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1. Introduction

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Table 2

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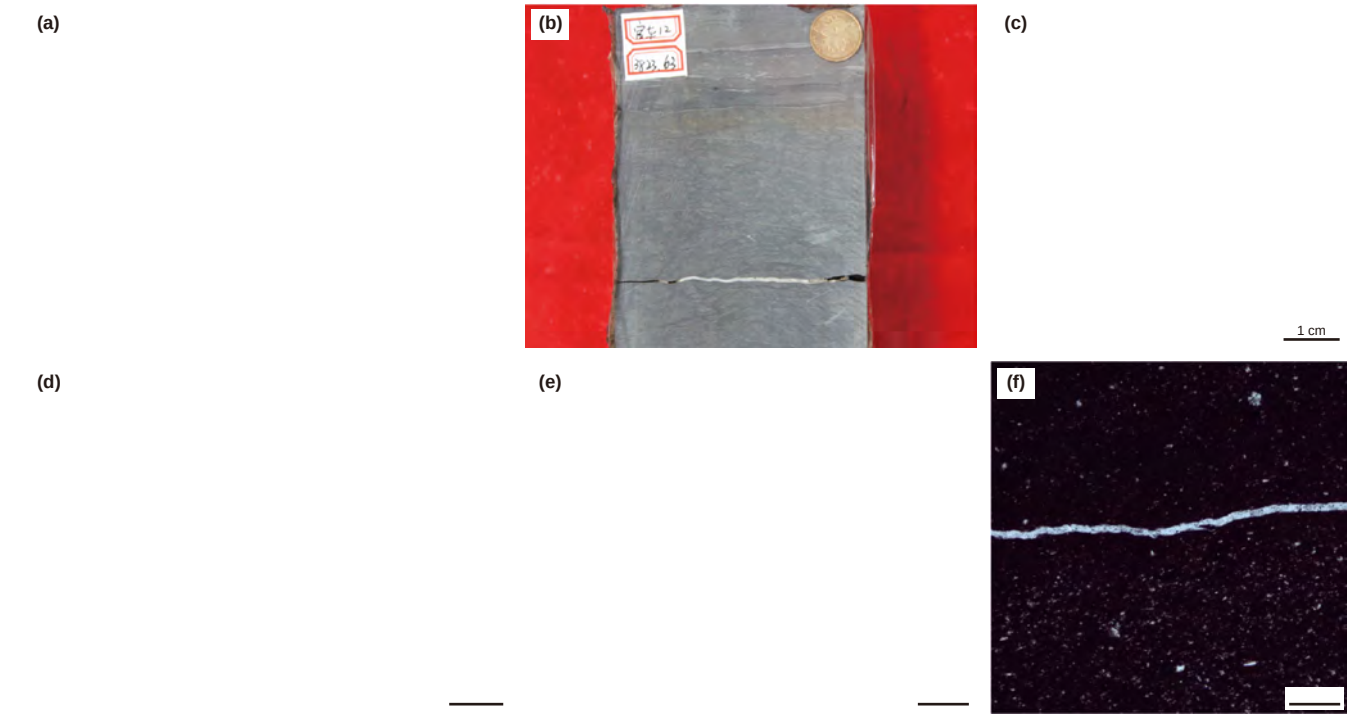

Fig. 1. 3 ?**a**B0 2 " " H>$% ,G%&3'* 9 ?**b**B H>$% ,G%,3C, 9 ?**c**B
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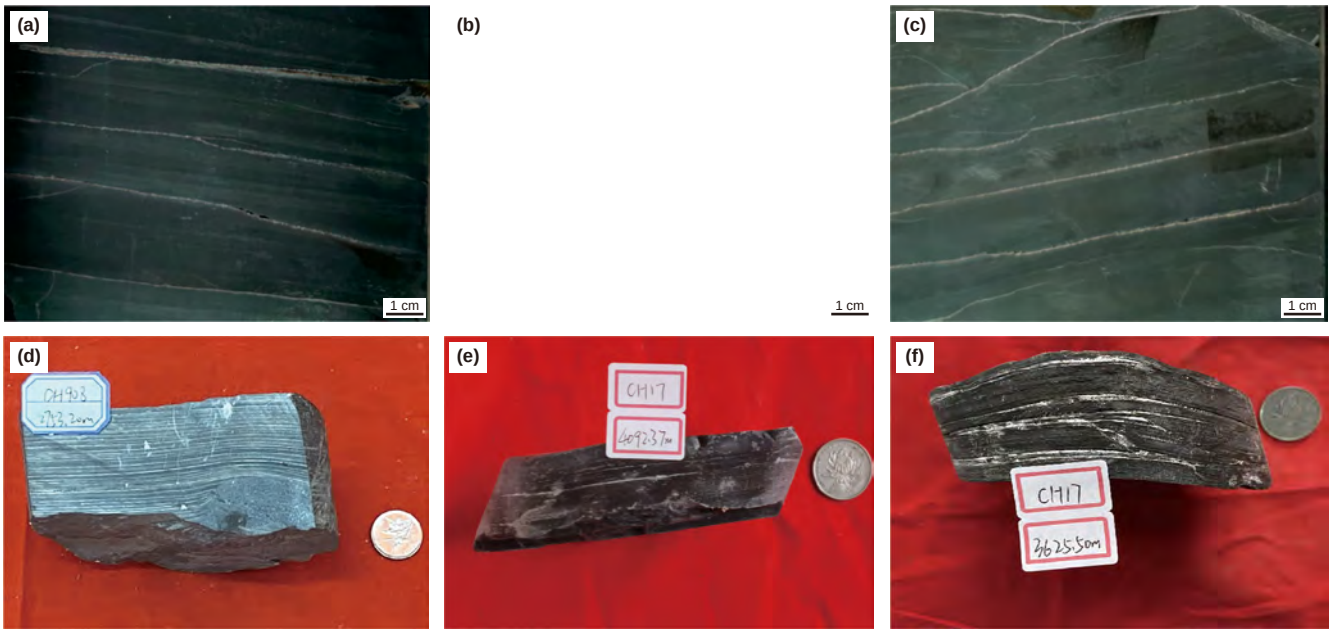

Fig. 4. 3 ?aB "" 4 " $ ' ,%$(3CG9 ?bB "" = $,C, (3(*
9 ?cB "" = $,,'F3C* 9 ?dB F&G %(*,3%& 9 ?eB $ ('&F%3,(9 ?fB $ (
,C%*3*& 3

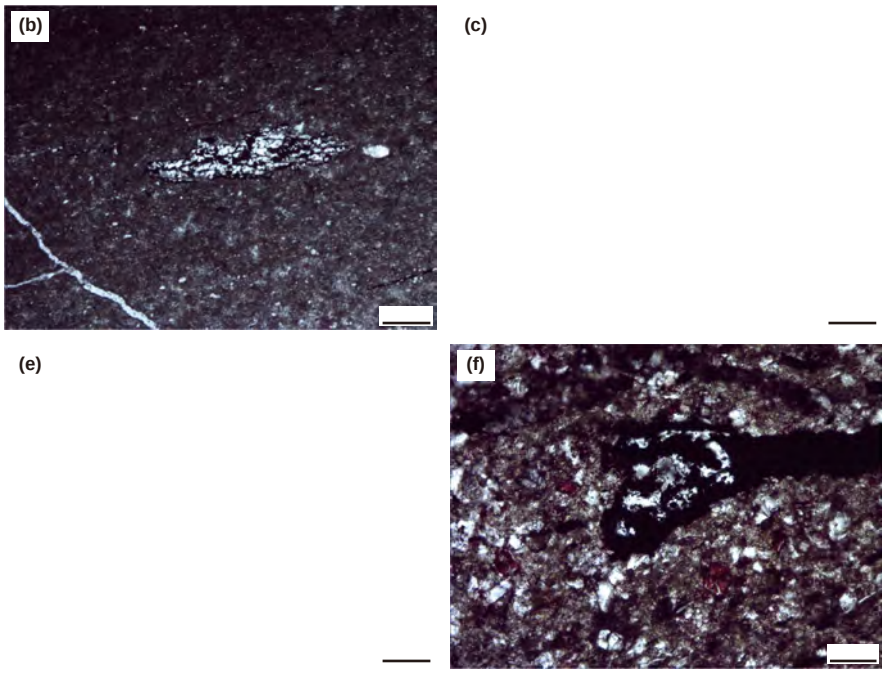

Fig. 5. " 3 ?**a**B/ 4 " " $,,& $3CF9 ?**b**B?**c**B' 4 " "
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" 4 " 5 $,,&%3,* 3

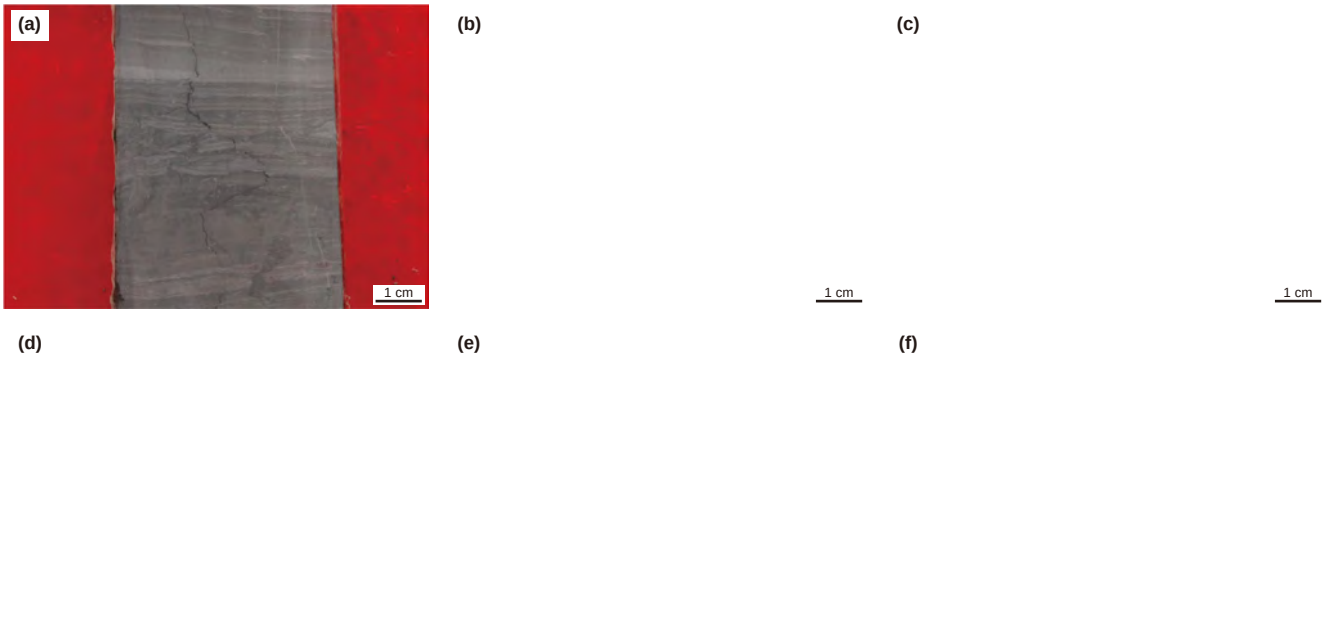

Fig. 6. " " 3 ?**a**B> " 4 $,, *'3(* 9 ?**b**B' " 4
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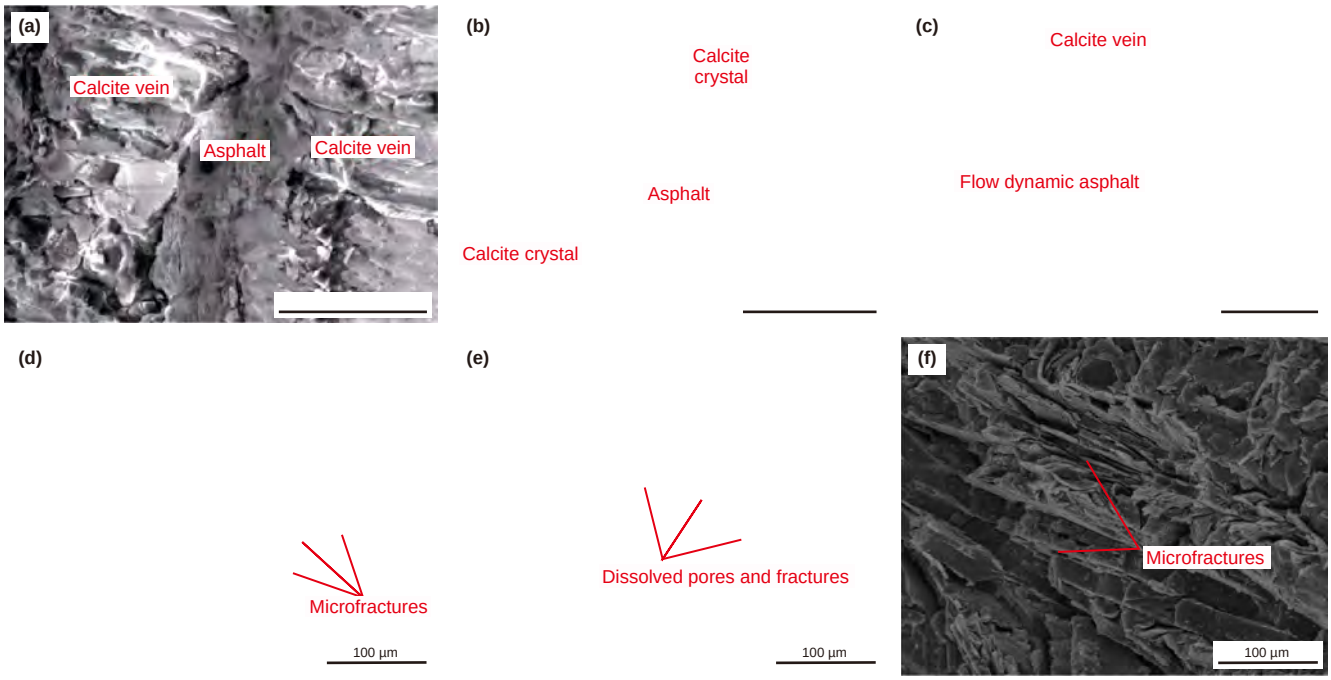

Fig. 7. " 3 ?**a**B> 4 " = $9 ?**b**B' 4 " ? 3 %&(B9?**c**B' 4 " ? 3 %&(B9 ?**d**B" " " H>$' '&((3%' 9 ?**e**B" " " H>$' '&G%3,* 9 ?**f**B' " " H>$' '&G*3C(3

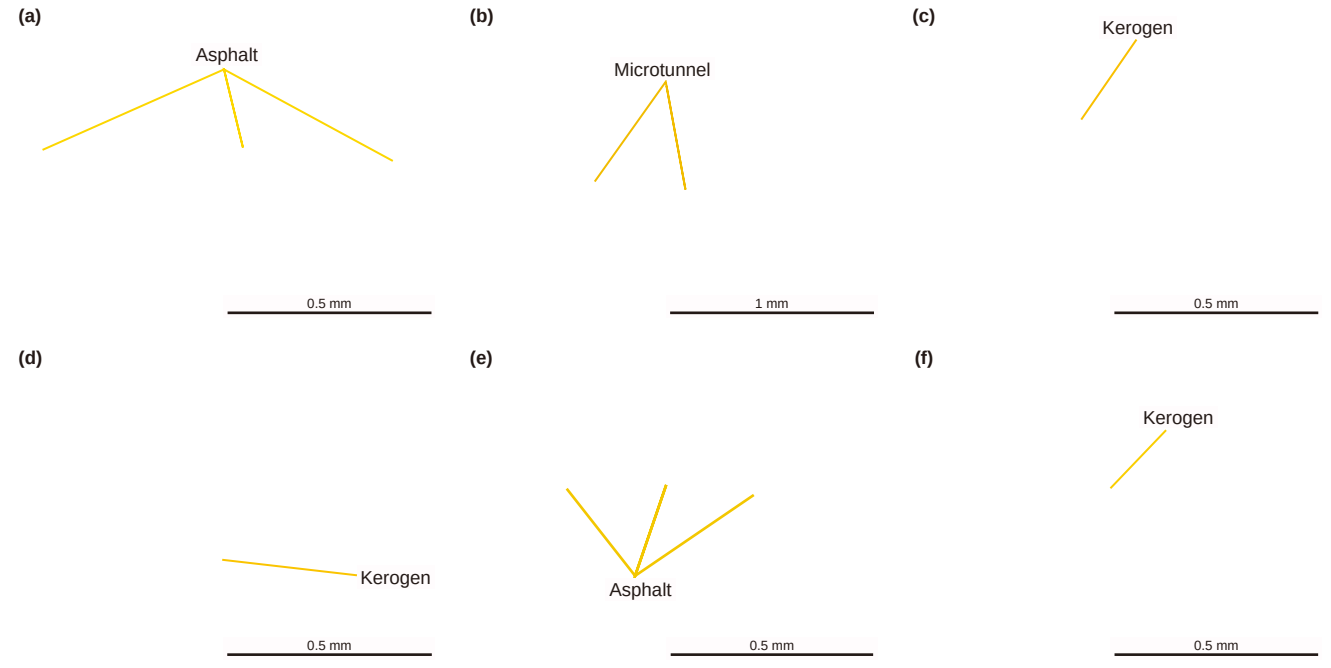

Fig. 8.)" " 2 3 ?**a**B 4 " $,%'G3C* 9 ?**b**B) 4 ") $,%*'3,* 9 ?**c**B 8 " 2 " 5) = $,&%,3,* 9 ?**d**B 2 " 5) 8 H>$% %FC*3*C9 ?**e**B 4 " H>$% %F(3C* 9 ?**f**B 2 " 5) 8 = $,&G(3GF3

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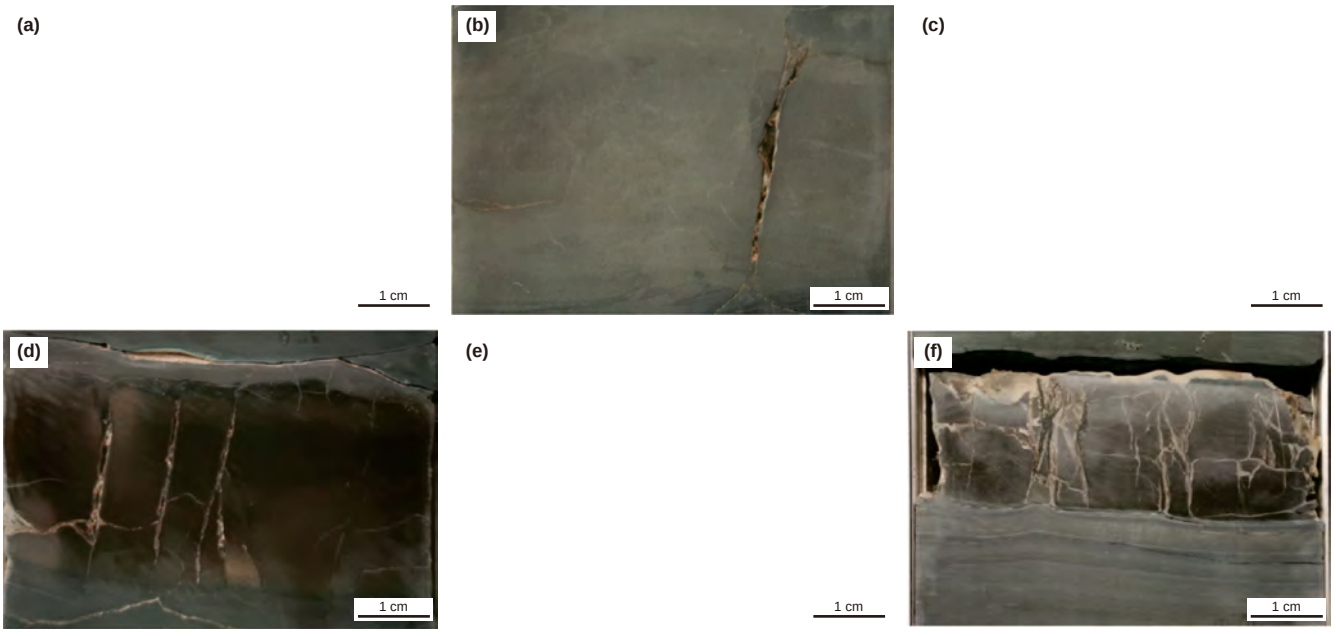

Fig. 9. " 3 ?aB " H>$' '&(G3F* 9 ?bB?cB 4 " " H>$' '&G*3C('&G(3FG9 ?dB?eB " ") H>$' '&FC3(G 9 ?fB = $,&C(3F* 3

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3. Factors controlling fracture development

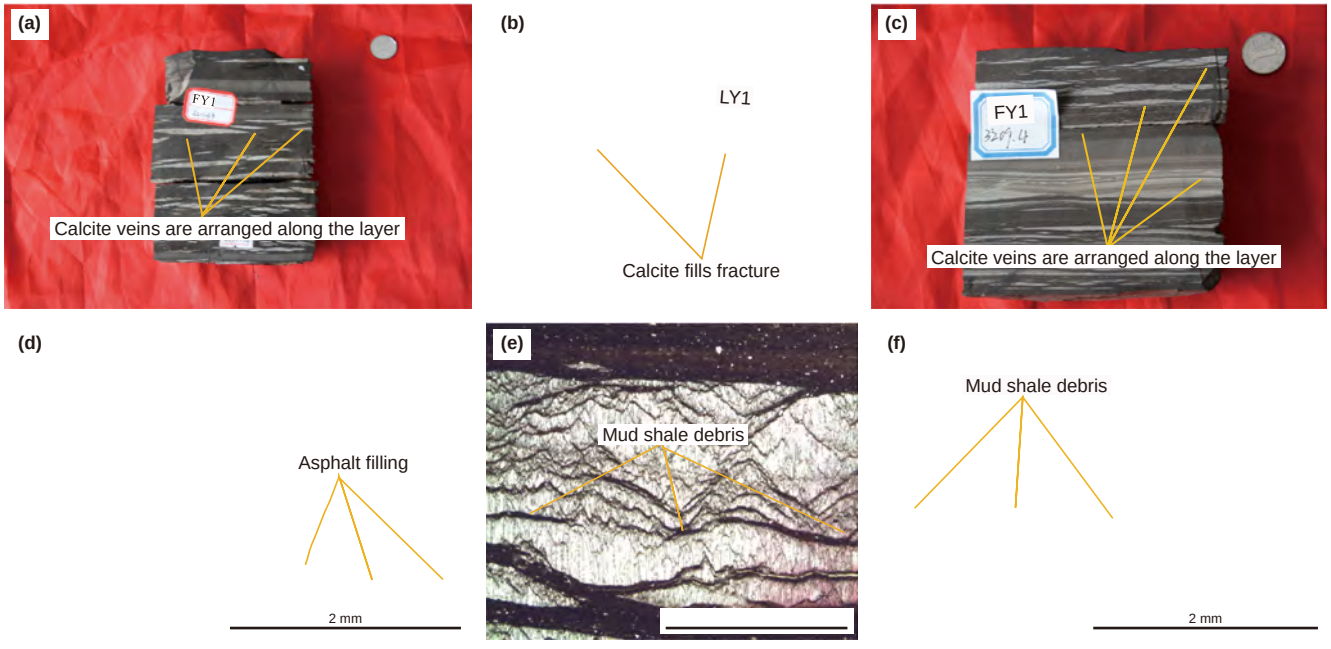

Fig. 10. "" 3 ?aB0 " "" $,%$$3*, 9 ?bB 4 "" ! $,C, (3(* 9 ?cB " "" $,%&F3'& 9 ?dB 4 " = $,&(*3*C 9 ?eB 2 " H>$% %FGG3F9 ?fB 4 " H>$% ,FG*3(* 3

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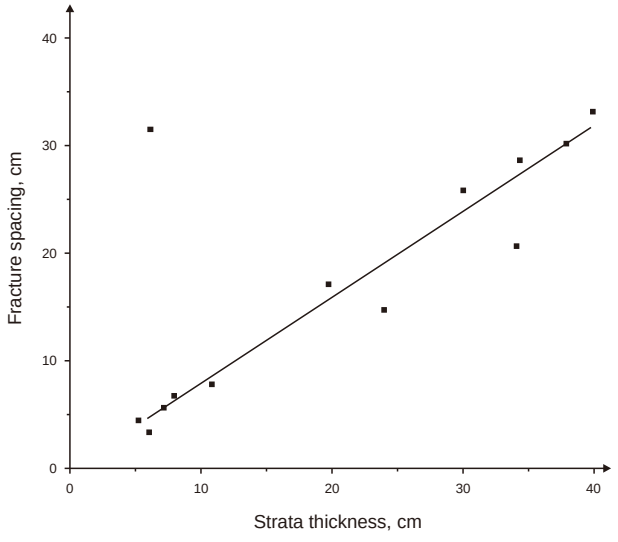

Fig. 11. " 8 " "
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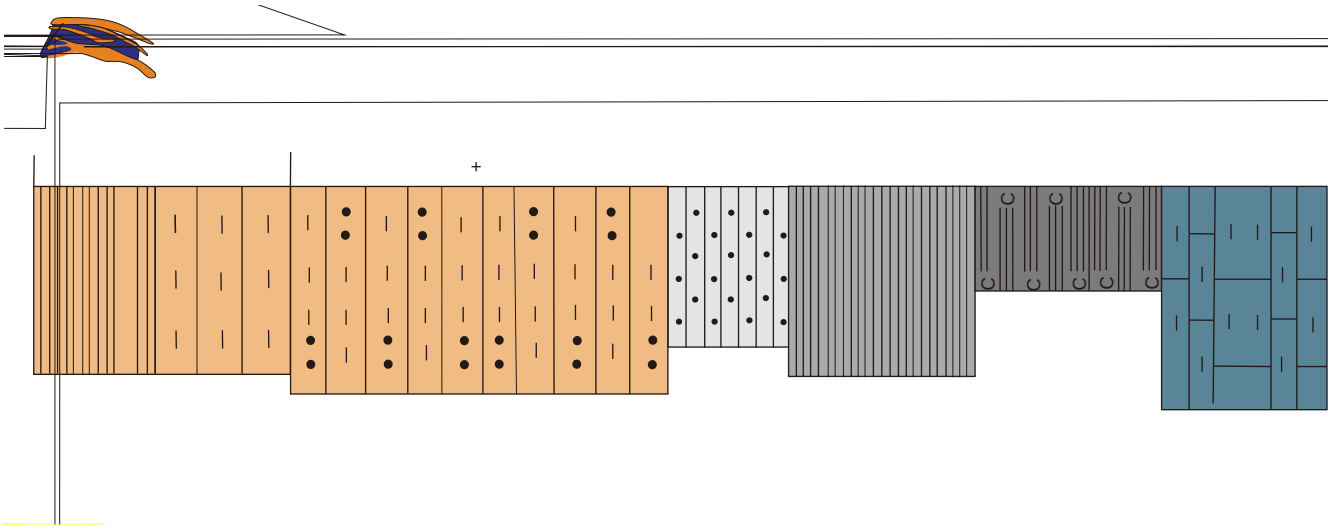

Fig. 12. " ?: " 3 %&%9 3 %&%B " " ") " " " " " " " " 3

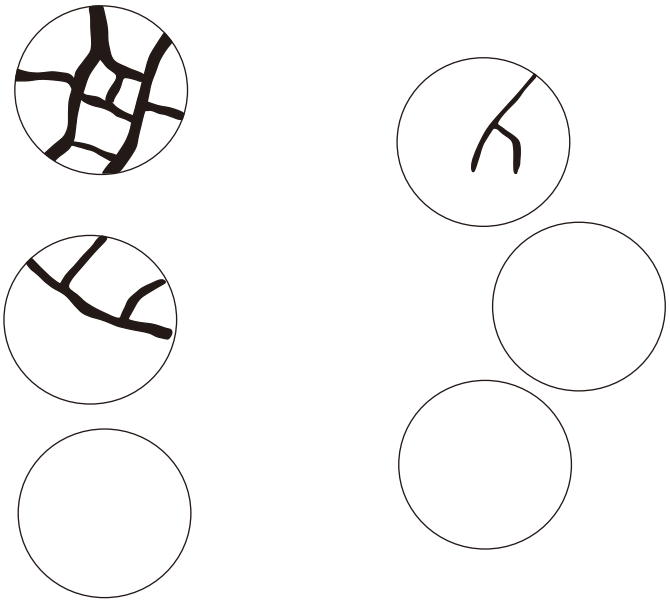

Fig. 13. 0 8 " " ? " 4 " / 3 %&%%9 3 %&(B3+ " 4 " 3

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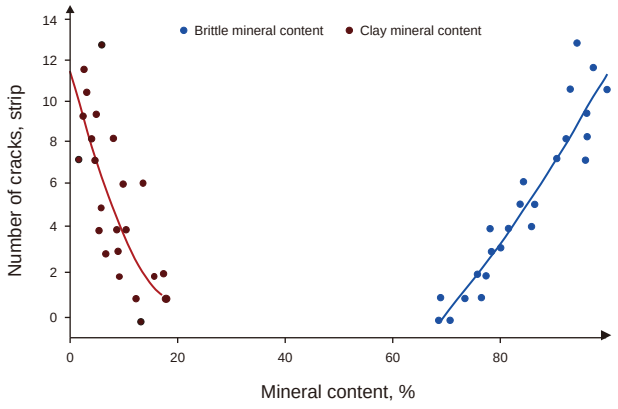

Fig. 14. 0 " "
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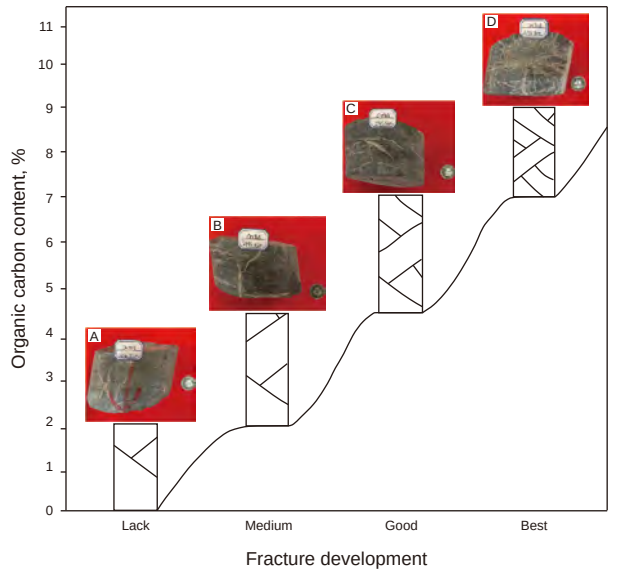

Fig. 15. 0 0I " "
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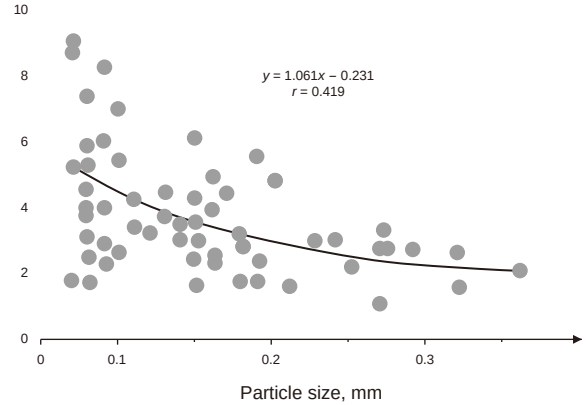

Fig. 16. 0 " ?> B " 5 ?: "
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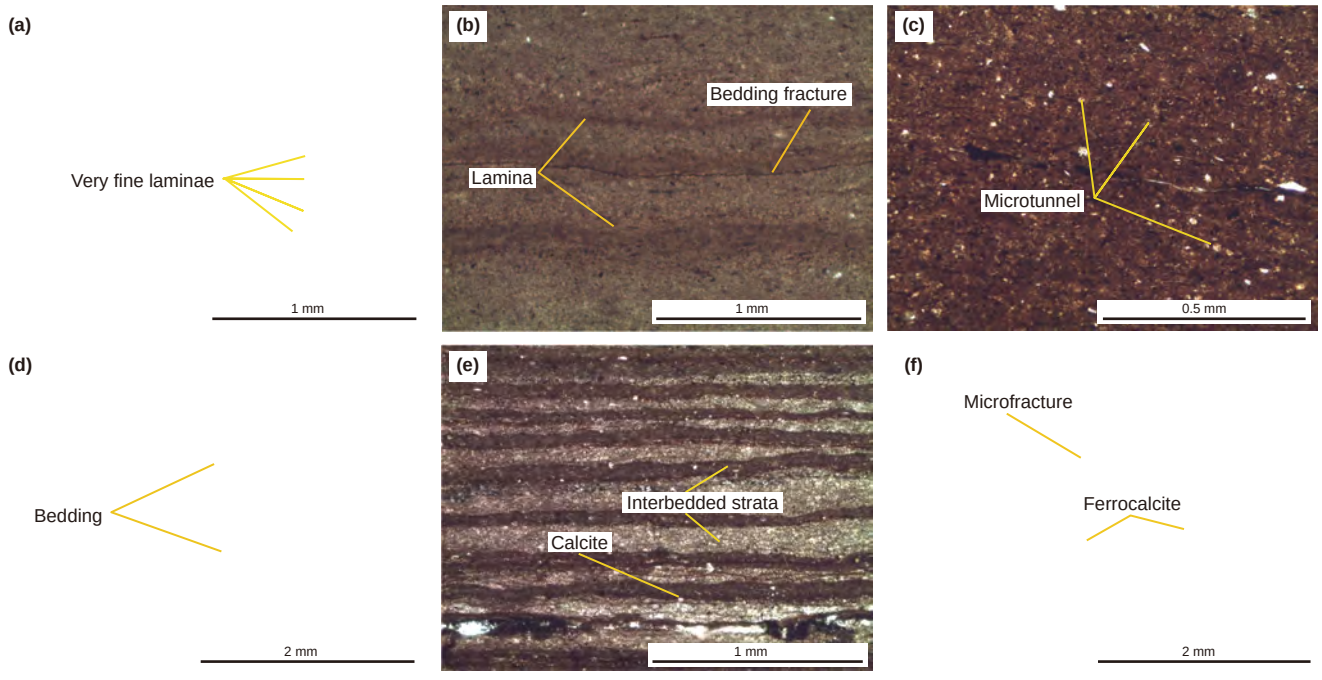

Fig. 17. " 3 ?aB?eB " = $,'%G3(' ,%'F3GG 9 ?bB?dB) " "
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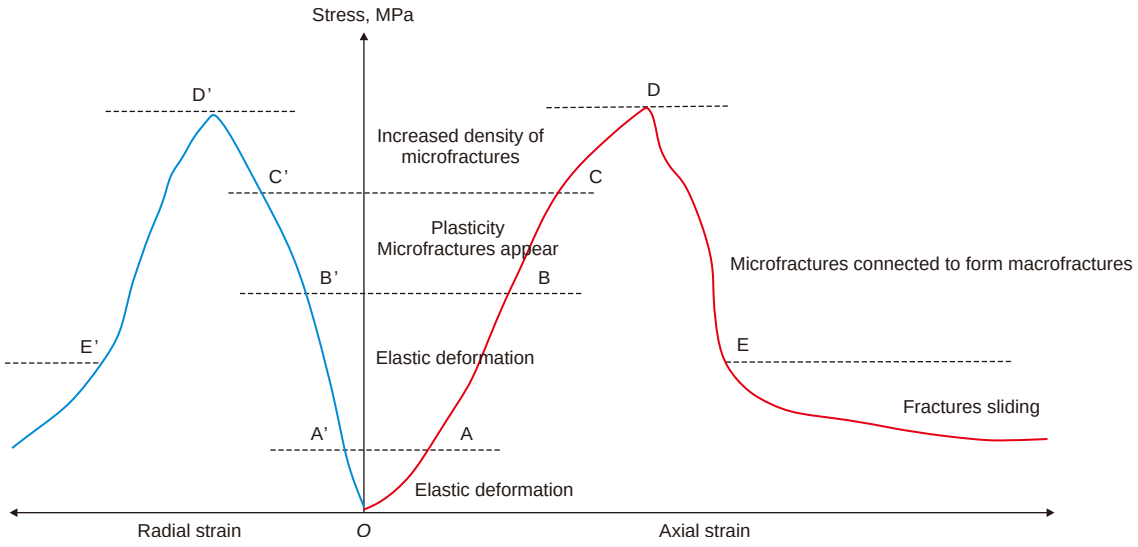


Fig. 18. 0 8 " ?" " 3 %&%&9 3 %&%B3) 4 " " " 3

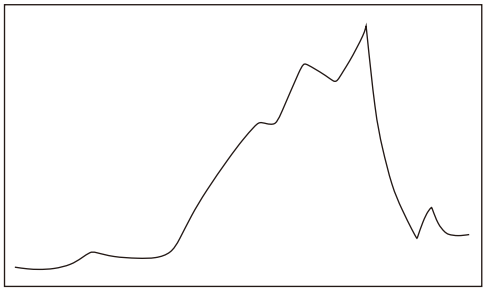


Fig. 19. 0 " " ? " 4 " / 3 %&%%B3 ") " " ") 3

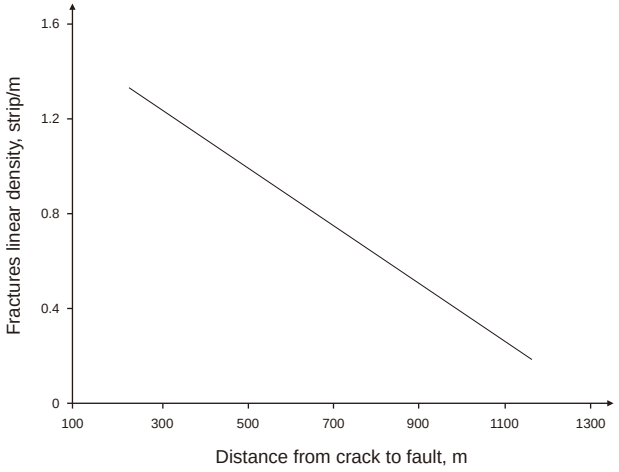
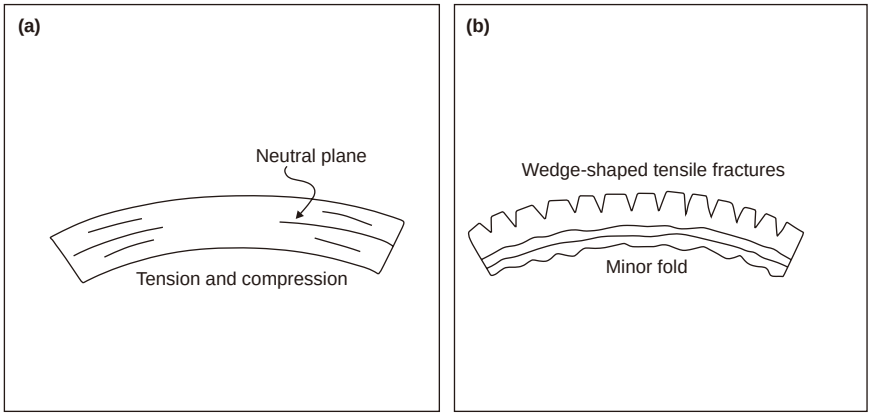


Fig. 21. " " " ? " 4 "

") " 8 " 3 " 2 5 "



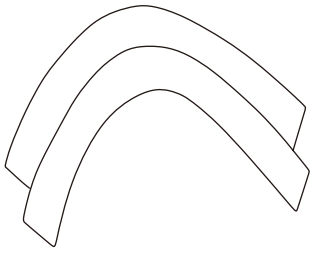
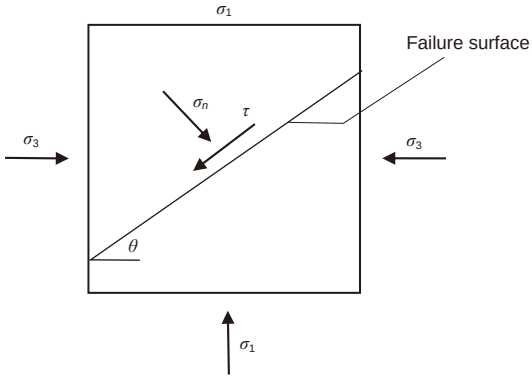
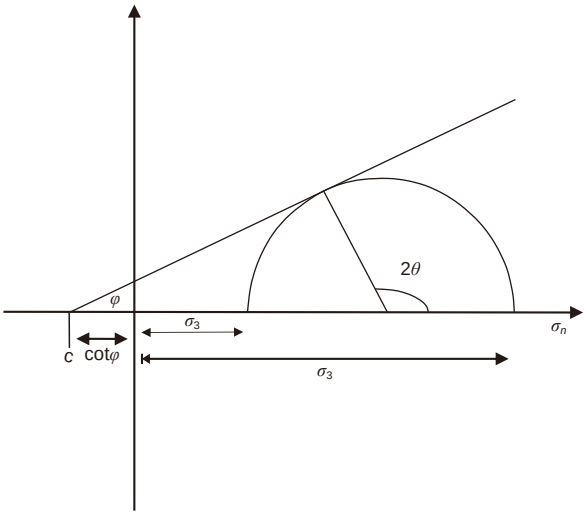


Fig. 20. " " " ?" " / %&FB3aB0 " 2 9 ?bB " " " " 9 ?cB " " 2 " 1 " 3



(a) Force state of unit body



(b) Mohr Coulomb fracture criterion

Fig. 22. 0 " " ? " " " + %&' 3 %&F %&F 9 %&FB3

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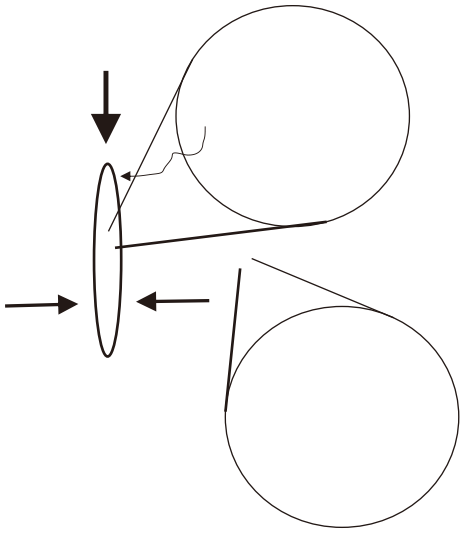

Fig. 25. " ? 8 $FG%B3
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4. Fractures formation mechanism

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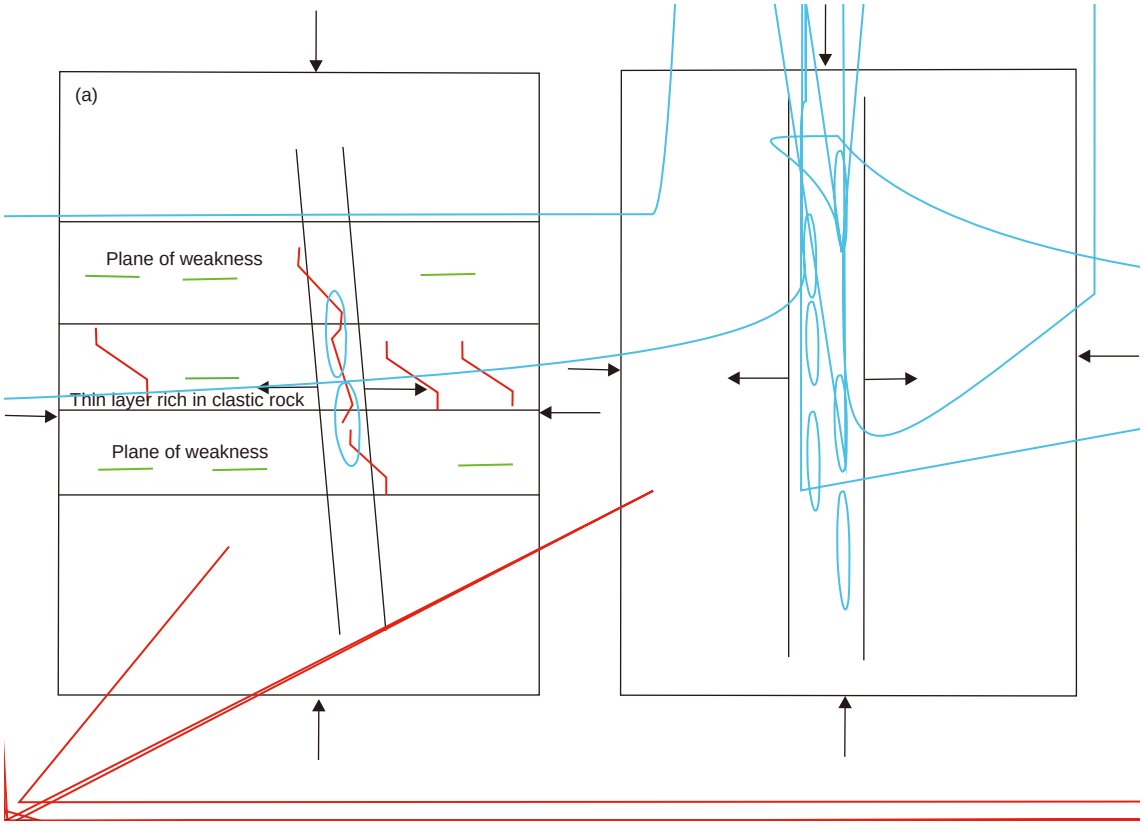

Fig. 26. " ? " 4 " / 3 %&$*B3?**a**B 9 ?**b**B
3

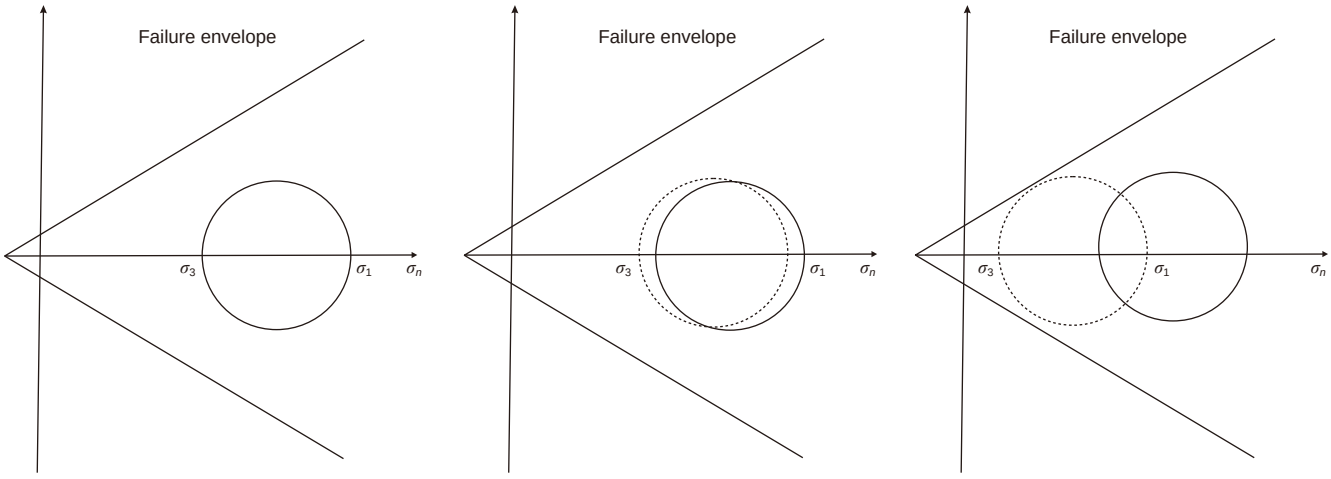

Fig. 29. 1 " ? " 4 " %&$(B30)" " 1 " " " "
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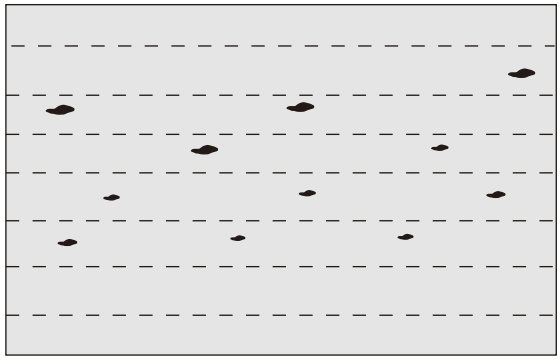

Fig. 30. ;)) ? " 4 " %&$(B30 8 " " ")"
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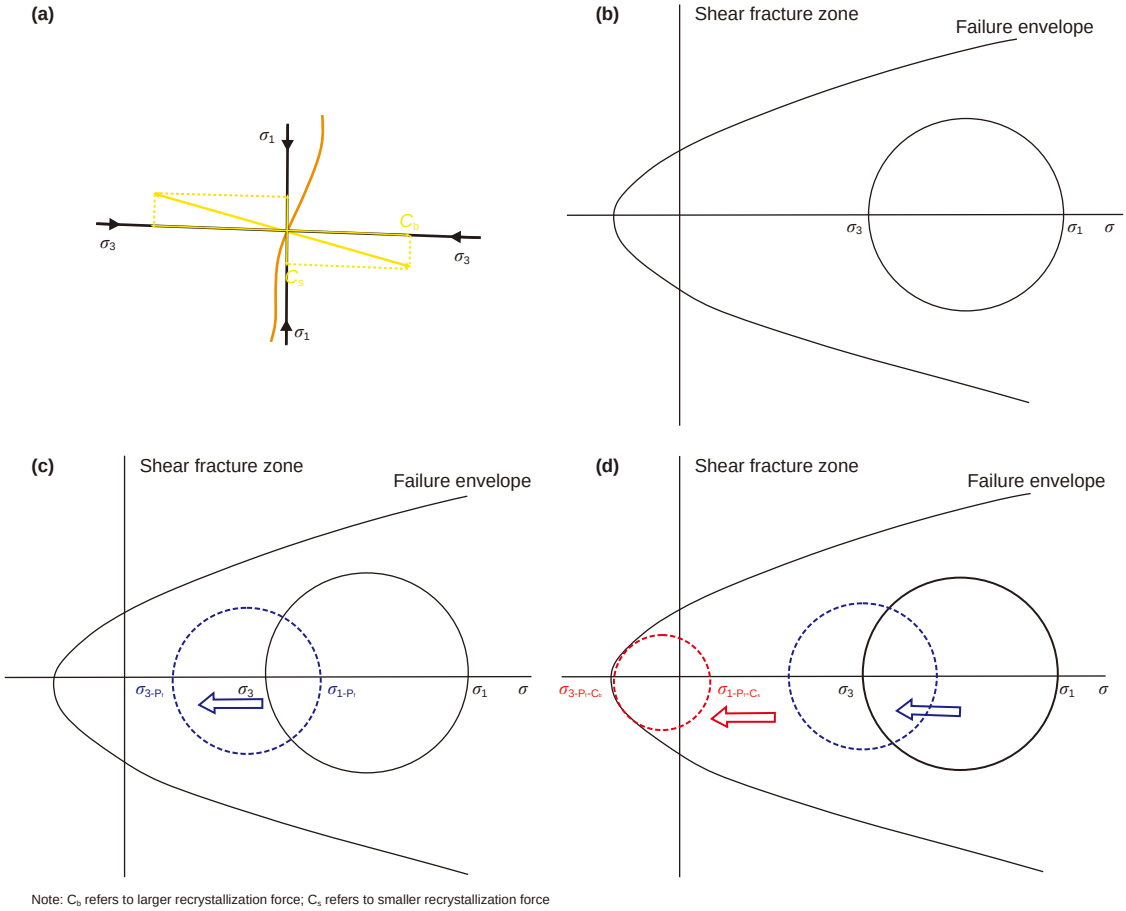

Note: C_b refers to larger recrystallization force; C_s refers to smaller recrystallization force

Fig. 31. " 3 E" 1 " " ") 5 " 5 "3

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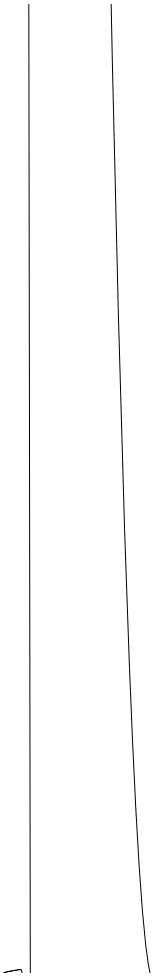

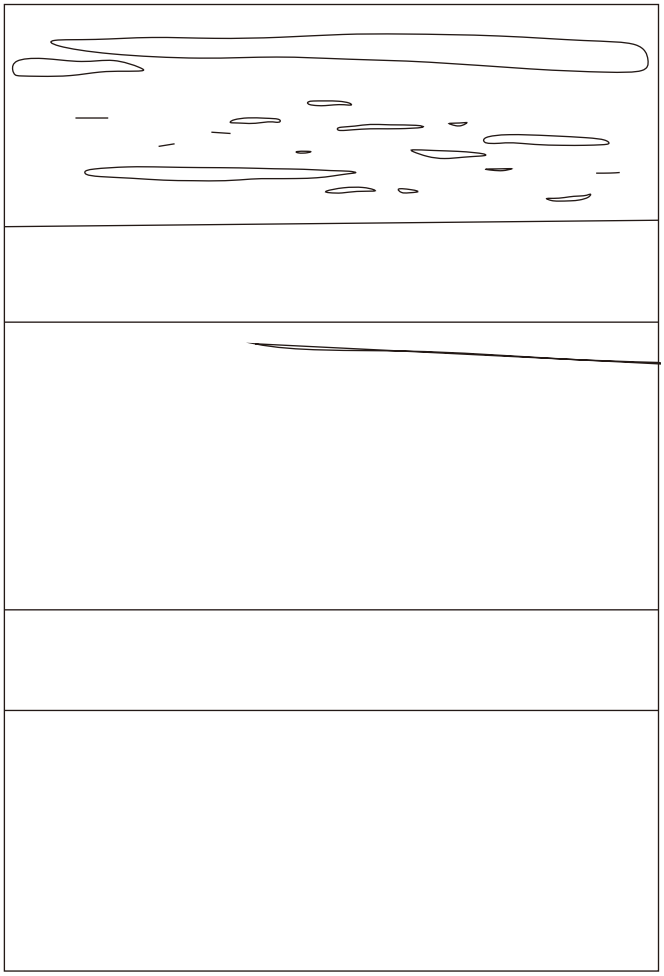

Fig. 32. "" ? " 4 " + 3 %&%B3E " 5 5
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Declaration of competing interest

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