than washing with soap and water in the numbers of *Staphylococcus aureus* on the hands of nurses in a skin hospital. Alcohol and alcoholic chlorhexidine were well tolerated and much less expensive than antiseptic detergent preparations. A large residual antimicrobial effect was found on the skin after disinfection with alcoholic chlorhexidine.

Among other agents tested 2% Irgasan DP 300 (2, 4, 4'-trichloro 2' hydroxydiphenyl ether) in a detergent base had a negligible immediate effect but a cumulative effect on repeated use almost as great as that of a 4% chlorhexidine detergent preparation.

When rubber gloves were worn for three hours after disinfection of the hands with various antimicrobial preparations (including 95% ethyl and isopropyl alcohols), the numbers of bacteria on the skin, expressed as a percentage of the pre-disinfection counts, were lower than the skin bacterial counts obtained immediately after disinfection.

Laboratory Autoclaves—Dangers and Safety

E. H. GILLESPIE AND S. A. GIBBONS (*Public Health Laboratory, Northern General Hospital, Sheffield*) Using a laboratory downward displacement vertical autoclave, the risk of failure to sterilize discard buckets has been demonstrated. The use of proper temperature and time controls can prevent this risk.

Wire baskets or containers with perforated sides are better than solid containers.

For sterilizing media in bottles it is safer to use cotton wool plugs or very loose caps.

When using sealed bottles one should not use a simple downward displacement autoclave but, if used, strict monitoring of temperatures and times is essential both in the heating up stage and, especially, in the cooling stage.

The temperatures in bottles are slow to rise. Cooling is very slow so that there could be a danger of attempting to remove bottles when the fluid temperature is well in excess of 80°C as the bottles could explode by thermal shock due to the high internal pressure.

It is suggested that all laboratory autoclaves should have a load temperature simulator or similar device to control automatically the temperature of the loading during the cycle. For fluid media sterilization, it is suggested that, in

addition to a simulator, one should consider the use of accelerated cooling to reduce damage to the media and to bring the temperature down rapidly and thus return the internal pressure in the bottles to a safe level. The opening of the sterilizer door or lid should be automatically controlled by the load temperature simulator.

In the meantime bacteriologists should monitor the times and temperatures in different loads by the use of thermocouples and thereby draw up a schedule for each type of cycle.

Hepatitis B Antigen Subtypes in North-West England and North Wales

HELEN T. GREEN AND G. C. TURNER (*Public Health Laboratory, Fazakerley Hospital, Liverpool*) Serum samples collected between 1969 and 1974 from 361 HBsAg-positive patients and blood donors in North-West England and North Wales were tested for subtyping reactions by an immunodiffusion method using anti-*ad* and anti-*ay* sera; 318 sera were subtypable by this method including two of the uncommon subtype *a*.

Among symptomless carriers of HBsAg, subtype *ad* was predominant and accounted for 76%; 23% were of subtype *ay*. In patients with chronic liver disease the subtypes were more evenly distributed with *ad* 55% and *ay* 45%. Among patients with acute hepatitis the distribution of subtypes in post-transfusion cases was *ad* 50%, *ay* 47%, and patients without a history of parenteral exposure *ad* 46%, *ay* 54%. On the other hand, *ay* predominated among patients with hepatitis who admitted an association with drugs (*ad* 5%, *ay* 95%) and those with a history of injections or tattoos (*ad* 15%, *ay* 85%). All cases of hepatitis among the staff of a haemodialysis unit were *ay*.

These findings are similar to those reported from other parts of North-West Europe and North America. When both *ad* and *ay* subtypes are present in the community they evidently differ in that *ay* causes acute hepatitis more readily than *ad*, and this difference is most pronounced when transmission is by parenteral routes associated with small amounts of blood.

Hepatitis B Infection in Families of Hepatitis B Antigen Carriers

D. M. JONES, JUDITH M. HELLAWELL, AND

I. W. DYMCK (*Department of Bacteriology, Withington Hospital, Manchester*) To investigate the degree of transmission of infection from healthy asymptomatic carriers of hepatitis B antigen (HBsAg) the family contacts of 41 such carriers have been studied. In 23 of the 41 families there were no other individuals who were either HBsAg positive or had antibody to the antigen. Comparing the 18 families where members other than the index carrier were either antigen or antibody positive, this could not be related to the titre of the antigen in the index carrier to the sub-type of the antigen, or to the presence of cryptic liver disease. The index carriers showed the usual male predominance that is found amongst HBsAg carriers (32 male, 9 female) and this distribution itself reduces the chance of observing the effects of maternal transmission of virus to children in this group of carriers. Altogether 93 blood relatives (parents, siblings, and offspring) were tested, and nine of these were HBsAg positive and 15 were antibody positive (*ie*, 26% had evidence of infection at some time). The sexual partners (5 male, 24 female) of 29 index carriers were tested; none of these was HBsAg positive but seven (24%) had antibody (25% female spouses, 20% male spouses). There was therefore no indication that the infection was spread any more by sexual contact than by other household contact, and no indication that the sex of the carrier was particularly relevant in the transmission of infection to the spouse. The family contacts who were found to be HBsAg positive and presumably also carriers were all blood relatives. This finding is in agreement with the suggestion that there may be a genetic susceptibility to becoming a carrier of HBsAg. There were 45 children of the index carriers, and of these 11 were female and 34 male. This remarkable male preponderance ($P = 0.003$) may be another manifestation of a genetic trait and was not found in a parallel group of families where there were no carriers but where one parent was HBsAg antibody positive.

SYMPOSIUM ON SOME MEDICAL HAZARDS OF COUNTRY LIFE

Farmer's Lung

D. W. R. MACKENZIE (*Mycological Reference Laboratory, School of Hygiene and Tropical Medicine, London*) Farmer's

lung is a form of respiratory allergy resulting from the inhalation of aerosols from mouldy hay. Symptoms are attributable to defects in ventilatory diffusion and appear in sensitized subjects four to six hours after exposure.

The major antigens are spores of *Micropolyspora faeni*, a saprophytic and thermophilic actinomycete that grows in microbially decomposing hay that has reached temperatures of 40-60°C. Both acute and chronic forms of the disease occur, and if repeated contacts with the inciting allergens occur, the lungs may become severely damaged.

The precise immunopathogenic mechanisms responsible for the condition are not yet fully understood.

Affected individuals usually have serum precipitins to *M. faeni*, and these are thought to be implicated in the disease process by complexing with inhaled antigens and activating complement in a manner similar to that occurring in the type III (Arthus) reaction.

It is not yet known if other hypersensitivity mechanisms are involved, and as yet no satisfactory animal model has been developed. There are some indications that type IV reactions might be present but the validity and significance of the data remain to be established.

Farmer's lung is diagnosed clinically, but laboratory findings may be helpful. Work at the Mycological Reference Laboratory has shown that glycopeptide antigens extracted from *M. faeni* are capable of detecting antibodies in the sera of a high proportion of cases of farmer's lung.

Leptospirosis

L. H. TURNER (*Leptospirosis Reference Laboratory (PHLS), London*) Of the 18 agglutinogenic serogroups which are now included in the Interrogans complex (parasitic, pathogenic strains) of *Leptospira*, at least seven are represented in the United Kingdom. These are Icterohaemorrhagiae, Javanica, Canicola, Ballum, Autumnalis, Australis, and Hebdomadis (Sejroe).

Animals from which strains have been isolated in the UK are rats, house mice (wild, pets, laboratory stock), dogs, cattle, pigs, and various wild mammals—field mice, voles, shrews, hedgehogs.

The initial phase of leptospiral infections is a septicaemia. Many combinations of symptoms and signs can result. None of these is pathognomonic, and the

clinical impression is often of viral rather than bacterial infection. Leptospirosis can cause syndromes resembling aseptic meningitis, encephalitis, other fevers with involvement of the nervous system (non-paralytic poliomyelitis, transverse myelitis); 'influenza' (which may be complicated by jaundice or renal involvement); enteric fever, glandular fever, atypical pneumonia, pyrexia of unknown origin, and various combinations of hepatic, renal, meningeal and haemorrhagic manifestations all of which are still referred to as Weil's disease. In fact, Landouzy (France, 1883), Weil (Germany, 1886), and Vasiliev (Russia, 1888) independently described a *syndrome* which we now know can be caused by agents other than *Leptospira*.

Diagnosis is usually by serological tests. Of various 'genus-specific' screening tests, a CF test with antigen supplied by the Reference Laboratory is conveniently used—with a battery of viral antigens—in testing sera from febrile patients. Positive and suspicious sera should then be sent to the Reference Laboratory for the microscopic agglutination test, which will often indicate the agglutinogenic serogroup to which the infecting strain belongs. Such information will indicate the likely epidemiological factors in the case.

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Psittacosis

A. D. MACRAE (*Public Health Laboratory, Nottingham*) Small numbers of human infections by the psittacosis group of organisms are reported each year in the UK. In the minority of instances these have an epidemiological association with sick birds, mainly imported psittacines but also others such as pigeons and budgerigars. Most infections however come to light because of inclusion of a psittacosis group antigen in serological screening tests for lower respiratory illness or undiagnosed pyrexia.

Though psittacosis primarily affects birds, particularly parrots, spread to man from contact is obviously possible. The aetiological rôle of the organisms, or chlamydia as they are known, was first established by Bedson and his colleagues

some 45 years ago. Despite being obligate intracellular parasites they differ from viruses in their larger size, possession of both types of nucleic acid, a cell membrane, and the capacity to multiply by binary fission.

Many avian species may be affected though such birds, being mostly healthy carriers, do not normally excrete the organisms. When subjected to adverse conditions or stress or during breeding their resistance can be lowered so that excretion recurs. Young birds exposed to infection as fledglings either succumb to the disease or become carriers in turn.

Chlamydia have also been isolated from a variety of animals so that the possibility of human infection by transfer from domestic species such as sheep or cattle must be borne in mind.

Q Fever

R. J. C. HART (*Public Health Laboratory, Exeter*) Between 50 and 60 cases of Q fever are reported annually in England and Wales. The causative organism, *Rickettsia (Coxiella) burneti*, is widely distributed in sheep and cattle but does not cause disease in them. It is present in very high concentration in the products of conception and is excreted in faeces and milk.

Infection in man is often symptomless. The commonest illness is pyrexia, sometimes with respiratory symptoms, but severe pneumonia is rare. Complications include myocarditis and endocarditis, which usually involves the aortic or mitral valves and has a poor prognosis.

Diagnosis is by complement fixation test to demonstrate a rising titre of antibody in paired sera. Phase 2 antigen reacts with antibody produced in acute infections but antibody to phase 1 is found in patients with endocarditis. Infection of cattle is shown by inoculating milk intraperitoneally into guinea pigs and demonstrating a serum antibody response in them.

A minority of patients require treatment, and tetracycline is the antibiotic of choice. It must be given for many months to patients suffering from endocarditis.

Toxoplasmosis in Town and Country

W. KWANTES (*Public Health Laboratory, Swansea*) There exist three forms of the *Toxoplasma* parasite, the crescent-shaped trophozoite, the encysted forms