Table 2. Viability and productivity of morphologically normal and deformed adults of *T. castaneum* previously reared in flour containing 0.1 ppm of either methoprene or hydroprene

IGR	Test cross* (♂ × Q)	Number set up	Number viable	Number progeny (m̄)
Methoprene	D × D	30	0	-
Hydroprene	D × D	30	6	9.1
	N × N	30	30	156.1

* N, Morphologically normal; D, morphologically deformed.

prene was prepared to give concentrations of 0.001, 0.01 and 0.1 ppm; flour treated only with acetone (the solvent used for these IGRs) served as a control[9].

The sterilising activity of the 2 IGRs was assessed on the basis of the number of progeny produced from crosses of morphologically normal or deformed adults previously reared in flour containing methoprene or hydroprene, with adults reared in untreated flour. Adults for all crosses were reared from eggs (< 24-h-old) placed into either IGR treated or untreated flour media in 240 ml glass jars. Periodically, pupae were removed and sexed, to provide supplies of virgin adults. Each virgin adult (< 2-days-old) from the treated medium was examined for deformity and then placed with a normal virgin adult of the opposite sex in a 75 ml plastic vial containing 5 g of untreated medium. As many pairs as possible were set up for each cross. At weekly intervals for a period of 4 weeks, the adults were transferred to fresh, untreated flour, and the vials of used flour incubated for progeny.

Viability was significantly reduced in all male adults previously reared in flour containing 0.1 ppm methoprene, and in only the deformed males reared in flour with 0.01 and 0.1 ppm hydroprene (table 1). The viability of morphologically deformed female adults reared in either methoprene or hydroprene flour was markedly reduced at all IGR concentrations, whereas that of normal female adults was comparable to control viability. Productivity of female adults reared from methoprene flour was comparable to that of the controls, and in the males a reduction occurred only in those reared in flour containing 0.1 ppm methoprene. When reared from hydroprene flour, the productivity of all adults was comparable to that of the controls except in deformed females reared at 0.1 ppm, which was significantly lower. Interestingly, additional tests (table 2) revealed that in crosses between deformed × deformed, only a small number of the crosses were viable, and these produced relatively few progeny. In the normal × normal cross of adults reared in IGR treated flour there was no marked change in either viability or productivity compared with the back cross to the controls or the controls themselves (table 2).

These sterilising effects of methoprene and hydroprene on *T. castaneum* have not been reported before although sterilising effects in *Trogoderma granarium* (Everts) have been observed for a juvenile hormone analogue when applied topically to the pupal stage[10]. The manner in which these IGRs interfere with the reproductive processes is not known. Nonetheless, the fact that both methoprene and hydroprene possess sterilising activity further enhances their potential as commodity protectants.

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Chain-proteins of the vertebrate lens

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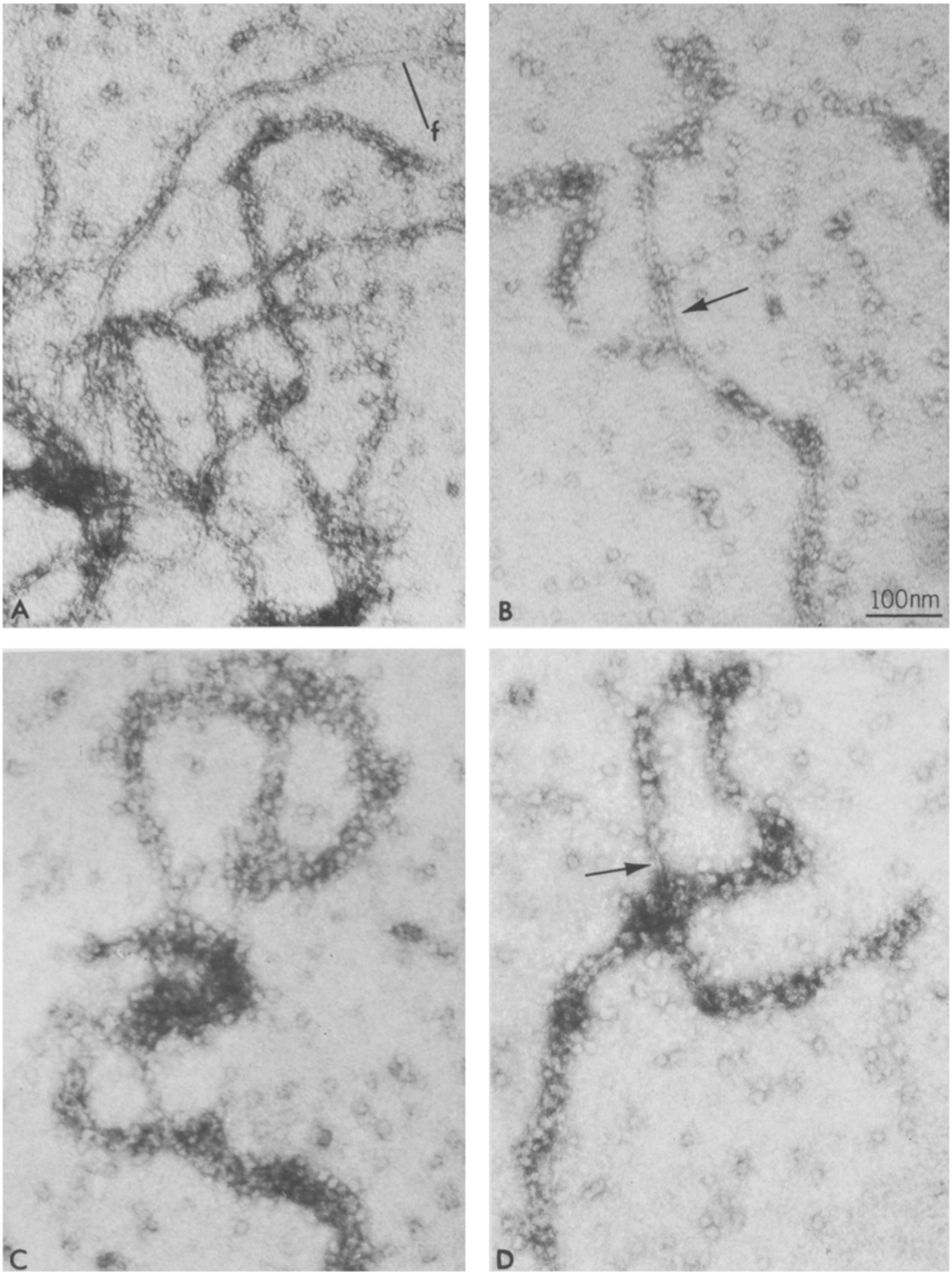
Summary. Some lens proteins exist in a chain-like form in the vertebrate lens fibre cells. They consist of globular proteins arranged on a filamentous backbone.

It has previously been reported that the water-insoluble intracellular matrix of the chick lens contains proteins arranged in the form of chains of particles (12–15 nm in diameter) aligned on a filamentous backbone (7–9 nm in diameter)[2,3]. Intermediate filaments (10–12 nm in diameter) are also found in the matrix material of the lens[2]. Chain-like organization of cytoplasmic lens protein has also been described for the bovine lens[4,5]. This study reports on the presence of chain-proteins in a variety of vertebrate lenses.

Lenses were obtained form the following adult species immediately after death: New Zealand white rabbit, Sprague-Dawley rat, Swiss-Webster mice, White Leghorn chicken, American turkey, and frog *(Xenopus laevis)*. Noncataractous adult human lenses were obtained within 36 h of death. The lenses were dissected free of capsule and epithelial cells and the fibre mass homogenized at 4 °C with 9 vol. of a 0.05 M Tris-HCl, 0.005 M-$MgCl_2$, pH 7.4 solution, containing 0.01 M β-mercapthethanol. Each homogenate was centrifuged at 37,000 × g for 20 min. The supernatant (water-soluble fraction) was collected and the water-insoluble pellet resuspended in the buffer. The water-soluble and water-insoluble fractions were examined by negative stain[2]. Epithelial cells were removed from the lens capsule and fractionated as described above.

Negative stain showed the presence of chain-proteins in the fibre cells of all species examined, but not in the epithelial cells. Such chains were noted in the water-soluble and water-insoluble fractions of the fibre cells. In the water-soluble fraction the chains were often seen as single free elements, whereas in the water-insoluble fraction, where the chains predominate, they were more frequent as large



Negative stain analysis of chain-proteins found in the 37,000 × g supernatant of lens homogenates. *A* Frog lens, *B* rat lens, *C* rabbit lens, *D* adult normal human lens. An intermediate size filament (f) is shown in the frog lens preparation. The filamentous backbone of the chain-proteins is indicated by the arrows. × 120,000.

aggregates. In the mammalian lenses the chains consist of particles of diameter 15–20 nm, while in the bird and frog lenses the particles were of the order of 12–15 nm. A filamentous backbone (6–8 nm in diameter) was observed in all lenses examined. The clustering of particles along the chain usually obscures the backbone, which is best seen in areas free of particles (figure, B). The size of the backbone is consistent with that of actin.

These chain-proteins can be pelleted from the 37,000 × g water-soluble fraction of the lens by centrifugation at 78,000 g for 2 h[2], and represent elements of the intracellular matrix not pelleted by centrifugation of the lens homogenate at 37,000 × g[6]. The chain-proteins are characteristic of the fibre cell, and are not found in the epithelial cell. Previous studies on the chick suggest that crystallin and non-crystallin proteins are present in the chains[6].

It has been suggested that the chain-proteins represent crystallins that have formed a stable association with microfilaments in situ[5]. It appears that with epithelial cell differentiation into fibre cells, lens crystallins became stabilized by association with other proteins into unique morphological structures, forming a cytoskeletal for the cell. The relationship of this structural arrangement to cataract formation remains to be elucidated.

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Antimicrobial activity of metal derivatives of sulfonamides

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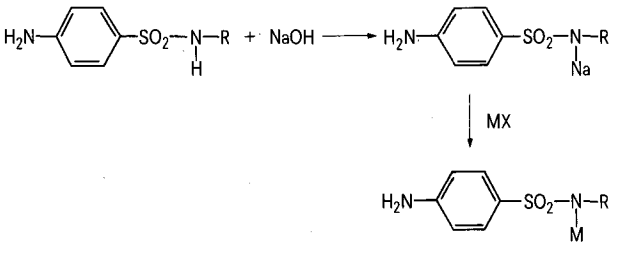
Summary. Antimicrobial activities of a series of metal derivatives of some sulfa drugs were examined. Such metal derivatives showed higher antimicrobial activity than the parent sulfa drugs, and among the metals, gold derivatives are seen to be the most effective.

Sulfonamides have been used for microbial infections, but because of their acquiring resistance and solubility problems, the molecules have been modified for more favorable drugs. Pharmacology of the basic structure of the molecule is well defined, and the molecular site to be modified is limited to the N^1-position. Modification at the aromatic amino group will lead to non-antimicrobial molecules.

In the present study, a series of metal derivatives of some sulfa drugs were made, and their antimicrobial activities were tested. Synthesis and antimicrobial properties of the metal derivatives are described briefly in this note.

Synthesis. General procedures are as follows:



Metal derivatives of sulfonamides and their MIC's for various test bacteria

Test organisms	SD	AuSD	AgSD	ZnSD	MnSD	MgSD	SM	AuSM	AgSM	SI	AuSI	AgSI
Staphylococcus aureus Rosenbach FDA-209-P JC-1	100	50	50	> 100	> 100	> 100	> 100	> 100	25	> 100	> 100	100
Staphylococcus aureus Smith S-424	> 100	50	50	> 100	> 100	> 100	> 100	> 100	100	> 100	> 100	100
Streptomyces faecalis ATCC 8043	> 100	12.5	25	> 100	> 100	> 100	> 100	> 100	50	> 100	> 100	100
Bacillus subtilis ATCC 6633	100	12.5	50	25	> 100	50	> 12.5	25	25	25	25	100
Escherichia coli NIHJ JC-2	> 100	6.25	12.5	50	> 100	50	100	50	50	100	50	50
Escherichia coli K-12 IAM 1264	100	6.25	12.5	100	> 100	100	> 25	50	25	25	50	50
Salmonella typhi O-901-W	100	6.25	12.5	50	> 100	100	> 100	50	25	> 100	50	50
Salmonella enteritidis No. 11 (Toukai)	> 100	6.25	25	> 100	> 100	> 100	6.25	50	50	100	50	100
Shigella dysenteriae Shigae	25	6.25	12.5	25	> 100	25	25	25	6.25	50	12.5	12.5
Klebsiella pneumoniae	25	6.25	25	50	> 100	50	25	50	100	25	50	100
Proteus morganii Kono	25	6.25	12.5	25	> 100	50	> 100	25	25	25	12.5	25
Proteus vulgaris OX-19	100	6.25	12.5	50	> 100	50	> 100	50	25	25	25	50
Proteus species C 73-23	> 100	3.13	12.5	> 100	> 100	> 100	> 100	50	25	> 100	25	50
Serratia species No. 1	> 100	6.25	25	> 100	> 100	> 100	> 100	50	100	> 100	50	100
Serratia species No. 2	> 100	12.5	25	> 100	> 100	> 100	> 100	50	50	> 100	50	100
Pseudomonas aeruginosa IAM-1007	> 100	12.5	12.5	> 100	> 100	> 100	> 100	> 100	50	> 100	> 100	100
Pseudomonas aeruginosa E-2	> 100	12.5	12.5	> 100	> 100	> 100	> 100	100	50	> 100	> 100	100
Vulgaris parahaemolyticus K-5	100	6.25	12.5	100	100	100	50	25	12.5	> 100	> 100	12.5

Metals used are Au, Ag, Zn, Mn and Mg. Legands (sulfonamides) are: SD, sulfadiazine; SM, sulfamethizole; SI, sulfisomidine.