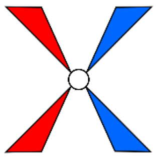
492 AA

bncdoc.id	H7K
bncdoc.author	Ager, Derek V
bncdoc.year	1984
bncdoc.title	The nature of the stratigraphical record.
bncdoc.info	The nature of the stratigraphical record. Sample containing about 36781 words from a book (domain: natural sciences)
Text availability	Ownership has not been claimed
Publication date	1975-1984
Text type	Written books and periodicals
David Lee's classification	

<492/c>



Key:
Footprint
ConEn1
Footprint
ConEn2
Footprint
ConEn3

seem to be in recognising the importance of such diachronism! And yet, is it so impressive? Four thousand years in four miles is forty thousand in forty miles, four hundred thousand in 400 miles and four million years in 4000 miles. We are still dealing with almost negligible figures in geological terms and certainly of the same order as the Synchronous/diachronous deposits such as the “Urgonian” limestones discussed in chapter 1. It all depends on whether you think in human terms or in geological terms. **The algal mat deposit** is strongly diachronous to us ephemeral human beings, but even if it extended for hundreds of miles inland it would still be virtually synchronous **geologically**. Let us consider a larger modern parallel: the Po Valley in northern Italy and the Adriatic Sea (figure 6.3). We have here a wide, flat valley filled with **sediment** passing into a long parallel-sided sea reminiscent of **many ancient sedimentary troughs**. The Po **delta** has been moving forward irresistibly for aeon upon aeon since late Tertiary times and will presumably, in the course of time, fill the Adriatic with **its sediments** from the decaying Alps. **The sedimentologist** of the distant future will find a long **trough** filled with **deltaic and fluviatile sediments** with clear evidence of their provenance from the north-west and of longitudinal infilling like so many other **trough**.shaped basins up and down the stratigraphical column. To him **the deposits** of the migrating Po drainage system will appear to be synchronous. Yet to mere man, Venice stands today on a group of islands at the head of the Adriatic very much as it was at the time of the great Doges. This brings us again to the vital question of where **sediments** actually accumulate at the present day. This was discussed at the beginning of the previous chapter, but it needs to be stated again that there seem to be comparatively **few and small areas** on the shelves at the present day where **sediment** is actively accumulating. There are **plenty** of areas of sea floor with Recent **sedimentary** cover of sorts, but - at least on the inner shelves - this nearly always seems to be moving to and Fro and **not building up**. Even in such classic areas as the Mississippi **delta**, where **sediment** is thought to be accumulating rapidly, there is **plenty of evidence** to suggest that, after building up for a while, **much of it is carried away again**. No doubt a great deal eventually **comes to rest** in the deep ocean basins, hut these are not environments much represented in the stratigraphical record of the continents, which have been our main preoccupation. In fact, even before the days of plate tectonics, I have always been struck by

the paucity of oceanic sediments in the continental areas

. We can get rid of much of it by subduction, but certain Orogenic episodes (notably the Hercynian) seem to have **very little to show** of **the ocean floor**. If we escape from the notion of **sediment** raining down every. where, all the time, we also escape from the notion of the sea-floor subsiding all the time. One of the most important corollaries of the hypothesis of the turbidity current was that we could now have the geosynclinal trough without the **geosynclinal sediments**. This was clearly demonstrated in the Alps in what were half humorously called “leptogeosynclines”, that is troughs with **very little** **sediment.** More important was the classic work on

	what is probably our best contemporary geosynclinal area-the Indonesian Archipelago. Here a great trough that is filled with Caenozoic **sediments** in northern Java and Sumatra (where a **sediment** supply was available) passes directly into a deep oceanic trough - the famous Flores Deep - where there was no such supply. Obviously **a great thickness** of **sediment** must he heavy and must press down that part of the crust on which it rests, just as the weight of continental ice caused subsidence of the great land masses during the Pleistocene. But snow and ice accumulate in a totally different way from **sediment**. They do not require **basins**, in fact they prefer mountains. What is more, they operate on a completely different scale. The old-fashioned concept of the **sedimentation** causing the subsidence to accommodate it is just not tenable. It is a process of diminishing returns, as Arthur Holmes showed mathematically nearly 30 years ago. Obviously a given **thickness** of **sediment** could not simply by weight produce the same amount of subsidence of a much denser crust. In practice, for a given area to remain in isostatic equilibrium, there would always be a limiting factor. Holmes calculated a ratio of approximately 2.4:1. That is to say, for 100 feet of water one could only expect 240 feet of **sediment** of normal density. **Sedimentation** must occur preferentially in certain areas, such as **deltas**, where there is a **plentiful supply** of **sediment** and a suitable retardation of the transporting medium. This explains **the abundance** of **deltaic sediments** in the stratigraphical record of the continental areas, but one must also expect that **such sediments** will either not exceed a critical maximum **thickness**, such as that suggested above, or they must have been deposited in a tectonically subsiding trough. We know that the process of **thick** **sedimentation** followed by isostatic readjustment has happened frequently in the past, both in truly geosynclinal areas and in Voigt's " bordering troughs " (Randtroge) of the shelf regions. But here **tectonic pressures** must have produced the subsidence and prevented the immediate re-establishment of