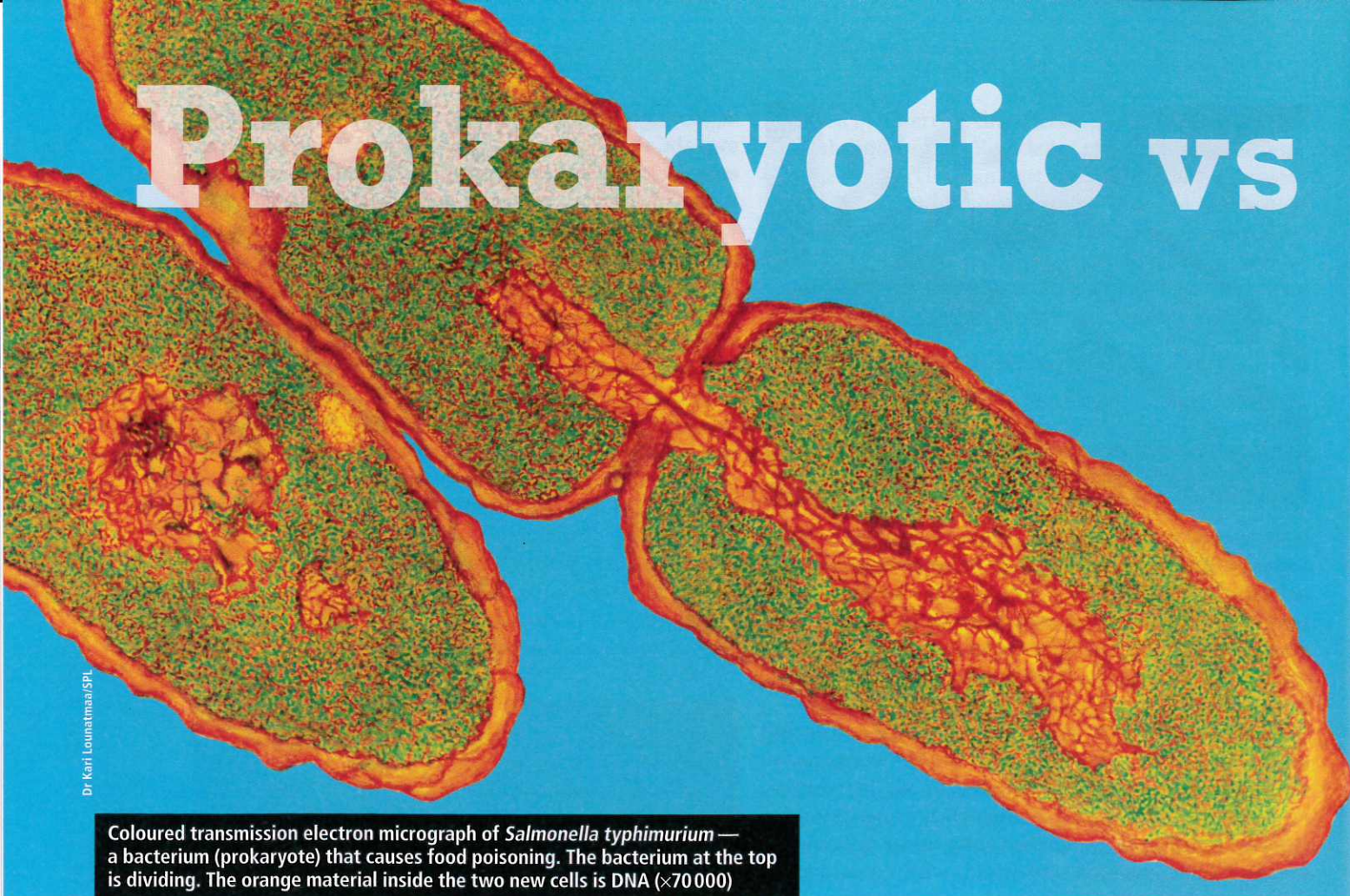
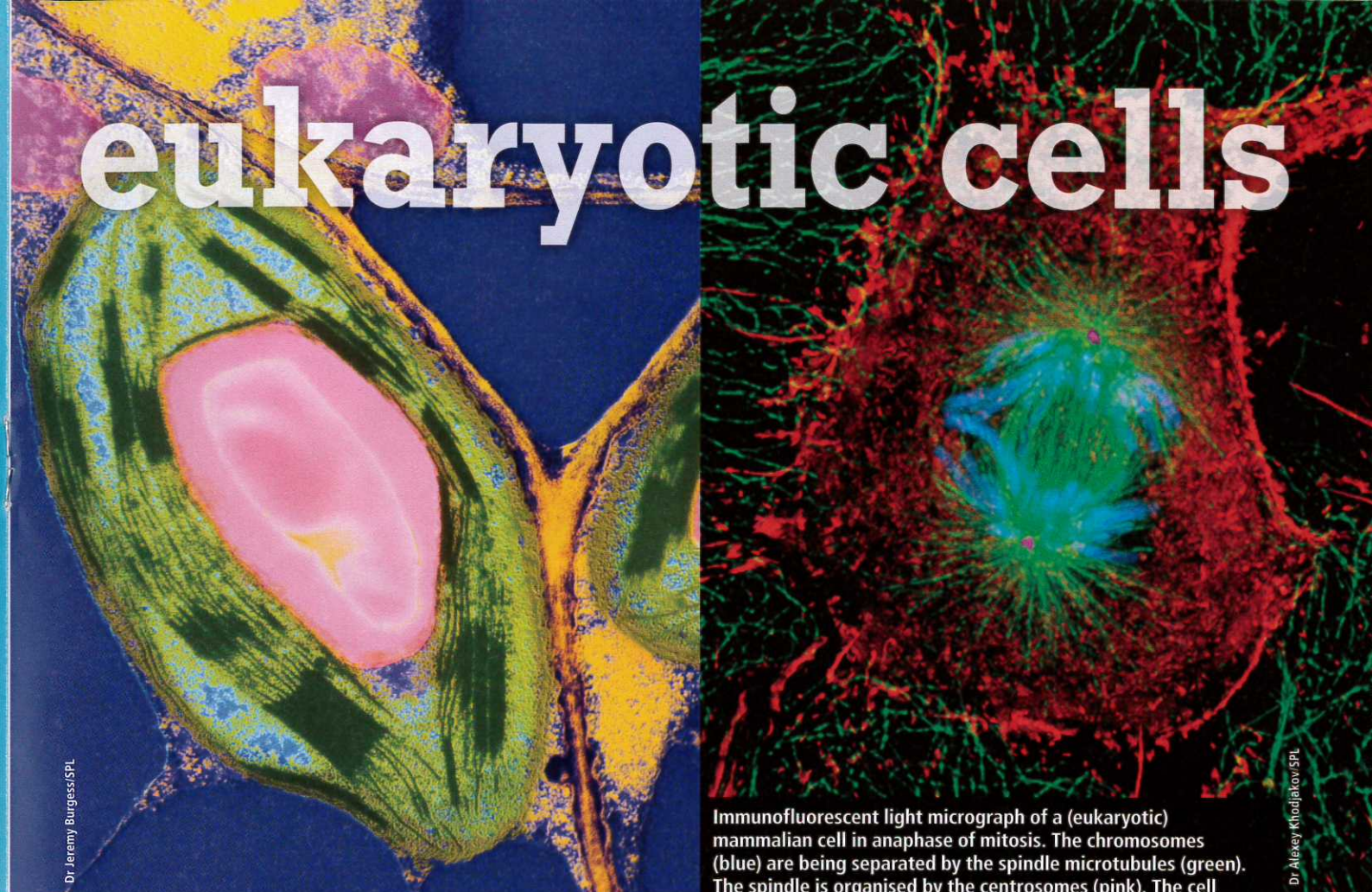


Prokaryotic vs



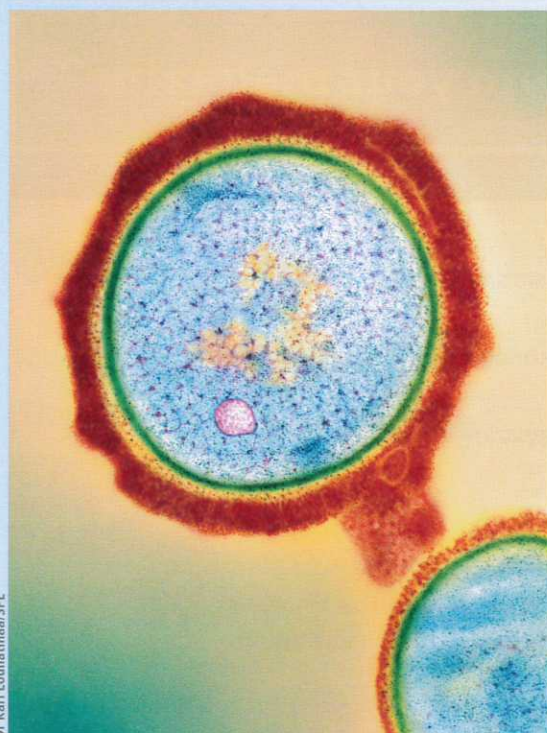
Coloured transmission electron micrograph of *Salmonella typhimurium* — a bacterium (prokaryote) that causes food poisoning. The bacterium at the top is dividing. The orange material inside the two new cells is DNA ($\times 70\,000$)

eukaryotic cells

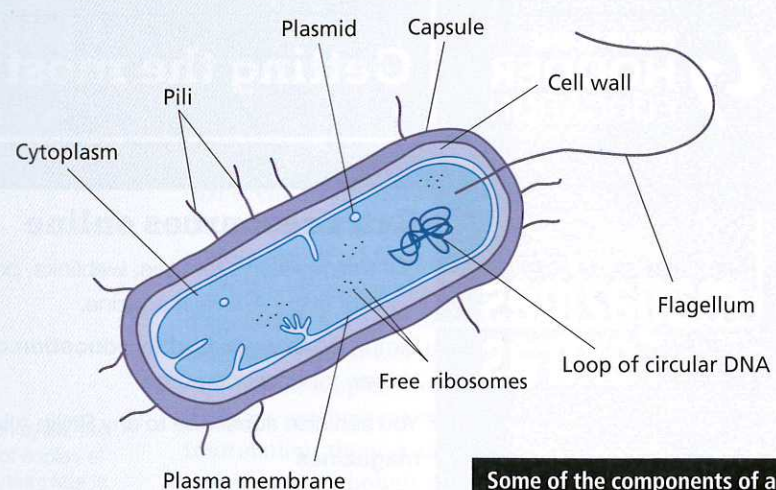


Coloured TEM of a (eukaryotic) plant cell including chloroplast with grana and stroma thylakoids surrounding a starch grain (pink) ($\times 10\,000$)

Immunofluorescent light micrograph of a (eukaryotic) mammalian cell in anaphase of mitosis. The chromosomes (blue) are being separated by the spindle microtubules (green). The spindle is organised by the centrosomes (pink). The cell structure is being maintained by the microtubules and actin microfilaments (red) ($\times 100\,000$)



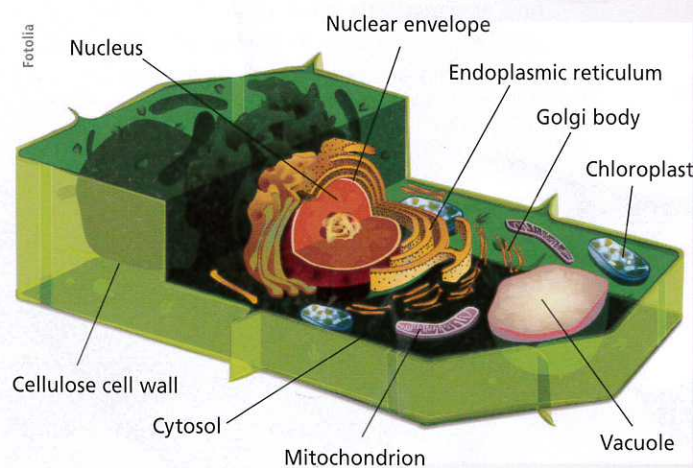
Coloured transmission electron micrograph of methicillin-resistant *Staphylococcus aureus* (MRSA) — a major source of post-surgery infection. The outer-layer of this prokaryote (its capsule) is shown in red, the peptidoglycan cell wall is green and DNA is yellow ($\times 45\,000$)



Some of the components of a prokaryotic bacterial cell

The different structure of prokaryotes and eukaryotes marks a major distinction between all known organisms. The Archaea and Bacteria are prokaryotes; all other cell types are eukaryotes. The clue to their major difference is in their names, derived from Greek: *pro* — before, and *karyon* — kernel (referring to the nucleus *karyon*), and *eu* — true, *karyon*. In other words, prokaryotes do not have a membrane-bound nucleus, whereas eukaryotes do.

The structure of the two cell types is different. Eukaryotes contain membranous organelles and components such as mitochondria, plastids (see *BIOLOGICAL SCIENCES REVIEW*, Vol. 24, No. 3, pp. 20–21), Golgi bodies, endoplasmic reticulum and lysosomes, each performing a specific metabolic function. They are also supported by a less well-known complex cytoskeleton, comprising microtubules,

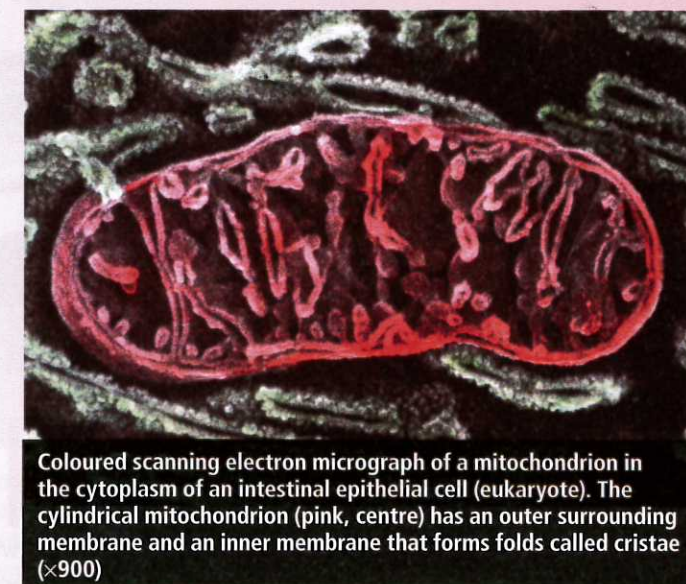


Some of the components of a eukaryotic plant cell

microfilaments and intermediate filaments. Prokaryotes have none of these things. Their metabolism takes place in a relatively unstructured cytoplasm. Both cell types contain ribosomes, but those in prokaryotes are smaller. In prokaryotes there is a single unenclosed loop of DNA with associated proteins. In eukaryotes, linear lengths of DNA are coiled and looped with histone proteins into discrete chromosomes enclosed in a nuclear envelope.

BiologicalSciencesReviewExtras

Go to the **BIOLOGICAL SCIENCES REVIEW Extras** page (see the back cover) for a printable PDF of this spread and for a table comparing prokaryotic and eukaryotic cells



Coloured scanning electron micrograph of a mitochondrion in the cytoplasm of an intestinal epithelial cell (eukaryote). The cylindrical mitochondrion (pink, centre) has an outer surrounding membrane and an inner membrane that forms folds called cristae ($\times 900$)

Ron Butler is a former reader in cytology at the University of Manchester and a former editor of *BIOLOGICAL SCIENCES REVIEW*.