

S100: Science: a foundation course
S100/17: Genetic code

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Clip transcript: Time-lapse photography showing mitosis.

Stephen Hurry:

Here's the nucleus with this nuclear membrane around it. The only structure that can be seen are these dark objects here. These are called nucleoli. They have no function in cell division. Notice that the rest of the nucleus contains apparently nothing special, but chemical activity is going on here and it's at this stage in the division process, that the DNA is duplicated. This stage is called Interphase.

What happens next? Well, inside the nucleus the chromosomes become apparent. The nucleoli vanish and the nuclear membrane bursts apart. Watch it here. We've made a jump so this is rather late in the process. You can see the chromosomes, now they become free in the cytoplasm. Here we are, here's the same cell again. Here are the chromosomes and you can see on this one, and on this one over here that the chromosomes are double along their whole length. This is a consequence of the duplication that took place at the Interphase stage. The doubleness of the chromosomes extends down their whole length except for one special region, here is one such region and here on this chromosome another. These special regions are called centromeres and they are in fact holding the double chromosome together. This stage is called Prophase.

What happens next is that the chromosomes move together in the centre of the cell and will line up across this equator. The centromere divides, setting the doubled chromosomes free in the cell. Let's see it happen. Here you are, the chromosomes are unravelling, becoming shorter and thicker. And are now beginning to line up. There. Now here's the same cell again and there's the equator along which the cell, the chromosomes are aligned. The centromeres divide, though you can't see that on the photograph, and this stage is called Metaphase. The next stages happen quite quickly. The now separated parts of the chromosome move, one to this end, and one to that end of the cell. At the same time, a new cell wall will become visible forming across the equator. And also around the chromosomes at the ends of the daughter cells a new nuclear membrane will appear. Now you can see this if you watch not only this cell but this one and this one, all three at the same time, for in these two cells the process is slightly in advance of the process in this big cell. So let's see that happen. Now the chromosomes are separating, some of them fairly reluctantly as if the chromosomes were sticking together. There they go and the last one. An arrow will appear in a moment simply to show the direction of movement. There it is. Now you can begin to see the beginnings of the cell wall forming across the middle, growing inwards from the edges. Now the cell wall's very distinct now.

Here are the last stages in the division of the cell. In this cell the chromosomes have retreated to the ends of the daughter cells. A new cell wall is forming between them and in these two cells the final stages can be seen. Notice that the structure of the chromosomes is being lost and in this lower nucleus, even less of the chromosomes can be seen. And around each, a new nuclear membrane will be forming. Daughter cells, each now with their own nucleus and separated by a cell wall, so that we have two cells where we started with one.