Commentary

In an analysis of the relevant literature it is unnecessary to refer to the frequent accounts of osteomyelitis of ribs due to typhoid, tuberculosis, syphilis, or pyogenic infections, as in the cases here reported there was no evidence of any bone disease. With regard to conditions confined to rib cartilage, Staehelin (1940) remarks that little is to be found on this subject in the literature, and we have been unable to trace any reports in English of cases similar to the above.

It is evident that, clinically, the cases here recorded closely resemble those described by Tietze and subsequent authors, and it seems probable that they represent the same morbid entity. The association with respiratory tract infections has not previously been noted. In each case the swelling was noticed by the patient himself or by a friend, and clinically it could not be disregarded. No fever which could not be attributed to other causes was present, except in Case 4. In each instance the swelling persisted for some time after the respiratory infection had subsided, and we were unable to observe complete return to normality in any case before discharge from hospital; indeed, Case 4 still presents symptoms and signs nine months after the onset. Special investigations have failed to throw further light on the aetiology of the syndrome.

With regard to the morbid anatomy, in a description of the biopsy findings Tietze writes: "The histological examination shows chondral tissue, the irregular arrangement of which suggests neoplasm, but there are no signs of malignancy. I therefore removed the entire mass, which consisted of two cartilages and part of the sternum. To our surprise the cartilages were not abnormal; the soft tissues, perichondrium, muscles, fascia, and ligaments were thickened, but microscopically did not show any inflammatory changes. The cartilages showed histological changes, described above, and here and there calcium deposits and dissolution into fibres." The similarity of this description to the findings at biopsy in Case 4 of our series is striking.

In discussing the aetiology Tietze tentatively suggested that the condition represented a dystrophic change in the cartilage analogous to the bone disease of nutritional origin which was prevalent in Germany in the early 1920's; but there has been no evidence of malnutrition in our patients, all young soldiers of good physique.

We cannot throw any light on the pathology of these swellings. Tietze's cases were all observed at a time when nutritional conditions in Germany were at their lowest ebb. This does not entirely apply to our cases, since, although the national dietary has altered, it is agreed that evidence of general malnutrition is lacking. Nevertheless, qualitative changes of which we are ignorant may be of aetiological significance.

Summary

An account is given of a syndrome first described by Tietze in which non-suppurative non-specific swellings appear affecting rib cartilage, and 5 cases are added to the 16 already recorded. The association with respiratory tract infections has not previously been noted.

Thanks are due to Dr. F. R. Berridge for the radiological examinations and to Dr. O. Morrey for all other special investigations. Our thanks are also due to Mr. John E. Rowlands and to Dr. A. M. Barrett.

REFERENCES

- Hartung, H. (1923). *Zbl. Chir.*, **50**, 333.
 Satani, H., and Fujii, S. (1937). *Mitt. med. Akad. Kioto*, **21**, 1716.
 Staehelin, R. (1940). *Schweiz. med. Wschr.*, **70**, 592.
 Tietze, A. (1921). *Berl. klin. Wschr.*, **58**, 829.

D. Skinner and J. E. Edwards (*New Engl. J. Med.*, 1942, **226**, 8) record two cases of subacute bacterial endocarditis caused by an enterococcus in men aged 72 and 60. In the first case symptoms of endocarditis followed prostatectomy, and death took place seven months later. The necropsy showed typical vegetations on the mitral, aortic, and tricuspid valves. The organism (strain A) was recovered from the blood, vegetations, and an extracted tooth. In the second case the symptoms developed in a patient who had had cardiac decompensation for six years. The necropsy showed old rheumatic heart disease with vegetations on the mitral valve. The organism (strain O) was recovered from the blood before death and from the vegetations post mortem.

THE CHEMICAL LUMINESCENCE TEST FOR BLOOD

FORENSIC AND CLINICAL APPLICATIONS

BY

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Although it is now some years since Specht (1937) first suggested the use of chemical luminescence for the identification of suspect blood-stains, it would seem that no references to the method have as yet appeared in the English literature. This reaction has been of considerable practical value in many technically difficult medico-legal cases and merits description. Its forensic use has led to other applications, and the clinical adaptation now described is simple and very delicate, though it has the disadvantage that it must be observed in the dark.

Gleu and Pfannstiel (1936) described the preparation of 3-amino-phthalic-acid-hydrazide-hydrochloride, and indicated that the alkaline solution, with the addition of hydrogen peroxide or sodium peroxide, produced a typical chemical luminescence with haematin. This reaction is the basis of the luminescence test for blood. One of two solutions may be used; they yield identical results:

A.	3-amino-phthalic-acid-hydrazide-hydrochloride	1 g.
	Sodium peroxide	5 g.
	Distilled water	1,000 ml.
B.	3-amino-phthalic-acid-hydrazide-hydrochloride	1 g.
	Sodium carbonate	50 g.
	Hydrogen peroxide (10 vol.)	50 ml.
	Distilled water	1,000 ml.

These solutions may show a trace of inherent luminescence. This is of no practical disadvantage, but may, if desired, be eliminated by the addition of a trace of indazolon-4-carboxylic acid. The solutions are effective when freshly prepared, and remain usable for years by the addition of about 10% of 20-vol. hydrogen peroxide to reactivate the quantity of stock solution required for a particular test.

Forensic Application

In medico-legal cases blood-stains are normally identified by close inspection; a chemical test such as the benzidine reaction to exclude negative stains; positive identification of blood spectroscopically and perhaps with the help of various microscopical preparations; determination of the source of the blood by means of the precipitin reaction; and, in suitable cases, possibly identification of the blood group. In a number of cases, however (and not infrequently those in which the evidence as to blood-stains may be of the utmost value), the stains may be obscured for various reasons and the discovery of their position and content may be attended with more or less difficulty. The stains may be small in amount; they may be mixed with mud or ashes, or other interfering substance; they may have been more or less cleaned away off, say, dark or dirty clothes, off the ground, carpet, or walls, or off a weapon, and traces only may have remained in crevices or cracks; they may have been irregularly distributed in small amounts or difficult to discover on the ground, on dark or rusty or soiled or painted objects, or in cellars or other places not easily susceptible to complete and thorough examination; they may have been changed by temperature, weather, and age. In still other instances the blood may be mixed with or simulated by other stains such as paint, oil, fruit juices, rust, etc. In these cases of difficulty the luminescence test is of especial value.

The solution is introduced into an all-glass pressure-spray designed to produce a fine mist from a watery solution. When this mist falls on a stain containing haematin the result is a marked bluish-white luminescence which is clearly visible in the dark. The luminescence persists for some minutes and can readily be photographed. Very fresh blood-stains, con-

taining little haematin, show little luminescence; but the older the stain, and the greater the proportion of haematin consequently present, the more marked and clear is the light effect. The method we use is to spray the suitably arranged suspect articles in a dark-room, or, in a house, to arrange for the room or area to be darkened or to wait for night.

We have experimented with a very wide variety of substances, and have found the reaction to be specific. There is no reaction with serum, bile, sputum, pus, seminal stains, pleural fluid, earth, faeces, fresh or rotting vegetable material, various paints, oils, metals, wood, wax, shoe-polish, or various other substances. Very slight traces of blood-stains containing haematin, and not detectable to the naked eye, are readily apparent with the luminescence test. Nevertheless, in the present state of knowledge it is not suggested that this test should be used as a final specific test for blood. After the site and extent of the stain have been determined, it is essential to proceed through the complete routine examination.

The luminescence test has a special value in this respect—that after its application to detect the site of the blood-stain all of the further necessary tests may be applied to portions of the stain. The spray allowed to fall on the stain is preferably kept minimal in amount, and after marking or photographing the stain it is allowed to dry. The stain is then available for all the usual tests, and we have been unable to detect any difference in the reactions obtainable in stains which have been sprayed with the reagent and allowed to dry and those which have not been so treated. Nevertheless, as

an additional safeguard, and to eliminate all possibility of error, we have in practice invariably adopted the precaution of running a control from a portion of the article which has been sprayed but which shows no evidence of staining.

Clinical Application

In the most direct and simple form of the test the fluid or suspension of the material suspected of containing blood is placed in a test-tube. A small amount of the activated stock solution is added, and the resultant fluorescence, if any, is observed in the dark. Faeces may be dried on a slide, and the test solution poured over it as with the benzidine reaction commonly employed.

A positive result depends on the formation of haematin from the blood originally present in the suspect material, and the greater the amount of haematin present the more marked is the reaction. The delicacy of the test in the presence of fresh blood may be enhanced in the following way: To the suspect fluid or suspension are added a few drops of NaOH solution (about 30%), the tube is shaken and haematin is thus formed; the addition of the test solution will then produce a marked reaction if blood is present. Warming increases the brilliance of the fluorescence but shortens the duration.

So employed, the test is remarkably delicate, and will show a clear positive reaction with blood in dilutions over one in a million.

REFERENCES

- Gleu, K., and Pfannstiel, K. (1936). *J. prakt. Chem.*, **146**, 129, 137.
Specht, W. (1937). *Z. angew. Chem.*, **50**, 155.

CARDIAC MASSAGE AN EXPERIMENTAL STUDY

BY

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In the treatment of collapse under anaesthesia Hamilton Bailey stressed the importance of early and prolonged cardiac massage in addition to artificial respiration; the present record demonstrates this from the experimental side.

During an experiment on haemorrhagic shock a cat collapsed from an overdose of ether, after the right carotid artery had been cannulated and the respiratory tambour adjusted, but

was given by means of a pump; while this was being carried out impulses transmitted to the heart from expansion and collapse of the lungs were registered as minor fluctuations in the blood-pressure tracing. When artificial respiration was stopped these transferred fluctuations also stopped, and there was no sign of either respiratory or cardiac recovery.

So certain was I the cat was dead that I was beginning to dismantle the apparatus, when I decided to try the effect of direct cardiac massage. Two minutes 40 seconds after breathing and heart had stopped, the heart was compressed regularly between the fingers of the left hand, which could be pushed up under the left costal margin, and the right hand, which pressed downwards on the left thoracic wall. After 40 seconds an irregular rhythm returned to the heart; this was registered as an irregular fluctuation on the blood-pressure tracing. Massage was continued for 1½ minutes, after which the heart began to beat regularly. The artificial-respiration

CAT. FEMALE. Wt. 2.5 KILO. 12.5.42.

before bleeding had been begun. Immediately before the collapse respirations were 8 a minute and the blood pressure was 150 mm. Hg. In 6½ minutes respiration had ceased and the blood pressure fell to 14 mm. Hg. Artificial respiration

pump was reconnected and the respiratory tambour adjusted. For one minute the heart maintained its recovery rate; but after the blood pressure had reached 74 mm. Hg it began to fall, as respiration had not been re-established. Artificial