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Paper Models in Geography Teaching

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Employing three dimensional scale models as an aid to teaching geographical concepts has, in the past, been widely accepted as an important pedagogigal technique. In today's scientific age, their importance has tended to be somewhat overshadowed by such innovations as computer assisted learning and the application of information technology generally within the classroom. It was therefore most refreshing to read a new publication by the Curriculum Planning Division of the M.O.E (1) which has re-highlighted the importance of model making to the teaching of geography. A number of highly commendable projects are outlined and discussed from a teaching/learning point of view along with design points, objectives and method of construction. However, it is not the purpose of this short article to reiterate the advantages of utilising hardware models in the teaching of geographical concepts, a view which the writers admirably demonstrate. Rather, it is a proposal to extend the idea to the production of even simpler "models" utilising merely a single sheet of paper, a few folds, a few cuts, and a spot of glue. Models of this type can be made very quickly, can be completed by every person in the class, have no problems with storage, no great skill is required, provide welcome variety to the normal run of lessons and children seem to enjoy making them. Although paper models can be produced for numerous topics from within both physical and human geography (as demonstrated on a recent In-service course held at the Institute of Education), the example now taken relates to the Earth's geological structures and tectonic features. These areas are normally covered in Secondary 1 or Secondary 3 but there is no reason why similar models might not be introduced into the upper Primary school. Two sets of models are now described very briefly as accompanying diagrams should speak for themselves.

"Working" Faults

Figure 1 gives the template for the "basic block to be made. Three of such blocks are required. Each shows five horizontally bedded rock strata to be coloured by the children (note that the layers on one of the blocks should be coloured in reverse order to the other two). The outlines are to be cut-out and folds made along the dotted lines. A spot of glue is added at the necessary points. Figure 2 shows some of the different faults and structures that can be demonstrated by moving the blocks relative to one another e.g. normal (dip-slip) faults, reverse (dip-slip) faults, transcurrent or tear (strike-slip) faults, rift-valleys or graben (German for "ditch" or "trough"), block-mountains or horsts (German for "crag"). As the blocks can be moved in various ways, they can be considered "working" models of geological features whose concepts can be discussed either very simply or more complex depending on the objectives of the teacher and the requirements of the class. Oblique slip faults, thrust-faults, hanging walls, foot walls, compressional and tensional forces may all be considered. An examination of the 1:25000 geological maps of Singapore as contained in a Public Works Department publication (3) shows local examples of some of these features. Photographs are also readily available in a variety of textbooks or commercial packs.

Folding And Intrusive Rock Features

Figures 3, 4, 5 and 6 give the basic templates for demonstrating batholiths, dykes, sills, anticlines and synclines. Construction is the same and Figure 7 sketches the finished models. Each template is composed of a basic box-shape outline on which the various structures have been drawn so that they appear as three dimensional features when they are cut and folded. These specific features are of importance to the geological structure of Singapore and to its relief features, particularly the granitic batholith (Figure 3) since the Island-State sits on the top of one such mass which emerges at the surface as Bukit Timah Hill. It is suggested that colouring of the models might be the same as those used on the geological maps. (3). Sedimentary, metamorphic and igneous rocks might be discussed along with their relative ages with regards to the Singapore structures. Although the

teacher might ask many questions in relation to these structures, one interesting query might concern the ways by which one is able to tell whether the igneous rock associated with tectonic activity came before or after the deposition of local sedimentary rocks. These rocks (the Jurong Formation) are to be found around the intrusion of the Bukit Timah granite. The completed construction of the dyke and sill (both volcanic features) as shown in Figure **4** is aimed at giving a clearer understanding of their difference, with the sill being formed between and along the bedding planes while the dyke protrudes across, through, and at an angle. The anticline (Figure 5) and syncline (Figure 6) simply show the difference between the downfold and upfold structures (Remember, the syncline sinks in the middle). Some of the photographs in the CDIS geography texts illustrate parts of these features, and an examination of the Singapore geology rnaps is wothwhile. Simply acquaint yourself with the appropriate symbols shown in the legend on the maps then look very carefully as to where they are formed. During construction, if the base only of each of these models is glued, then they can be collapsed and kept in individual class exercise books. For demonstration purposes, the teacher can always produce larger versions made from card.

Hardware modelling in geography is a valuable technique for helping to explain geographical concepts, helping to understand and remember those concepts and for maintaining classroom interest. Constructing simple paper models is a variation on the same theme. The common aphorisms that "children learn best by doing things" and "variety of approach leads to successful teaching" lend themselves particularly well to this practical approach. The examples given demonstrate but one area in which the technique can be applied. There are many others. Why not give it a try?

Note: *For publishing purposes the models have been reduced from their original A4 size but may be enlarged for classroom use.*

Reference

1. Ang Siew Hong and Yee Sze Onn (ed) (1990). *Making and Using models in geography teaching.* Curriculum Planning Division, Ministry of Education, Singapore.

2. Merrick, Brian (1991). "Paperwork in geography : the tropical cyclone." *Teaching Geography,* Vol. 16, No. 1 : 21 – 23 : The Geographical Association, Sheffield.

3. Public Works Department (1976). *Geology* of the *Republic of Singapore.* Singapore.

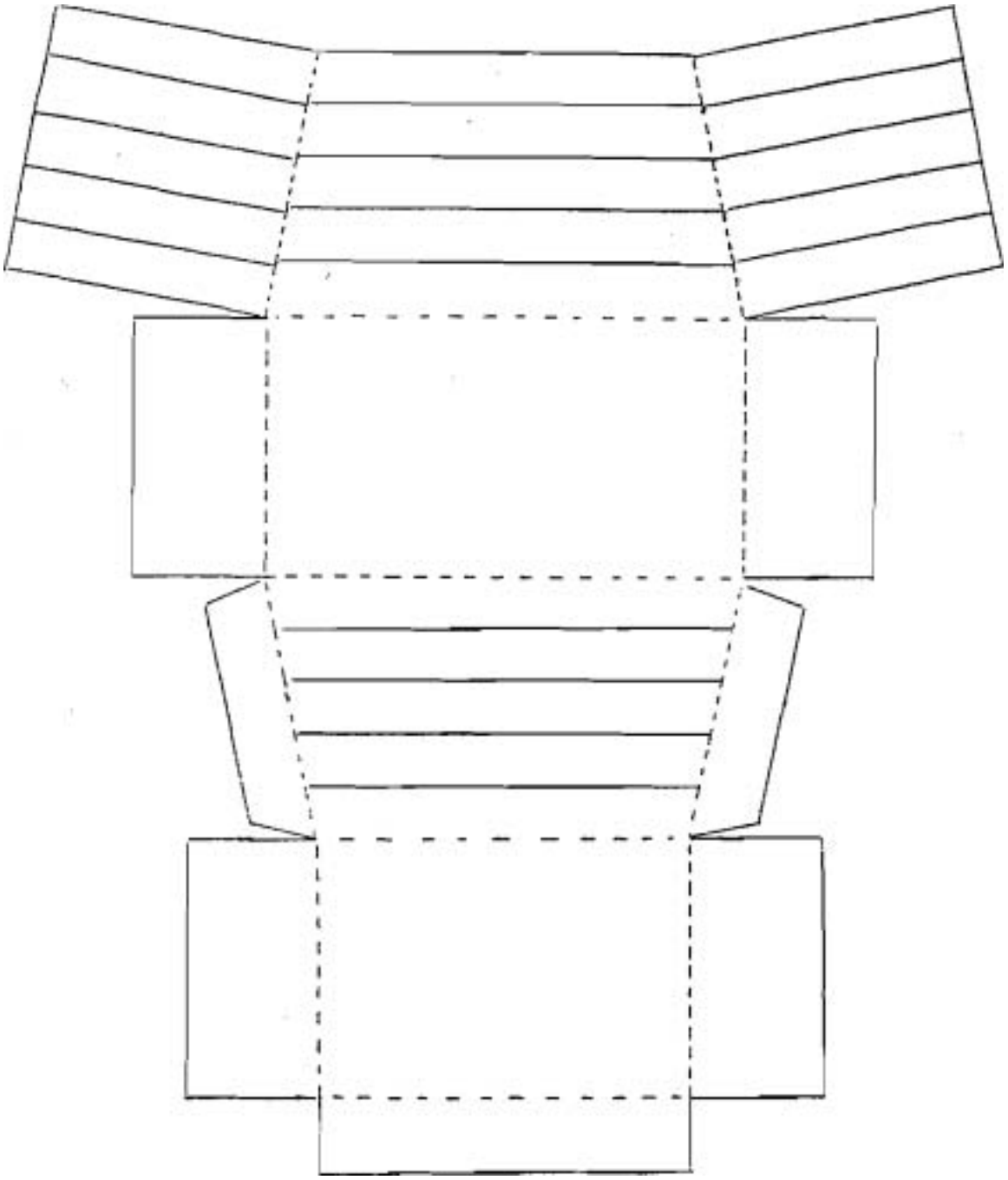


Figure 1. Template for a fault block
[Three of these are required]

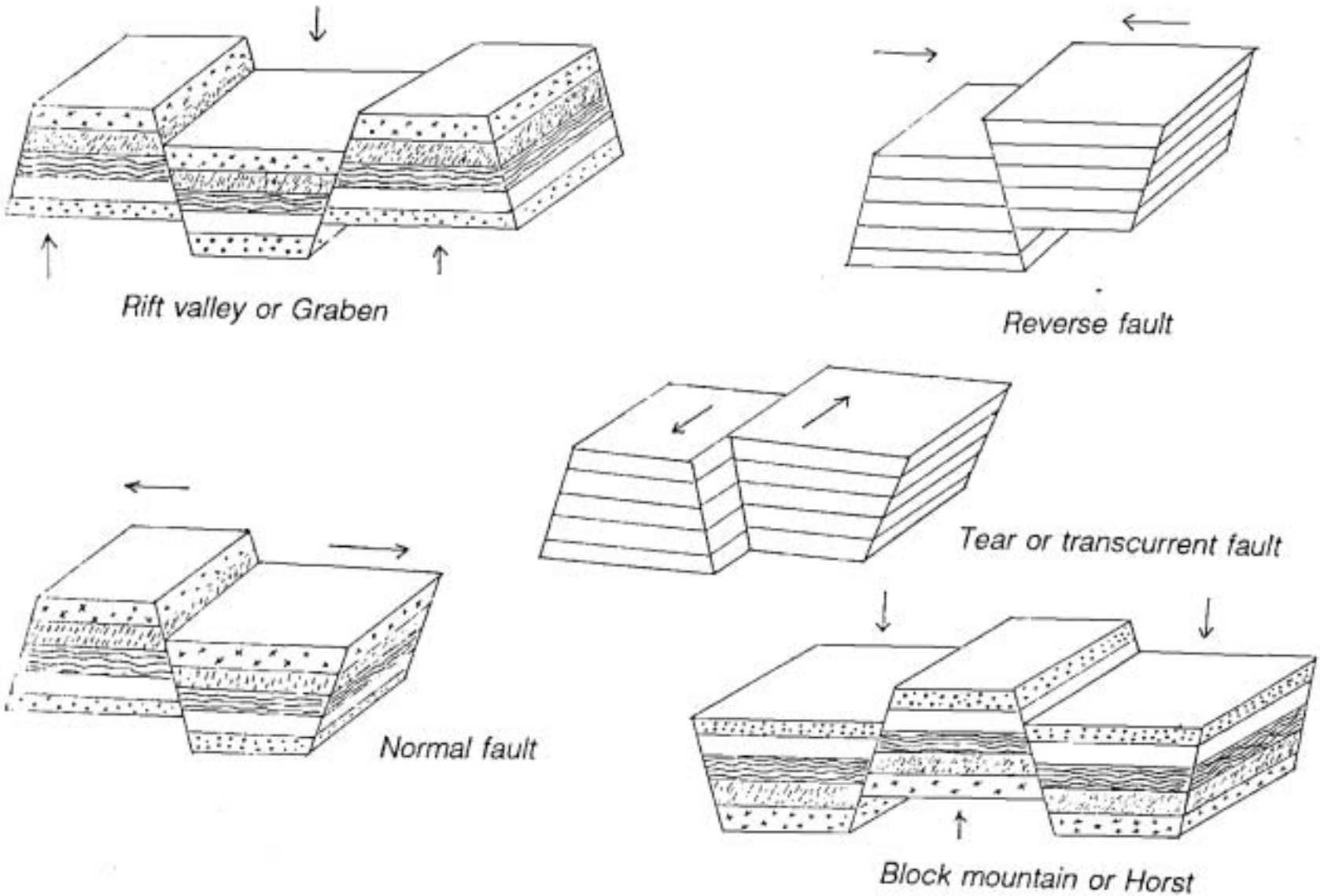


Figure 2. Some 'working' faults

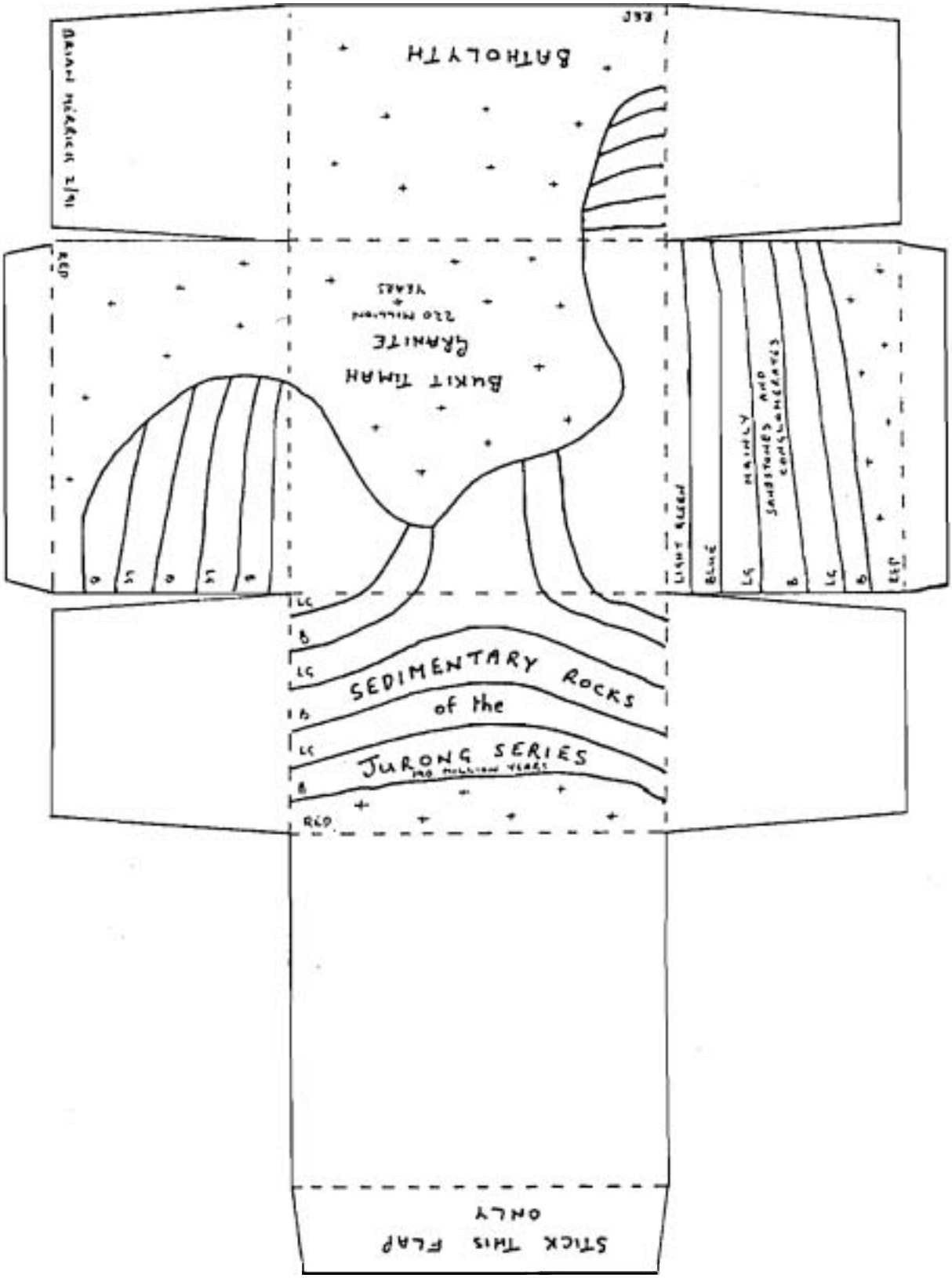


Figure 3. Template for a batholith

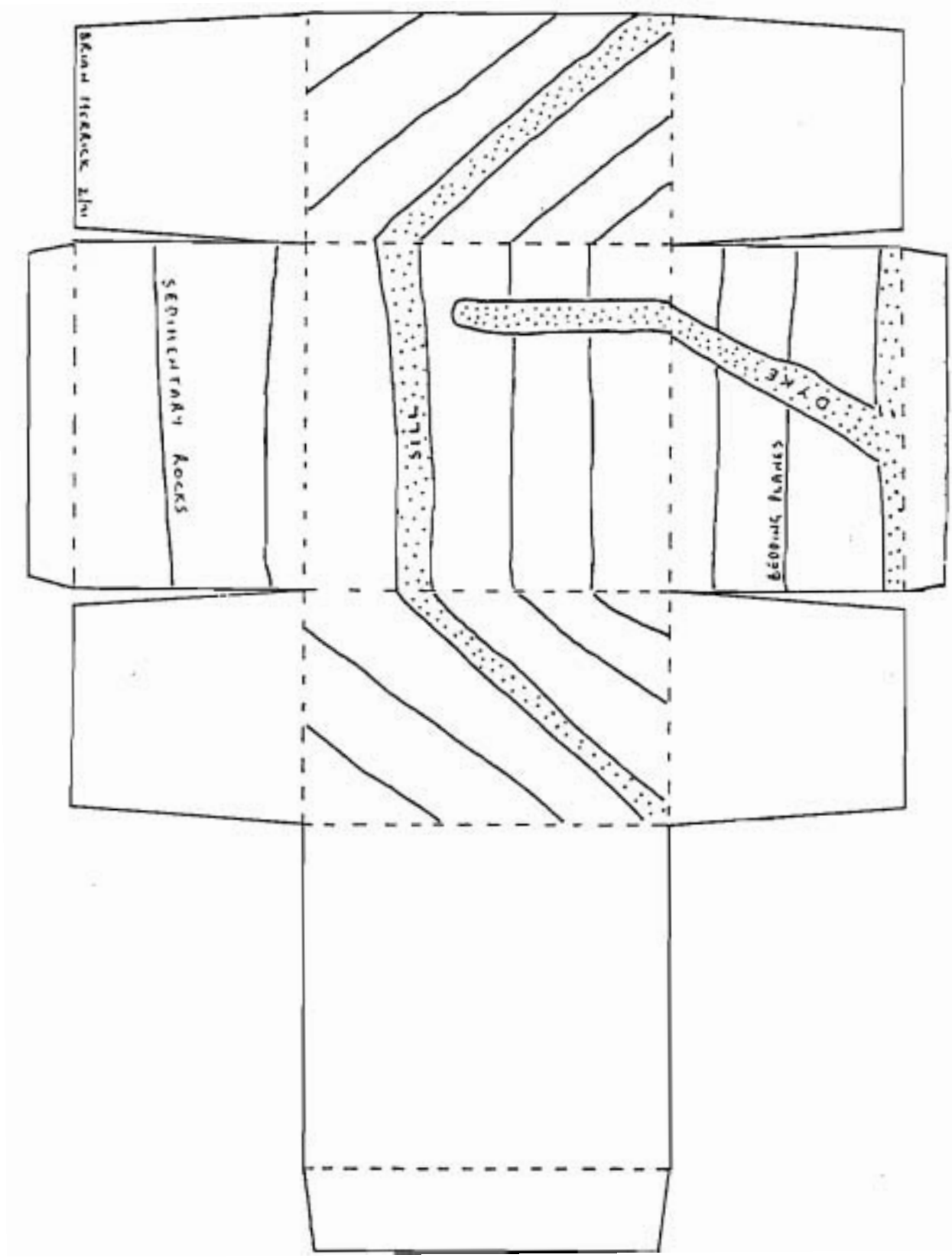


Figure 4. Template for a sill and dyke

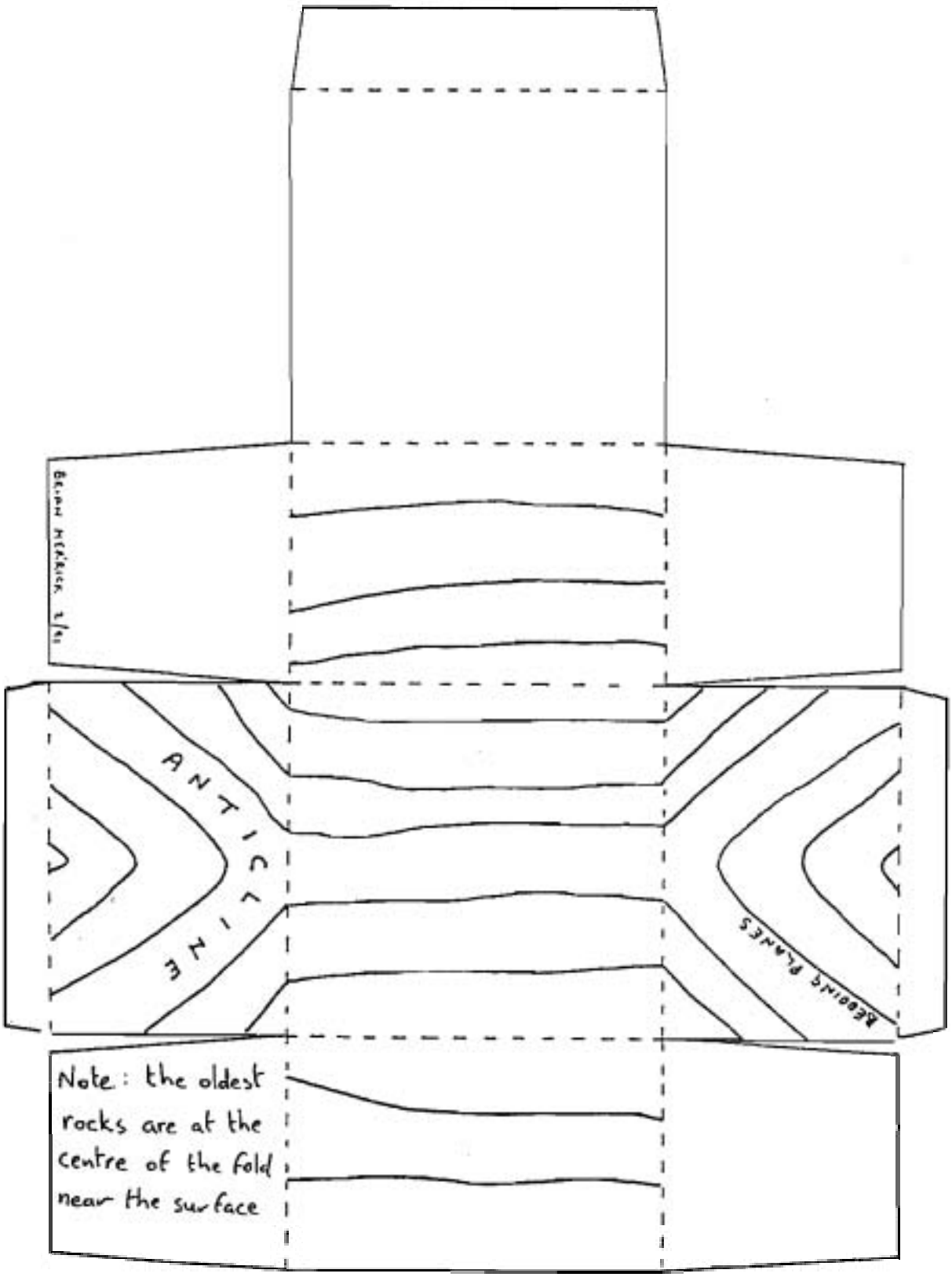


Figure 5. Template for an anticline

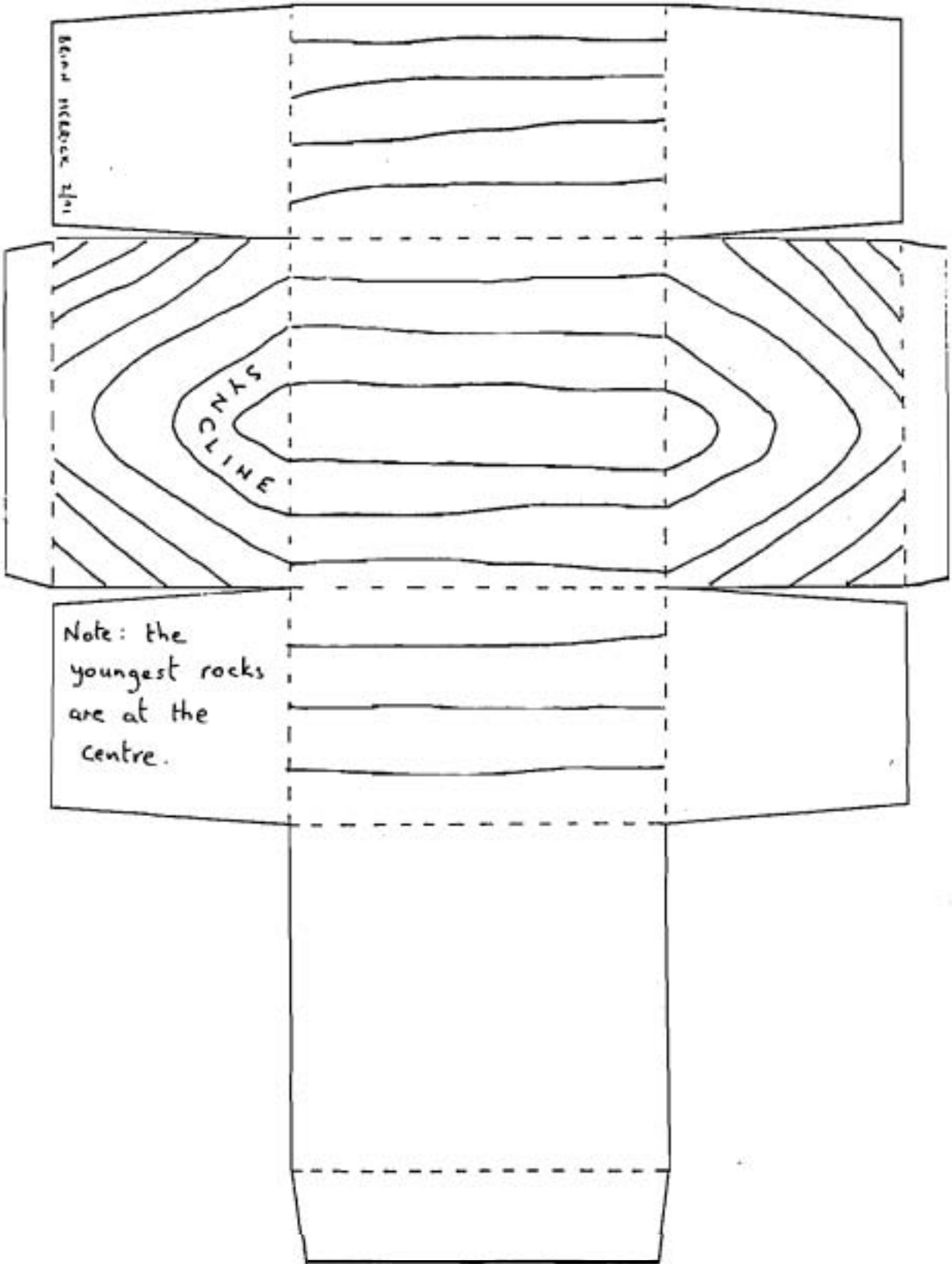
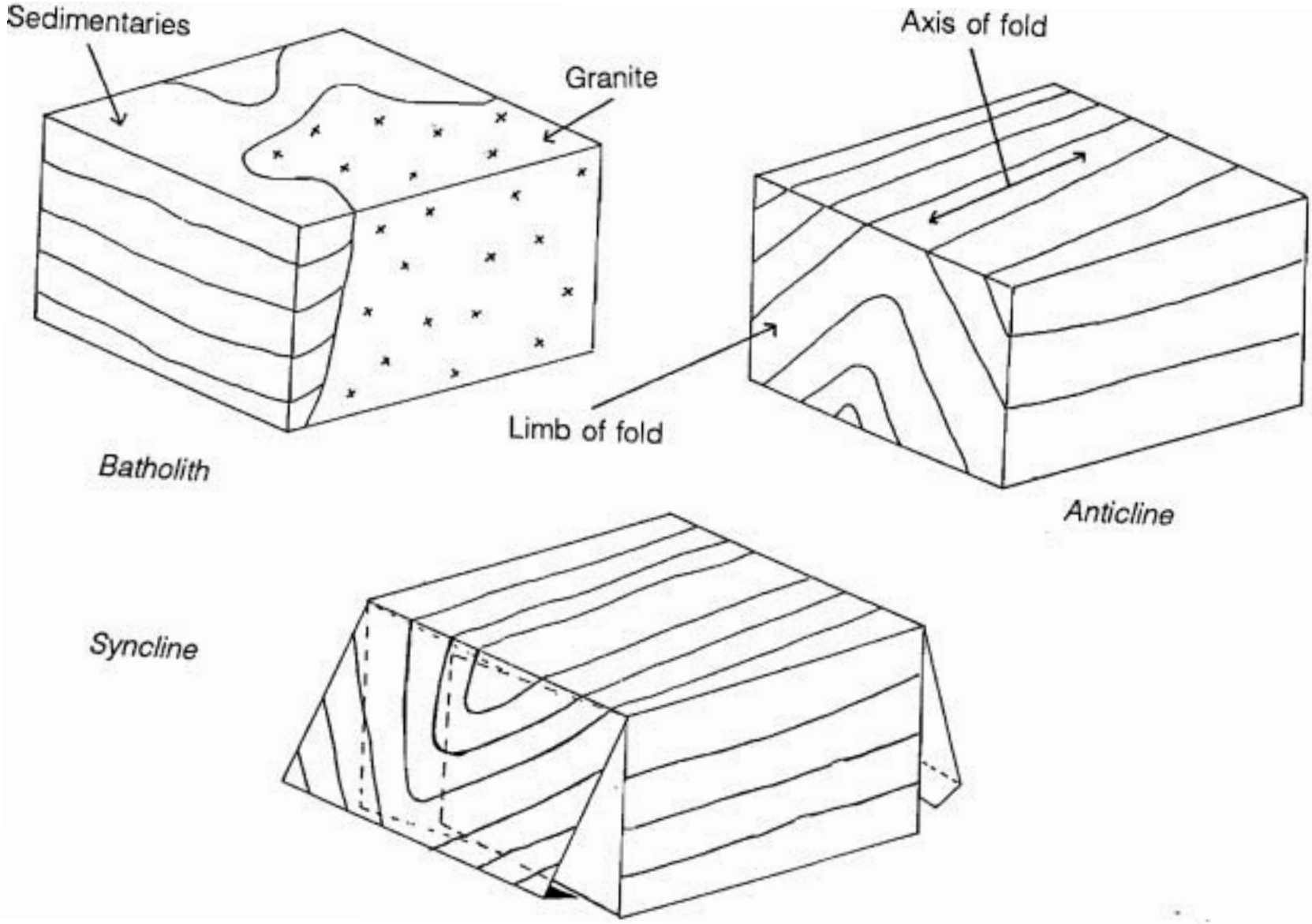


Figure 6. Template for a syncline


Sedimentaries
Granite
Batholith
Axis of fold
Limb of fold
Anticline
Syncline

Figure