SALMONELLOSIS

Salmonellosis has emerged as a world problem of great complexity. The strain-diversity within each serotype has necessitated the development of special methods of strain identification for epidemiological purposes. Bacteriophage typing gives the most reliable results and the maximum amount of strain differentiation. The discovery of phage-mediated transduction introduced the possibility of detailed genetic analysis. Antigenicities and antigenic variations of salmonella were re-examined with transductional techniques. Schemes on the genetic determination of antigenicity and on the cellular regulatory system of gene expression have been constructed. An evolutionary pattern of salmonella serotypes has been postulated and it is based on the observation that new types may proceed by the loss, gain or modification of the ability to add a sugar to the polysaccharide skeleton of the germ's microcapsule. This happens stepwise by either phage conversion or mutation of antigen determinants.

Since the identification of S. typhosa in 1881, the number of salmonellae has increased continuously. During the period 1881-1914 only twelve types were identified; in 1927 twenty-four and in 1934 forty-four were listed. At present the total of described salmonella types surmounts 1,100, but this constitutes only 12% of the roughly estimated 9,000 types which are theoretically possible according to the mathematically feasible gene-combinations.

Out of the 1,100 types, only 5% (i.e. 55) can be designated as frequent salmonellae. They vary considerably from region to region and allow the establishment of "regional salmonella spectra". At the Department of Medical Microbiology of the University of Stellenbosch at the Karl Bremer Hospital, the salmonella types most commonly isolated from human beings of the South Western Cape Province, for the period 1960-1967, were:

1. S. johannesburg 6. S. newport
2. S. typhimurium 7. S. kentucky
3. S. typhi 8. S. minnesota
4. S. anatum 9. S. bovis-morbificans
5. S. reading 10. S. irumu

14. S. vele

Another 103 types occurred only sporadically. This 'local spectrum' differs considerably from the usual spectrum of the northern hemisphere, where S. paratyphi B still dominates, and from the 'Asian spectrum' with a considerable amount of S. paratyphi A.

In addition to antigenic formulae, salmonella types have been given names. The names are used in daily practice, since it seems to be easier for most investigators to remember a name instead of a numeric formula. Often very little is known about the origin and meaning of these names. In 1933 the Salmonella Subcommittee made international recommendations for the naming, based on the rules of botanical nomenclature. The finder of a new type may suggest a name to the International Salmonella Centre at the Pasteur Institute, Paris, after confirmation that the type in question is in fact a new one. The names should be short and should be related to the place of origin and not to the place of isolation. In the absence of suitable geographical names, some types were named after virtues such as S. charity, S. verity and S. patience. Two types isolated from South African frozen whole egg were named in England after the composer Sir A. Sullivan and his librettist W. S. Gilbert: S. ank is derived from the initial letters of 'address not known'. Sometimes artificial names are formed, such as S. ceyco from ceylonese coconut, S. chinovum from chinese and ovum, S. anjo from animal food. Types like S. aderike, S. agbeni, S. aminatu, S. london and S. thompson are named after patients. Some types bear the names of hospitals: S. lindenburg, S. bled-dam, S. blockley, S. jericho, S. sankt-georg, S. virchow.

The question, 'which species are pathogenic for man?' is difficult to answer, since cultures are isolated from clinically ill patients and also from apparently healthy carriers. From the 1,100 described types, about 750 have been isolated from human beings, from food and from animals. Anyone dealing with salmonellae should regard all the salmonella types as pathogenic for man, animals, or both, as long as evidence to the contrary does not exist.

CONJUNCTIVAL MYIASIS DUE TO OESTRUS OVIS L.*

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In 1960 du Toit and Meyer described the case of a member of the Veterinary Research Institute at Onderstepoort who, while walking within the grounds of the Institute, suddenly experienced the feeling of a moving object under the upper eyelid. On examination, a small maggot-like larva was discovered and removed. Investigation proved this larva to be a typical, first-stage larva of Oestrus ovis.

Ophthalmomyiasis has been frequently reported from Central America, East Europe and Africa, but rarely in West Europe and Asia. Affection of man is a common occurrence in countries bordering the Mediterranean sea, e.g. Algeria. Cases have been recorded in Southern Oranais, in Switzerland, America, India and Sardinia. The first case of human infestation with Oestrus ovis found in the Republic of South Africa appears to be that of du Toit and Meyer.

CASE REPORT

I recently removed a larva from the eye of a young female laboratory technician who had had no contact what-
ever with sheep and who gave a history of feeling some flying object hitting her in the eye while she was on the beach at a popular local seaside resort. Her own diagnosis was that a bit of sand or sea-shell had blown into the eye. Intense irritation developed and when I saw her 24 hours later, a small wormlike object was discovered, swimming rapidly under the conjunctiva of the upper lid. I attempted to seize this with a pair of forceps but the larva escaped into the inferior fornix and I was then able to remove it quite easily with a cotton-wool-tipped probe. This specimen was sent by Dr. R. Schapera to the Research Department of the SAIMR and was identified as a larva of *Oestrus ovis*.

The subsequent history has been quite uneventful. Knowing that the normal habitat of the larva in sheep is the nose, we had the patient fully examined by an ENT surgeon, who found nothing abnormal. In point of fact she had been complaining of epiphora and a running nose since her visit to me, but these symptoms soon cleared up, and in the following 2 years of observation she has had no further trouble.

**DISCUSSION**

Ocular myiasis which is divided into ophthalmomyiasis externa where the parasite is present in the conjunctival sac (conjunctival myiasis) and ophthalmomyiasis interna where it is present in the orbit (destructive myiasis), was first recorded by Kayser, but the life history of the parasite and its relationship to man was worked out by Portchinsky.

In the suborder *Cyclorrapha* there are 3 families of medical importance: Muscidae, Calliphoridae and Oestridae. The last is subdivided into the genera Oestrus, Dermatobia and Hypoderma. In this paper only *Oestrus ovis* will be discussed. The adult female of *Oestrus ovis*, which is about half the size of a honeybee, which it resembles, normally deposits living young while on the wing, by striking the nostril of the victim or by dashing into the eye. From this site, the larvae, usually multiple, finally find their way to the sinuses where they grow and later fall to the ground to complete the cycle. The usual victim is the sheep and death occasionally results. The larvae may be deposited in the eyes of humans or dogs and other domestic animals. They may remain alive for up to 10 days but cannot develop further, because these are accidental hosts. In man the larvae may also be introduced indirectly when the face is washed in water contaminated with the larvae, but the usual story is that the patient is struck in the eye by the fly.

**Symptoms and Signs**

These are similar to those of acute or subacute conjunctivitis. Itching, a burning sensation, lacrimation and photophobia and sometimes pain are common complaints. The bulbar conjunctiva is red and thick. Occasionally the lids are swollen and a sticky white membrane is seen in the fornix. Close examination shows the maggots, greyish-white worm-like creatures, crawling on the conjunctiva by means of alternate contraction. Because the maggot clings to the conjunctiva by means of its powerful hooklets, it is difficult to remove and should be rendered immobile with cocaine or a similar local anaesthetic.

Sometimes severe signs may occur, e.g. Herms described a case in which corneal ulceration and necrosis developed.

The number of parasites found in the eye is usually about 10. Kayser found 5, and Hedges and Humphries extracted 50 in one case. The 3 cases of Liu-Ying Chi et al. had 6, 8 and 12 maggots, respectively.

**REFERENCES**

4. Hedges and Humphries extracted 50 in one case. The 3 cases of Liu-Ying Chi et al. had 6, 8 and 12 maggots, respectively.

**SUMMARY**

A case of human ocular infestation with *Oestrus ovis* in a young laboratory assistant is presented. She was affected while on the beach of a popular seaside resort. No complications occurred after removal of the larva. This is the second case described in the South African literature.

**Fig. 1. Larva of *Oestrus ovis***

After removal, recovery is rapid. Ocular myiasis in South Africa is probably more common than one would gather from the literature. This is only the second reported instance. It is rather interesting that this patient had had no contact whatever with sheep. Hedges and Humphries have commented that infection may be more common than one expects because the patients may not seek advice. Du Toit has previously shown that the species is widespread in this country and has suggested the importance of biomicroscopic examination of the fornix in all irritated eyes.