containing so many staphylococci as perhaps to obscure streptococcus colonies in ordinary plates. Francis (1941) isolated haemolytic streptococci from 98 (32.7%) out of 300 specimens of wound pus on gentian violet blood agar, whereas on plain blood agar they were recovered from only 68 (22.7%) of these. He also observed that diphtheroids, which are often very numerous in superficial wounds, were completely inhibited. The medium used in recent studies for both these purposes—1 in 500,000 gentian violet blood agar—has been in use in my laboratory for ten years, and I have never seen any Gram-positive organism other than a streptococcus grow on it. The optimum concentration will vary somewhat with the amount of blood added, and may vary with different samples of the dye. It is important to secure a good one and verify its action: once identified it will last for years, since solutions are fairly stable and the quantity used minute; 10 grammes of the dye would furnish a dozen plates a day for over a century.

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A TUBERCULIN AND X-RAY SURVEY OF A GROUP OF ADOLESCENT BOYS WITH SPECIAL REFERENCE TO MINIATURE RADIOGRAPHY

BY

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Case-finding in tuberculosis by means of tuberculin tests and radiography in groups of individuals has been carried out on a large scale on the Continent and in America—for example, the work of Heimbeck in Norway and Opie and McPhedran in the U.S.A.—but not to the same extent in this country. The objects of such surveys have been to determine the incidence of tuberculous infection as shown by the tuberculin test, and to ascertain the presence of latent or active lesions in the lungs.

The high mortality from pulmonary tuberculosis in Wales is well known, and it is reasonable to assume that the incidence of tuberculous infection is also high. We have had no recent definite knowledge of this.

Present Survey

Boys who volunteered for the Air Training Corps had to undergo a medical examination by individual medical practitioners, and we were later given the opportunity of carrying out tuberculin tests as well as clinical and radiological examinations of their chests. Altogether 437 boys aged between 15 and 18 years, from the county boroughs of Cardiff and Swansea, were examined and radiographed by us. Tuberculin tests were carried out in 385 of them, and in 239 cases a detailed comparison was made of full-sized (15 in. by 12 in.) and miniature (52 mm. by 42 mm.) films. On clinical examination suspicious physical signs

were found in the chest in 6 cases; these included one of the two boys who were subsequently proved to have pulmonary tuberculosis.

Tuberculin Patch Test

The patch test was chosen owing to its simplicity and the speed with which it is applied. We failed to obtain the Vollmer patch (Lederle), which we had previously used, and had to substitute another preparation, which has given less well-marked reactions, as noted below. The instructions issued by the maker were carefully followed and the result was read on the fourth day.

TABLE I.—Results of Patch Tests

Total No.	Positive	Negative	Doubtful
385	141 (36.6%)	206 (53.5%)	38 (9.9%)

We consider that 36.6% of positive reactions is low for a highly urbanized area, and doubt if it is a true representation of tuberculous infection in this age group. In 1929 D'Arcy Hart (1932), using the graduated intracutaneous test, found that by the age of 16 years 70% of his controls of the hospital class in London reacted positively. In America, Hetherington, McPhedran, Landis, and Opie (1934) found that in a group of 1,081 schoolboys aged 15 to 19 years 79.6% reacted positively.

In 38 (9.9%) cases the result is given as doubtful; here the skin showed only one or two small vesicles, with no surrounding erythema, and we felt that to record these as either positive or negative would be unjustifiable.

The patch test must be considered less sensitive than the graduated Mantoux test, but we think that our low percentage of positive, and high percentage of doubtful, reactions may be partly due to the test material used.

Radiography

TABLE II.—Results of X-ray Examinations (15 in. by 12 in. Films)

Total No.	Active Pulmonary Tuberculosis	Require Further Observation	Calcified Primary Complex	Calcified Nodes	Normal Limits
437	2 (0.46%)	9 (2.06%)	5 (1.14%)	86 (19.68%)	335 (76.66%)

Only 2 (0.46%) cases were found to have active tuberculosis. This is not surprising, considering that in Great Britain it is in the subsequent age group that the disease becomes more manifest. We considered that 9 (2.06%) cases required further observation because their radiographs showed evidence of former basal pleurisy, widely diffused hilar shadows, or localized indefinite shadowing. Only in 5 (1.14%) cases were calcified primary complexes found. By "primary complex" we mean an initial tuberculous focus with involvement of the associated lymph glands.

In 86 (19.68%) we agreed that calcification of hilar glands was present. Israel, Hetherington, and Ord (1941), in America, found that out of 643 prospective nurses aged 17 to 21, 59 (9.2%) showed calcification in their x-ray films. It is interesting to note here that of the boys whose films showed hilar calcification 36% were positive to the patch test, 57% negative, and 7% doubtful.

Miniature Radiography

The technique used was that described by A. L. Cranch (1940), who was responsible for the miniature radiographic work. In 239 cases both full-sized and miniature films were taken. The tube distance for the large films was 5 feet, and for the miniatures 3 ft. 4 in., the respective exposure times being one-tenth and four-tenths of a second.

Had these factors been the same for both methods the film comparisons would have been fairer.

The miniature radiographs were carefully examined with a magnifying viewer before the large films were read. Of the miniature films, one showed active pulmonary tuberculosis (the second case of active tuberculosis did not have a miniature film taken)—the large film did not add to our knowledge of this case; 2 left us in doubt as to the condition (here the large film simply confirmed our opinion that these cases required further observation); 4 others showed minute apparently unimportant shadows, and the large films confirmed the absence of any significant lesions. We consider that as the method of miniature radiography is still in its infancy it is advisable to take full-size films where definite or doubtful lesions are seen. Careful comparison of the 239 full-size and miniature films showed that the latter did not miss anything of importance. Calcified hilar nodes were more easily recognized as such in the full-sized films: this is probably explained by the difference in the distance and exposure factors already mentioned.

The number of miniature films so far examined by us is too small for a final opinion, but we feel that the results are promising. With further technical improvement and increased interpretative experience miniature radiography will take a leading place in the campaign against tuberculosis. The speed with which the films can be taken, the reduction in filing space, and, after the initial cost, its cheapness, make this method, together with tuberculin testing, the ideal for a case-finding survey.

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ORBITAL CELLULITIS FROM GAS-PRODUCING ORGANISMS

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Orbital cellulitis caused by gas-producing organisms is a rare occurrence. I have been unable to trace any reports of it in the recent literature. In the following case the condition arose from infection of the nasal sinuses.

Case Record

A maltster aged 67 was admitted to the Tennent Institute on September 27, 1941. For five days he had complained of very severe pain in the right eye, and the lids had become grossly swollen. Small incisions had been made in the outer third of both eyelids close to the upper and lower orbital margins. Brown pus and bubbles of gas were escaping from the wounds. The smell was so foul that it was difficult to remain in the room. The proptosed globe was immobile, and purple folds of conjunctiva were overhanging the margin of the cornea, which was intact. The patient was very ill. On the day after admission right antral lavage was carried out by Mr. Fulton Christie, and was positive. This was repeated every few days over a period of six weeks. Disease of the right antrum and right ethmoidal cells was revealed by radiographs. On September 29 the anterior end of the middle turbinate was removed. A radical antral operation (Caldwell-Luc) was deferred until November 7.

when the patient was stronger. Anti-gas-gangrene serum and sulphathiazole were used from the outset, both intravenously and intramuscularly. The details are shown in the table. In

Week	Anti-gas-gangrene Serum	Sulphathiazole	Operations	Blood Picture, etc.
1st	Three preliminary doses of 277 units at 4-hourly intervals. A total of 86,000 units (i.v.) and 24,000 units (i.m.), spread over three days	23 gm. (i.v.) over 48 hours; 4 gm. (orally) 4-hourly for remainder of week, with one day's rest, total—40 gm. orally	+antral lavage three times. Turbinatectomy and curettage of ethmoids	Group B. i.v. glucose saline drip for 48 hours. W.B.C. 18,000 on 28th, W.B.C. 15,000—85% neut., 14% lymph—on 30th
2nd		4 gm. orally 4-hourly for the first 3 days, with one day's rest, followed by 1 gm. orally 4-hourly, then stopped	+antral lavage three times	Hb. 80%; R.B.C. 4,000,000; W.B.C., 9,000
3rd			+antral lavage three times	
4th			+antral lavage twice	
5th			+antral lavage twice	
6th			Radical antral operation (Caldwell-Luc)	

four days the patient was feeling better. His temperature, which had been 100° to 101°, came down to normal. The swelling of the lids subsided very slowly, and the cornea, which had developed a marginal keratitis, healed. The proptosis receded, and on November 11 it became possible to examine his fundus. The optic nerve was found to be atrophic. There was no evidence of haemorrhages or exudates.

The bacteriologist reported the presence of various cocci and a few Gram-positive bacilli from a smear and, on culture, *Staphylococcus aureus*. In a later stab culture we found a Gram-positive bacillus with filamentous forms, some of which showed swellings resembling spores. The clinical picture of gas bubbling from the wound was a fact which does not conflict with the equivocal findings of the cultures.

The right eye was completely blind, there being no perception of light. The visual acuity of the left eye was 6/6 and Jaeger 1 with a hypermetropic correction. The field of vision was full. There was no evidence of uveitis in either eye. The patient had bilateral nerve deafness from a shell-burst in 1916. The Wassermann reaction was negative. The clinical diagnosis was confirmed by Mr. T. Murray Newton.

Discussion

This case is put on record because of the extreme rarity of gas infection of the orbit. Cross (1941) reported 12 cases of gas gangrene following perforating wounds of the globe, in all of which the eye was lost and the patient recovered. In infection of the orbit the venous channels available for dissemination are numerous, and recovery is less easily understandable than in an infection limited to the globe.

There is now no paretic limitation of movement of the eyeball in the above case, and we may infer that there has been no gangrene of muscle. The surgeons of the last war (Fraser, 1919) differentiated clearly between gas infection of the wound and infective necrosis of muscle. In wound infection alone pain was less, the smell was less, the patient was usually not so gravely ill, and the outlook was better. But there would seem to be no picture of convincing constitutional signs pointing to muscle necrosis, and the proof is in surgical exposure. The decision is important to the general surgeon. Excision of affected muscle is considered essential, while exploration of gas cellulitis is needless. In the orbit this difficulty does not arise. The muscle mass is small. Further, the technical difficulty of exposing the whole muscle cone in order to inspect it convincingly would be great. The incisions would have to be very wide and would open up the fascial