Use of Logarithms in recording Serological Reactions

Vennes, MacDonald and Gerhardt[1] have performed a useful service by pointing out again the potentially misleading effect of comparing serological titres expressed as actual dilutions, and their suggestion that logarithms to the base 2 (or a smaller base for finer work) should be used instead is a good one. I have earlier[2] used powers of 10 in reporting titres obtained by diluting one reagent successively 1 : 10 and, by giving tube numbers[3] merely, what amounted to logarithms to the base 1·5 when dilutions were made in these steps.

My example has not been widely followed ; perhaps the suggestion of Vennes, MacDonald and Gerhardt will fare better.

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Electron Microscopy of a Stable *Proteus* L Form

The bacterial L forms, which may arise when normal bacteria are subjected to an unusual or unfavourable environment, are highly pleomorphic : they may consist of granular, vesicular and branched structures. Probably the L forms (reviewed by, among others, Klieneberger-Nobel[1], Dienes and Weinberger[2] and Tulasne[3]) have a structural organization that is different in several respects from that of normal bacteria. Thus some workers[2,3] have described composite structures in L forms consisting of granular elements inside large vesicles. According to Klieneberger-Nobel[4] these granules may fuse with each other. Tulasne[3] assumes that the various morphological structures found in cultures of bacterial L forms represent stages of a complicated life-cycle. This has, however, been questioned by other investigators[5,6]. The observations reported below may be of some interest in connexion with a general discussion of the nature of the bacterial L forms.

The strain used was a stable L form of *Proteus vulgaris*, obtained from Dr. Klieneberger-Nobel[7]. The L form was grown in a liquid medium[8] for 24 hr. at 30° C. with mechanical agitation. After centrifuging the culture the pellets were fixed for 2 hr. at 37° C. in osmic tetroxide vapour. Dehydration and embedding in a methacrylate mixture was performed in the usual way. After polymerization sectioning was carried out on a Sjöstrand ultramicrotome. An RCA type *EMU-2D* instrument was used for the electron microscopy.

The sections revealed spherical or ellipsoidal forms varying widely in size and internal structure. In some preparations vesicles with a rather complex structure were observed (Fig. 1). These vesicles were bounded by an envelope in which sometimes two layers could be distinguished. The layers seemed to consist of chains of minute granules. Moreover, the envelopes surrounded a large number of small bodies of rather uniform size. Similar bodies were found also outside the complex structures.

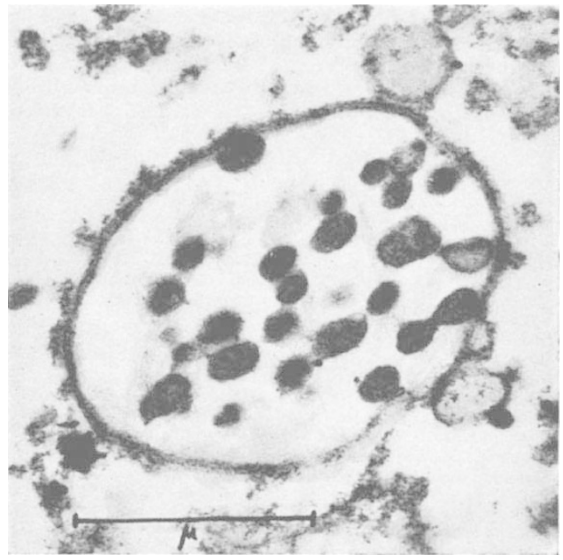

Fig. 1. Thin section of a composite structure found in an electron microscopical preparation of a *Proteus* L form

We are of the opinion that the small bodies found either inside the vesicular structures or free in the medium represent well-defined structural elements and not merely protoplasmic fragments. Similar observations, made using the light microscope[2–4], thus seem to be confirmed. However, it cannot be ascertained by electron microscopy alone whether or not the small bodies shown in Fig. 1 represent stages in the life-cycle of the L form studied.

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Development of *Micrococcus lysodeikticus* Resistant to Lysozyme

Cytochrome *c*-like compounds have been found to be proximate to rat kidney lysozyme in fractions derived from ion-exchange chromatography on 'Amberlite *IRC*-50' resin[1]. This led to experiments designed to test the effects of cytochrome *c* upon bacterial lysis by lysozyme. Although under certain conditions oxidized cytochrome *c* was found to increase the initial rate of lysis by lysozyme, the pigment alone had no antibacterial activity *in vitro*. In testing the potential activity of cytochrome *in vivo*, *M. lysodeikticus* was grown in the presence of lysozyme in very low concentrations (0·1 μgm./ml.) as a control. In this way the production of resistant cells was first observed.

Cultures of *M. lysodeikticus* were originally obtained from the Rutgers Institute of Microbiology and carried