would be in consort with the range of antigenicity due to differences of the surface mosaic and could account (excluding strains that have been lysogenized) for bacteriophage susceptibility as being related to the detailed structure of the cell wall[6]. The results presented have been reproducible to ± 0·05 log, and it is conceivable that with a modification of the testing procedure to increase sensitivity and reproducibility, lysostaphin could be used to supplement bacteriophage typing and serotyping in epidemiological studies[7].

This work was supported by the U.S. Air Force Systems Command.

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Microbiological Oxidation of Cyclic Ketones

Ali Khan, Hall and Robinson[1] have reported that when a Gram-negative bacterium (probably *Pseudomonas* sp.) was grown in an aqueous suspension of *n*-octane plus mineral salts, dioic acids (mainly suberic acid) were recovered from the medium. The activity of this bacterium (culture kindly presented by Dr. A. N. Hall) and of ten other species of bacteria on cyclic ketones has been investigated. There appears to be no previous report of microbiological oxidation of cyclic ketones. In his limited survey, Baldacci[2] could not detect any microbial activity on *cyclo*hexanone.

Ten species of bacteria which had been previously reported to oxidize hydrocarbons[3–5] were obtained from the National Collection of Industrial Bacteria and, together with the bacterium of Ali Khan *et al.*, were cultured at 30° C in an aqueous medium containing 1 per cent w/v 2-heptyl*cyclo*pentanone, plus mineral salts (0·5 per cent ammonium nitrate, 0·1 per cent magnesium sulphate, 0·02 per cent calcium chloride, 0·01 per cent ferric nitrate, and 0·1 M phosphate buffer to *p*H 7·0). After 5 days, the culture solutions were exhaustively extracted with diethyl ether after acidification, and the extracts were subjected to gas-liquid chromatography. All showed varying amounts of residual heptyl*cyclo*pentanone. The culture solutions of *Pseudomonas oleovorans* 6576, *Ps. aeruginosa* 8295, *Ps. fluorescens* 8027, *Ps. methanica* 9133 and the bacterium of Ali Khan *et al.* also contained 0·2–0·5 mg/ml. of the lactone of 5-hydroxydodecanoic acid, the first-named giving the highest yield of lactone. The lactone was identified before and after conversion to the free acid and methylation, by comparison with authentic samples of the lactone and of 5-hydroxydodecanoyl methyl ester on gas-liquid chromatographic analysis. The ethereal extracts of the culture solutions of *Ps. aeruginosa* 950 and 5940, *Ps. rubescens* 8768, *Vibrio oleo* 8250 and *Arthrobacter simplex* 8929 contained only heptyl*cyclo*pentanone. A microbiological synthesis of such lactones has been reported by Tuynenburg Muys *et al.*[6]. These authors found that the microbiological reduction of racemic keto-acids could produce optically active lactones. Therefore, the 2-heptyl*cyclo*pentanone medium of *Ps. oleovorans* was examined after culture. It was found to be laevo-rotatory. As the cyclic ketone was racemic, this activity was ascribed to the lactone. Assuming all the lactone produced was optically active, $[\alpha]_D = -36{\cdot}6°$.

It was found that *Ps. oleovorans*, *Ps. fluorescens* and the bacterium of Ali Khan *et al.* would also oxidize 2-pentyl*cyclo*pentanone, giving the lactone of 5-hydroxydecanoic acid, and would oxidize *cyclo*pentanone to glutaric acid. The last-mentioned product was identified only after methylation.

Of the total ketone initially present, less than 5 per cent was recovered as partially oxidized product, and between 60 and 70 per cent of the cyclic ketone was recovered unmodified.

Thus two or perhaps three species of bacteria, of which one is already known to promote oxidation of an *n*-alkane to dioic acids, oxidize *cyclo*pentanone to glutaric acid, a dioic acid with the same number of carbon atoms. This process involves ring cleavage, which has not been demonstrated previously with these bacteria. When asymmetric molecules of alkyl-substituted *cyclo*pentanones are offered, cleavage occurs at the most labile bond in the ring, between the two substituted carbon atoms. However, in this case, the presence of the alkyl side-chain prevents more complete oxidation to give a dioic acid. The reaction goes no further than the production of a hydroxy acid, which then lactonizes. This is further evidence to add to that of Kester and Foster[7] that microbiological oxidation of alkyl compounds to give dioic acids proceeds by way of hydroxy acid intermediates.

I thank Mr. E. Taylor for performing the polarimetry examination.

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CYTOLOGY

Diffuse Centromeres in a Dicotyledonous Plant

A CYTOLOGICAL search for a sex chromosome mechanism in *Myristica fragrans*, the common nutmeg tree, has revealed some meiotic peculiarities. Mitotic metaphase counts in this admittedly unfavourable material usually gave a number of 44 small, more or less isodiametric elements. This is at variance with the results of Simmonds[1], who found 42 chromosomes.

At early first meiotic metaphase in a male-only flowering tree from Trinidad, I counted 22 strongly contracted chromosome bodies. These bivalents, in polar view as well as in side view, were often slightly sub-divided into two halves, thus in end view showing a quadripartite structure (Fig. 1). In late first metaphase, the configurations loosened up, mainly perpendicular to the metaphase plane, into what appeared to be four slightly interconnected chromatids. By releasing the connexions across the equatorial plane, the bivalents divided into two halves, each presumably consisting of two interconnected short chromatids, parallel to the equatorial plane. At second anaphase the chromosome bodies split into two short rods. Each attempt to localize centromeres with the help of meiotic behaviour failed. This suggested centric activity lacking localized character. Configurations really show a close similarity to those of *Luzula campestris*, as described by Brown[2].

As pointed out by Hughes-Schrader and Ris[3], induced fragments of chromosomes with such centric activity will perpetuate themselves through many cell generations. This is in contrast to the behaviour of acentric fragments of chromosomes with localized centromeres, which are