

granules which they do not think are mitochondria and (3) small 'true' mitochondria". Our papers show, however, that the small granular and the long thread-like mitochondria represent, in our opinion, two physiological states of the chondriome.

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Leptospirosis in Piggery Workers

It is generally believed that human cases of the type of leptospirosis known as canicola fever arise through man's contact with infected dogs, the dog being the only natural host and carrier of the infecting organism, *Leptospira canicola*. The infection in the dog may lead to a clinically recognizable disease with acute renal symptoms leading to the death of the animal; but a milder condition may occur and may escape detection. All degrees of infection give rise to the carrier state, which may persist for months or even years, during which time the leptospiras are expelled in the urine, which thereby constitutes a potential source of infection to other dogs and man.

Although the probable source of many human cases of canicola fever has been traced directly or indirectly to dogs, there have been instances where no connexion between patient and dog could be found. Four examples of such cases gave rise to an investigation into a possible alternative source of infection, the results of which present some interesting features. The patients concerned in these four cases, which arose during the years 1950-55, were all persons employed in piggeries situated within the City of Edinburgh. It seemed unlikely that the farm dogs were responsible for the infection, since they appeared healthy, and sera obtained from them failed to agglutinate *Leptospira canicola* to more than a low titre. In one of the piggeries where a single case had occurred, it was possible to obtain specimens of blood from all of the other human contacts living and working there, namely, three men and two women. Agglutination tests show that in four of these bloods, antibodies to *Leptospira canicola* were present in high titre—1/1,000 to 1/10,000. The one person whose blood failed to show any response to the agglutination test was the young wife, who was the only member of the household having no contact with the pigs.

Blood samples were taken from some of the pigs selected at random at the time of slaughter. Of seventy-six such specimens forty-six were found to have antibodies to *Leptospira canicola* giving titres of at least 1/100 (fifteen were 1/1,000 to 1/10,000). *Leptospira icterhaemorrhagiae* was agglutinated to a lesser degree. No antibodies to *Leptospira pomona*, *Leptospira hyos* or *Leptospira biflexa* were found in any of the samples tested.

These results indicate that pigs may become infected with a species of *Leptospira* closely related to, if not identical with, *Leptospira canicola*. If the responsible organism is indeed *Leptospira canicola*, the infection may have been introduced into the piggery in the first place by an infected dog, and once established there the infection has continued to spread directly from pig to pig.

To investigate the infectivity-rate among pig workers, blood specimens were obtained from forty-

seven workers employed in twelve different piggeries (these figures include those already mentioned). Agglutination tests showed that nineteen (that is, 40 per cent) contained a high antibody content to *Leptospira canicola*—1/100 to 1/10,000. *Leptospira icterhaemorrhagiae* was agglutinated to a lesser degree.

An explanation of this apparently high infectivity-rate may be that the workers' hands are frequently contaminated with infected urine. The conditions of their work seem to predispose them to cuts and abrasions which do not heal readily. These injuries and the fact that the hands are often wet from frequent submersion in water will allow the leptospira to penetrate into the skin readily.

Further inquiry regarding the health of those workers whose bloods were positive to *Leptospira canicola* revealed that during the past five years, five of them had suffered from an illness diagnosed as canicola fever and, of the remaining fourteen, five had a history suggestive of the disease. No marked symptoms of disease in the pig have been observed, but leptospira have been seen in the urine.

Further work is in progress, and it is hoped that the results of the complete investigation will be published in detail elsewhere at an early date.

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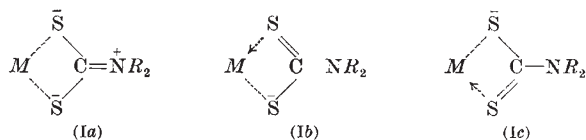
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Electronic Structures of Dithiocarbamates and Xanthates

It has long been realized that the canonical form (Ia) may contribute significantly to the structure of the dithiocarbamate residue in its complex compounds, $M(S_2CNR_2)_n$, where M is a metal atom and n its valency, but no physical or chemical evidence for this has yet been advanced.



Recently, van der Kerk and his co-workers^{1,2} have suggested that (Ia) contributes strongly to the structure of methyl derivatives ($R = Me$) but that its importance decreases rapidly on ascending the homologous series. They consider the dipolar form (Ia) to be responsible for the antifungal and plant-growth promoting properties of certain derivatives of NN-dimethyldithiocarbamic acid. Since the biological activities of the NN-dialkyldithiocarbamate derivatives fall rapidly on ascending the homologous series, they conclude that the contribution of the form (Ia) to the structures also falls rapidly. At the time of their later publication², we had examined the infra-red spectra of a number of complex NN-dimethyl- and NN-diethyldithiocarbamates and interpreted the so-called 'thioureide ion' band³ in terms of the canonical form (Ia). This band had previously been identified in many thioureides but not satisfactorily interpreted^{3,4}. Van der Kerk's publication