

SHORT PAPERS

Further observations on the correlation between kappa and phage-like particles in paramecium

BY GARY W. GRIMES AND JOHN R. PREER, JR.

Department of Zoology, Indiana University, Bloomington, Indiana

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SUMMARY

It has been possible to examine the correlation between the presence of phage-like particles and R bodies by using serial sections of kappas of stock 562. No exception has been found to the rule that 562 kappa particles with R bodies also have phage-like particles; however, 3 out of 78 kappa particles with phage-like particles lacked R bodies.

Kappa, a bacterial endosymbiont of *Paramecium aurelia*, is responsible for the killer phenotype. Up to 50% of the kappas in each paramecium contain an R body – a roll of ribbon consisting of protein. Preer & Preer (1967) showed that free R bodies isolated from kappa are associated with bacteriophage- or virus-like particles, which recently have been isolated and shown to contain DNA (Preer *et al.* 1971). These facts have been interpreted to mean that kappas without R bodies harbor a temperate phage which occasionally enters the vegetative stage, resulting in the production of mature phages and the R body as well.

Preer & Jurand (1968) sectioned killer stocks 7 and 562 of syngen 2 of *P. aurelia* and observed phage-like particles in kappa. They found a strong but not absolute correlation between the presence of phage-like particles and R bodies in sections of kappa as predicted. Since at a given level a section through a kappa may fail to pass through phage-like bodies or R bodies or both, they analysed a number of sections statistically and concluded (1) that most if not all kappas with R bodies also contained phage-like particles and (2) that most if not all kappas with phage-like particles also contain R bodies.

We have now examined serial sections of the original embeddings of 562 described by Preer and Jurand. Sections were cut with a diamond knife in a MT-2 Sorvall microtome, placed on a one-holed grid with an aperture of 1 mm, stained with uranyl acetate and lead citrate, and examined in a Phillips 300 electron microscope. We confirm that in the case of 562 all kappas with R bodies contain phage-like particles. (In fact, it was shown in the previous study that all sections of 562 with R bodies contain phage-like particles.) However, we find that despite the strong correlation between the presence of R bodies and the presence of phage-like particles, a few kappas with phage-like particles do lack R bodies. Of seventy-eight kappa particles with phage-like particles, three were found to contain no R body (see Plates 1 and 2). These three kappas appear to contain fewer than the usual number of phage-like particles.

It may be that the presence of these exceptional kappas means that completed phage-like particles are formed before the R body becomes visible. On the other hand, it is also possible that the formation of phage-like particles may be occasionally uncoupled from the formation of the R body.

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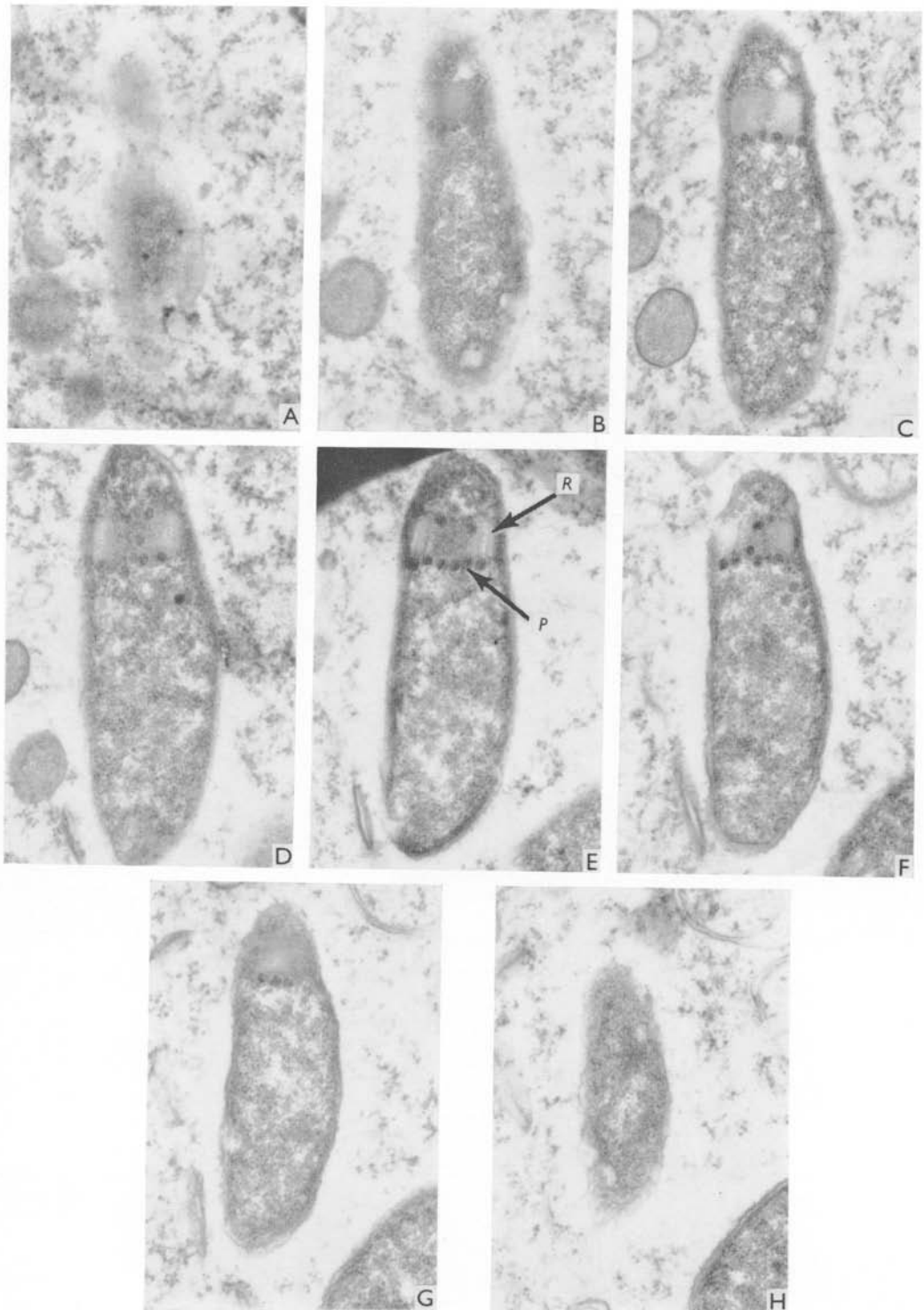


Plate 1. Serial sections through a kappa with an R body (*R*), showing numerous phage-like particles (*P*). $\times 33000$.

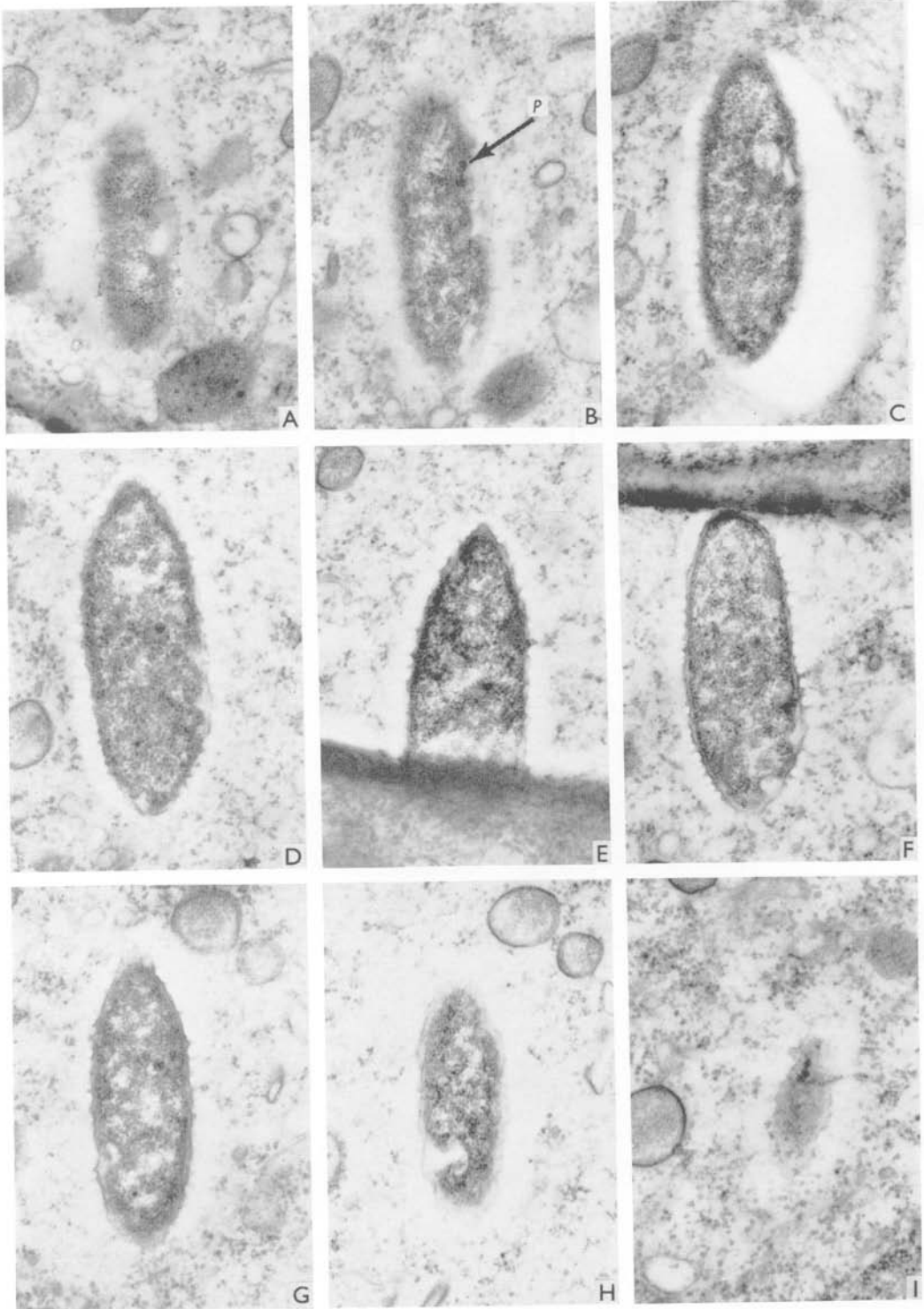


Plate 2. Serial sections through a kappa without an R body but with phage-like particles. $\times 33000$.

G. W. GRIMES AND J. R. PREER