



Rocks in the field

A rock matrix

GLYNDA:

When you arrive at a new locality the first thing you should do is to stand back and take a good look around.

TONY:

Although there's no obvious bedding at this point there is plenty of evidence in this rock to suggest I'm dealing with a sedimentary rock. If we look here for example I've got these very large clasts which are in excess of 20 centimetres ranging down to about 2 or 3 centimetres, and most of them are showing beautifully rounded edges, this large boulder here for example and I can see the same thing here and here. Most of these pebbles and boulders are actually in contact with one another, for example here and here. This kind of texture we will call grain support and in between these clasts we can actually see other material, it's much finer but it's still in its own sense quite coarse and I would actually call this a sand. The suggestion here is of material that actually filtered down in between the grains to form a matrix. I'm going to try and show you that now with an experiment. And it worked .. the balls in the bucket were effectively the pebbles and boulders that you can see in the face here. The sand that I poured into the bucket is the material which we can see here forming the matrix between the boulders. And what in effect has happened is as you have a high energy environment here where presumably water, the sediment was largely being carried as bed load. The boulders and pebbles being larger were probably deposited first and as the energy waned in the flow the finer grained sediment was deposited on top of it, but because of the large spaces between the boulders, there was plenty of room for that material to actually filter down to form in effect a matrix and of course eventually the whole thing lithified into the rock we can see here today.

Although the clasts in this rock are rather poorly sorted, when we look at it in terms of composition we see that the overwhelming majority of the pebbles and boulders in this rock are actually of the same type. We have this grey slightly crystalline rock, quite fine grained which I think is probably a quartzite. And there are similar examples although they're red stained and we can see this very shiny crystalline surface to the rock and again this is another example of quartzite. Well the red stained pebbles and the red stained matrix suggest to me that we've had a certain amount of oxidation here. If we think in terms of what type of rock we're dealing with, clearly it's a very coarse grained rock. And if these clasts were angular I think we'd refer to this as a breccia but here because of the rounding of the grains I'm going to call this a conglomerate.

At this locality it's not all conglomerates. I can see here a very different type of rock, it's showing layering, it's quite coarse to the touch, it suggests to me that I'm dealing here with a sandstone. And when I move around the outcrop I can see that there are some quite considerable features of interest within it. Here for example I can see a very sharp truncation which down-folds into the rock. When I look closely at this locality, the layers within this sandstone unit have in fact been deformed downwards this unit has actually sunk into the sand because of its higher density and that is what's deformed it here. What that tells me is that I've got two things. First of all the variation in grain size between the conglomerates to the sandstone tells me I'm dealing with bedding. Secondly, the fact that the bedding surfaces here have down-folded at this point tells me that I've also got a way-up structure. This must be the base of the sandstone and this is the top of the sandstone and therefore if I think of this as an original sedimentary unit that would presumably deposit reasonably horizontally - it was actually laid down in a layer like this and has now been tilted in that direction.

GLYNDA:

So how might these rocks have been formed? The rounded tumbled nature and large size of the clasts suggests that quite a strong water current was involved or that these pebbles were carried by a fast flowing river some distance from the source.

TONY:

The coarse grain size in both the conglomerate and the sandstone indicates that this is bed load transport but with two contrasting energy levels. The pebbly conglomerates are a high energy event associated almost certainly with flooding and you can pick that out with the quite sharp junction between the sandstones and the conglomeratic unit's. But as the floods subside we see a decline in energy levels and the end of the stage is with the finer grain sediment being deposited as a sandstone unit.