottingham NG12 5GG, U.K.).

April 8 - 11, 1986

COAL AND COAL-BEARING STRATA (International Symposium), London, U.K. (A.C. Scott, Dept. of Geology, Chelsea College, 552 King's Road, London SW10 0QA, U.K.).

April 21 - 24, 1986

ENVIRONMENTAL GEOTECHNOLOGY (International Symposium), Allentown, Penn., USA. (Prof. H.Y. Fang, Symposium Chairman, Geotechnical Engineering Division, Dept. of Civil Engineering, Lehigh University 13, Bethlehem, PA 18015, USA).

April 21 - 25, 1986

GLOBAL CHANGE IN AFRICA DURING QUATERNARY, PAST - PRESENT - FUTURE (International Symposium), Dakar, Senegal. Sponsored by INQUA, GSA (Africa), AGID, IUGS, IGCP, ILP. Languages: English and French. (INQUA/1986 Dakar Symposium Secretariat, Laboratoire de Géologie du Quaternaire, Faculté des Sciences, LUMINY, Case 907, 13288 Marseille Cedex 9, France).

April 24 - 27, 1986

INDUSTRIAL MINERALS (7th International Congress), Athens, Greece. (G.M. Clarke, Editor, Industrial Minerals, 16 Lower Marsh, London SE1, U.K.).

May 11 - 16, 1986

MINING AND METALLURGICAL INSTITUTIONS (13th Congress), Canberra, Australia. (Council of Mining and Metallurgical Institutions, c/o The Australian Institute of Mining and Metallurgy, P.O. Box 310, Carlton South, Victoria, Aust. 3053).

May 12 - 14, 1986

GEOEXPO-86 (Meeting), Vancouver, B.C., Canada. Co-sponsored by AEG and GAC. (GEOEXPO-86 Regional Symposium, Association of Exploration Geochemists, 700-409 Granville Street, Vancouver, B.C., Canada V6C 1T8).

June 1 - 6, 1986

GEOSCIENCE INFORMATION (3rd International Conference), Adelaide, South Australia. (Conference Secretariat 31 CGI, c/o Australian Mineral Foundation, Private Bag 97, Glenside, South Australia 5065).

June 2 - 5, 1986

DINOSAUR SYSTEMATICS (Symposium), Drumheller, Alberta, Canada. (Kenneth Carpenter, Academy of Natural Sciences, 19th and the Parkway, Philadelphia, PA 19103, USA).

June 23 - 26, 1986

ARENACEOUS FORAMINIFERA (2nd Workshop), Vienna, Austria. (Dr. Fred Rogl, Naturhistorisches Museum, Burgring 7, A-1014 Wien, Austria).

June 30 - July 4, 1986

GEOCHRONOLOGY, COSMOCHRONOLOGY AND ISOTOPE GEOLOGY (6th International Conference), Cambridge, U.K. Sponsored by IAVCEL. (Organizing Committee, 6th International Conference, Dept. of Earth Sciences, University of Cambridge, Downing Street, Cambridge CB2 3EQ, U.K.).

July 7 - 10, 1986

PRECAMBRIAN GOLD/URANIUM DEPOSITS (GSSA Congress), Johannesburg, South Africa. (C.F. Vermaak, Geological Society of South Africa, Kelvin House, 2 Holland Street, Johannesburg 2001, South Africa).

August 11 - 15, 1986

KIMBERLITE (4th International Conference), Perth, Western Australia. (Dr. A.F. Trendall, Geological Survey of Western Australia, 66 Adelaide Terrace, Perth, W.A., Australia).

August 13 - 20, 1986

SOIL SCIENCE (13th ISSS International Congress), Hamburg, F.R.G. (Prof. Dr. K.H. Hartge, Inst. für Bodenkunde, Univ. Hannover, Herrenhaserstrasse 2, D-3000 Hannover 21, F.R.G.).

August 17 - 22, 1986

CIRCUM-PACIFIC ENERGY AND MINERAL RESOURCES (4th Conference), Singapore. (Circum-Pacific Conference IV, c/o AAPG, P.O. Box 979, Tulsa, Ok. 74101, USA.).

August 18 - 22, 1986

INTERNATIONAL ASSOCIATION ON THE GENESIS OF ORE DEPOSITS (7th Symposium), Lulea, Sweden. (Centek Conference, S-951 87 Lulea, Sweden).

August 24 - 30, 1986

INTERNATIONAL ASSOCIATION OF SEDIMENTOLOGISTS (12th International Congress), Canberra, Australia. (ACTS, GPO Box 1929, Canberra, ACT 2601, Australia).

\* 31 August - 5 September 1986

COAL PREPARATION CONGRESS. Edmonton, Canada. A.J. LePage, P.O. Box 242, Booval, Queensland 4304, Australia.

September 1986

ENGINEERING IN COMPLEX ROCK FORMATIONS (International Symposium), Beijing, P.R. China. (Prof. Tan Tjong-Kie, Institute of Geophysics, Academia Sinica, Beijing, People's Republic of China).

September 1986

SHALLOW TETHYS 2 (International Symposium), Wagga Wagga, NSW, Australia. (Dr. K.G. McKenzie, Riverina College of Advanced Education, P.O. Box 588, Wagga Wagga, NSW 2650, Australia).

September 8 - 12, 1986

PALEOCEANOGRAPHY (2nd International Conference), Woods Hole, USA. (W.A. Berggren, Woods Hole Oceanographic Institute, Woods Hole, MA 02543, USA).

September 22 - 28, 1986

BENTHOS '86 (3rd International Symposium on Benthic Foraminifera), Geneva, Switzerland. (D. Decrouez, Dept. of Geology and Invertebrate Palaeontology, Museum d'Histoire naturelle de Geneva, CP 434, 1211 Geneve 6, Switzerland).

September 29 - October 1, 1986

GOLD '86 (International Symposium), Toronto, Canada. (E. Craigie, Selco Division of BP Resources Canada Ltd., 55 University Avenue, Suite 1700, Toronto, Ontario, Canada M5J 2H7).

October 5 - 11, 1986

WORLD ENERGY (13th Congress), Cannes, France. (R. Ruttley, World Energy Conference, 34 St. James' Street, London SW1A 1HD, U.K.).

\* 19 - 22 October 1986

IRON CONTROL IN HYDROMETALLURGY. Toronto, Canada. D.J. MacKinnon, CANMET, 555 Booth Street, Ottawa, Ontario, Canada K1A 0G1.

October 20 - 26, 1986

INTERNATIONAL ASSOCIATION OF ENGINEERING GEOLOGY (5th Congress), Buenos Aires, Argentina. (Dr. M. Primel, L.C. P.C., 58 boulevard Lefebvre, 75732 Paris Cedex 15, France).

## 1987

January 1987

GRANITES AND ASSOCIATED MINERALIZATIONS (International Symposium), Brazil. (ISGAM, Augusto J. Pedreira, Rua Ceara, 3-Pituba, 40,000, Salvador, Bahia, Brazil).

May 3 - 7, 1987

ENGINEERING GEOLOGICAL ENVIRONMENT IN MOUNTAINOUS AREAS (International Symposium), Beijing, P.R. China. (Geological Society of China, Ministry of Geology, Pai Wan Chung, Fuchengmenwai, Beijing, People's Republic of China).

May 25 - 27, 1987

COASTAL LOWLANDS: GEOLOGY AND GEOTECHNOLOGY (International Symposium), The Hague, The Netherlands. (Dr. H.J.W.G. Schalkke, P.O. Box 85947 CP The Hague, The Netherlands).

July 31 - August 9, 1987

INTERNATIONAL UNION FOR QUATERNARY RESEARCH (12th Congress), Ottawa, Ontario, Canada. (Dr. Alan V. Morgan, Dept. of Earth Sciences, University of Waterloo, Waterloo, Ontario, Canada N2L 3G1).

August 1987

PACIFIC NEOGENE PALEOCEANOGRAPHIC AND BIOSTRATIGRAPHIC EVENTS (Meeting), Berkeley, Calif., USA. (Dr. C. Brunner, Dept. of Paleontology, University of California, Berkeley, Ca. 94720, USA).

August 9 - 22, 1987

IUGG (XIX General Assembly), Vancouver, Canada (R.D. Russell, Dept. of Geophysics and Astronomy, University of British Columbia, Vancouver, B.C., Canada V6T 1W5)

August 30 - September 4, 1987

INTERNATIONAL SOCIETY FOR ROCK MECHANICS (6th International Congress), Montreal, Canada. (Prof. B. Ladanyi, Dept. Civil Engineering, Ecole Polytechnique, Box 6079, Stn. A, Montreal, Canada H3C 3A7).

September 7 - 11, 1987

CARBONIFEROUS STRATIGRAPHY AND GEOLOGY (11th International Congress), Beijing, People's Republic of China. (Prof. Yang Jing-zhi, Nanjing Institute of Geology and Palaeontology, Chi-Ming-Ssu, Nanjing, People's Republic of China).

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## BULLETIN OF THE GEOLOGICAL SOCIETY OF MALAYSIA

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Papers of general interest or on the geology of the Southeast Asian region (South China, Burma, Thailand, Indochina, Malaysia, Singapore, Indonesia, Brunei and the Philippines) and also marine areas within the region are welcome for publication in the *Bulletin*. Short notes, progress reports and general items of information are best submitted to the *Warta Geologi*.

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