All coagulase-positive staphylococci tested were sensitive to the inhibitory effect unless they were themselves "producers", whereas coagulase-negative staphylococci were unaffected. Thus the production of a zone of inhibition in an unknown staphylococcus offers a possible means of recognising pathogenic staphylococci. "Producer" strains occur infrequently; 14 were found out of 2035 consecutive strains examined—i.e., 0.7 per cent. These "producer" strains were derived mainly from chronic superficial skin lesions, mostly from elderly patients. Most of the "producer" strains are resistant to penicillin, streptomycin, tetracycline, kanamycin, framycetin, erythromycin and neomycin, but variations in this pattern occur. Of 41 "producer" strains examined, 19 belonged to phage-type 84/85 and 20 were considered untypable but, of these untypable strains, 18 gave recognisable patterns of inhibition with group-III phages. Two further untypable strains did not show inhibition with any of the international typing phages. There is no association between the phage inhibition patterns given by these untypable strains and the production of the inhibitor material. Many non-producing strains are also found in this untypable group of *Staphylococcus aureus*.

SUMMARY

A small minority of *Staphylococcus aureus* strains produce a substance referred to as "aureocin". It appears to inhibit all coagulase-positive staphylococci, unless they themselves produce this substance.

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ISOLATION OF *BORDETELLA PERTUSSIS* FROM PERNASAL SWABS STORED IN STUART'S TRANSPORT MEDIUM

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STUART (1946) described the use of a carrier medium for the diagnosis of gonococcal infections. He incorporated thioglycollate in a non-nutrient semisolid base, and thus showed that delicate organisms carried in a non-oxidising medium survived transport to the

laboratory. Overgrowth by more vigorous organisms was overcome by the non-nutrient nature of the medium.

Stuart (1946, 1959) and Stuart, Toshach and Patsula (1954) showed that this transport medium was suitable for a wide range of organisms. *Bordetella pertussis* was shown to survive on pernasal swabs transported in the medium, but lack of clinical material prevented testing of isolation rates. Their work was confirmed by Cooper (1957) and Gästrin, Kallings and Marcetic (1968).

The participation of this laboratory in the recent Public Health Laboratory Service Whooping Cough Survey (Report, 1969) presented an opportunity to assess the value of Stuart's transport medium in the isolation of *Bordetella pertussis*. Work carried out by Gästrin *et al.* on the viability of *Bordetella pertussis* suggested only a very small reduction in viable organisms in the first 48 hr. However, in order to achieve the maximum isolation rate for the purposes of the Survey, we requested that swabs should reach the laboratory on the day on which they were taken.

MATERIALS AND METHODS

In the first year of the Survey, pernasal swabs were examined from 208 families in which a case of whooping cough had been notified. General practitioners had been asked to notify all patients with paroxysmal cough; a proportion of those reported did not develop clinical whooping cough. Swabs were taken from suspected cases and pre-school siblings.

To assess whether delay in receiving specimens might reduce the isolation rate all the swabs were received in transport medium and after being plated on Oxoid charcoal agar were replaced in transport medium and left overnight at room temperature. Next day the swabs were again inoculated on plates. This investigation could be done only at the early and late stages of the Survey, when fewer specimens allowed time for duplication of culture.

RESULTS

During the first year of the Survey, 68 isolations of *Bordetella pertussis* were obtained, representing an isolation rate of 30 per cent. of the families studied. A total of 20 positive swabs were kept overnight in Stuart's medium and 19 were replated after 24 hr. In 18 instances the organism was re-isolated, although in some cases there was a small reduction in the number of colonies. In the one case that was negative, the initial isolation consisted of 6 colonies only. In the remaining case the replating was done only after 48 hr, with negative results. In three of the re-isolations, the original number of colonies ranged between 3 and 12. Confluent growth obtained originally from one swab reappeared when the swab was replated after 24 hr and again after 96 hr.

DISCUSSION

In other laboratories participating in the Survey, swabs were inoculated either directly on plates at the bedside, or placed on slants of the same medium. In these laboratories the isolation rate until October 1967 averaged approximately 25 per cent. of 5197 families investigated. The rate of isolation achieved by the use of Stuart's transport medium (30 per cent.) would seem to compare favourably with these alternative methods. The results achieved after replating the swabs suggest that, unless the organisms are present in very small numbers, a delay of up to 24 hr before examination will be unlikely to be responsible for negative findings.

SUMMARY

Difficulty in isolating *Bordetella pertussis* from suspected cases, where direct inoculation of plates is not possible or convenient, has hitherto limited the scope of the laboratory in the diagnosis of whooping cough. The results reported here suggest that Stuart's transport medium is of value in the diagnosis of whooping cough.

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AN ACID-FAST BACILLARY PHASE IN STREPTOCOCCUS MG AND CERTAIN OTHER GRAM-POSITIVE COCCI: IDENTIFICATION WITH *MYCOCOCCUS* (KRASSILNIKOV)

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PLATE XII

STREPTOCOCCUS MG is a single strain of Gram-positive coccus isolated from a case of primary atypical pneumonia (Mirick *et al.*, 1944). Its importance lies in the fact that sufferers from this mycoplasma infection develop antibodies to Streptococcus MG (Thomas *et al.*, 1945); and it has been shown that the pathogen, *Mycoplasma pneumoniae*, shares an antigenic component with the coccus (Marmion and Hers, 1963; Pease, 1963; Eaton, 1965). Streptococcus MG is not supposed to be virulent.

In the process of cultivation of Streptococcus MG in artificial media, it was observed that it possessed the morphological characters of *Mycococcus* (Krassilnikov). This organism was described by Krassilnikov (1938, cited by Breed, Murray and Smith, 1957, pp. 707-713) and subsequently by Csillag (1964); it is a Gram-positive coccus, characterised by considerable variation in size. The cocci produce rod-like projections that may develop into small mycobacteria. Other strains of unclassified Gram-positive cocci isolated from human sources were found to have the same morphology.

MATERIALS AND METHODS

The culture of Streptococcus MG employed was NCTC8037. The original observations of the phenomenon were made on a culture from this source that had been maintained freeze-dried in this department for 4 yr. To avoid suspicion of contamination, the observations and illustrations recorded in this paper were made *ab initio* upon a culture newly obtained from the National Collection of Type Cultures. The identity of this organism was checked at intervals through the project, by slide-agglutination with Burroughs Wellcome Streptococcus MG antiserum, batch K7645.

Strains of Gram-positive cocci, S47, C20 and C25, were isolated in this laboratory from human serum, in the course of a general investigation.

Nutrient agar and nutrient broth (Oxoid) were autoclaved at 121°C for 15 min. Cultures