

National University of Ireland, Galway
OLLSCOIL NA hÉIREANN, GAILLIMH

SUMMER EXAMINATIONS 1999

3rd SCIENCE
GEOLOGY [GE 321, 323]

PAPER THREE

Prof. J.F. Dewey
Prof. P.D. Ryan
Dr. P. Orr

Time allowed: Three hours

Answer four questions: **two** from Section A, **two** from Section B.

Illustrate your answers with diagrams where appropriate.

SECTION A

1. Why do earthquakes generally occur in the top 10km of the continental crust? Describe the geometry and nature of the structures that allow rocks in this upper, brittle layer to deform in response to plate motions?
2. Describe how we can use the shape of deformed objects to estimate the finite strain ellipsoid. How might such an analysis help us distinguish between a region subjected to a non-coaxial strain from a region subjected to a coaxial strain?
3. EITHER
Show how Ramsay's use of isogons to classify fold geometries into 3 classes can be related to mechanism of fold formation. Why must all large middle crustal fold packages statistically approximate to Class 2 folds?
OR
Show how the concepts of fold facing and fold vergence can be used to elucidate structure and stratigraphy in a region subjected to two phases of folding. Make reference to a region where you have applied such an analysis.
4. You suspect that your mapping area is situated along a major transcurrent fault zone several kilometers wide. What sort of structures and structural history might you expect to find in such a zone?

SECTION B

5. How can the taphonomy of bioclastic material, including shell beds, be studied?
6. How can fossils contribute to our understanding of the distribution of plates over the Earth's surface through geological time?
7. Discuss how partitioning of organisms below the sediment-water interface (infaunal tiering) can be studied using the trace fossils left by their activities.
8. Distinguish between lithostratigraphy, chronostratigraphy and geochronology; include discussion of the techniques employed with each procedure.