EPIDEMIC DROPSY

A NEW TEST FOR ARGEMONE OIL

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Introduction

EPIDEMIC dropsy is a disease occurring in epidemic or endemic form characterized clinically by œdema, erythema, cutaneous nodules, diarrhœa, cardiac failure, glaucoma and/or abortion in pregnant women. Pathologically there is an extensive dilatation and engorgement of the capillaries in the skin and the internal organs. Its ætiology has been traced to the use of adulterated mustard oil, the chief cooking fat of a large section of the Indian population. Subsequent work has shown that the disease is primarily a toxic condition produced by the adulterant argemone oil which is extracted from the seeds of the plant *Argemone mexicana* that grows wild.

The toxic properties of argemone oil were, however, known as long ago as 1878 when accidental poisoning from the use of this oil in food was reported in a number of cases (Lyon, 1889). Apparently this fact has been overlooked by the recent workers in this field.

Detection of toxic oil

The detection of argemone oil in mustard oil is, therefore, an essential step for the supply of pure oil and for the maintenance of the health of the community. The problem engaged the attention of some workers in the past, and three *chemical tests* have been in use for the purpose, *viz :* (1) nitric acid test,* (2) cupric acetate test (Lal *et al.*, 1939) and (3) ferric chloride test (Sarkar, 1941; Sen, 1946). The *physical tests*, such as spectrophotometric and fluorescence tests, are of indefinite value and have little practical utility and no simple *biological test* on laboratory animals has yet been developed (Lal *et al.*, 1939, 1941*a*). The *feeding experiments* on human volunteers with the toxic oil proved successful (Lal *et al.*, 1937, 1941*b;* Chopra *et al.*, 1939) but it can have no place as a test measure.

Of the three chemical tests mentioned above the nitric acid test is very simple but non-specific, yielding positive results with many other oils, *viz,* linseed oil, *mahua* oil, niger seed oil, safflower seed oil, sesame oil, olive oil, jute seed oil, tamarind oil and radish oil (Sarkar, 1942). The cupric acetate test also has not yielded consistent and reliable results. The ferric chloride test is specific and in its modified form detects argemone oil in a concentration of 0.25 per cent. But the procedure for this test is rather complicated and a microscopic examination may be needed when the oil is present in minute amounts—a positive reaction being indicated by the appearance of a reddish-brown acicular precipitate in small lumps which tend to adhere to the acid (hydrochloric acid used for the test)-oil interface. Another drawback of the test is that it cannot be developed properly for the colorimetric estimation of argemone oil because of the presence of the coloured ferric ion in the acid layer. The quantitative method developed from the colour in the acid layer of the nitric acid test (Lal *et al.*, 1940) is unreliable since other oils used as adulterants might account for part or whole of the colour, and this may wrongly be attributed to argemone oil. Sarkar and Rahaman (1945) described a quantitative method but besides the fact that it involves a complicated procedure, it is only capable of estimating argemone oil in a concentration of 5 per cent or more.

We, therefore, undertook to develop a test for argemone oil that should be simple, sensitive and practicable in the least equipped laboratory. The present test satisfies these conditions; it also needs only a small amount of the suspected oil and depends on a colour reaction which may be utilized for quantitative colorimetric estimation. The test is described below :—

The test

Reagent.—Two volumes of concentrated hydrochloric acid (S.G. 1150 to 1155) diluted with one volume of distilled water (*i.e.* about 20 per cent HCl w/w).

Procedure.—Part of the sample of suspected mustard oil is filtered. 2 cc. of the filtered oil are mixed by gentle shaking with an equal volume of ether in a ½ inch × 4 inches test tube and 0.3 cc. of the above reagent is added. The test tube is then well plugged with cotton-wool and kept for 16 hours. An orange colour of the lower acid layer at the end of this period indicates the presence of argemone oil in the original sample.

The colour can be discharged by the addition of a few drops of concentrated sodium hydroxide solution or liquor ammonia and can be made to reappear by the addition of a few drops of concentrated hydrochloric acid. The colour can also be discharged by the addition of a small piece of zinc. In cases where the adulteration is fairly high, orange needle-shaped crystals have

* There is some doubt regarding the originator of the nitric acid test. Lal *et al.* described the test in 1939 and Sarkar (1941) referred to it as the 'test of Lewkowitsch and Warburton' (1922), although in the reference quoted by him it is mentioned under *A. speciosa* and not *A. mexicana*. A detailed description of the test can, however, be traced as far back as 1888 (Lyon, 1889).

been found to separate out at the acid-oil interface.

Comment

This test is extremely sensitive, being found positive in a concentration as low as 0.1 per cent and is at the same time extremely simple. It does not require elaborate laboratory facilities and very little manipulative skill is necessary. It can be carried out with the minimum of labour and attention. The dilution with ether is not essential but appears to help the development of the colour.

We have outlined here the result of our preliminary work on the new test for argemone oil and further investigation is in progress along the following lines :—

1. The effect of time, temperature and other reagents to develop the test.

2. The effect of other aqueous acids in place of hydrochloric acid.

3. The development of the test for the colorimetric estimation of argemone oil in mustard oil.

4. The effect of adulteration with various other oils on the test.

The results on these lines will shortly be communicated in detail for publication.

Our grateful thanks are due to Lt.-Col. S. D. S. Greval, I.M.S. (R.), for kindly drawing our attention to the reference on argemone oil poisoning in Lyon's *Textbook of Medical Jurisprudence for India*, a new edition of which he is preparing.

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CORRIGENDA

In the article on 'Treatment of Epidemic Dropsy' by R. N. Chaudhuri and N. K. Chakravarty in April 1950 issue of this journal—

(1) Page 165, 2nd column, lines 10–15 : *in place of* 'Bailey Robinson and Staunton.....7 : 8 : 4′ : 5′-tetramethoxy-3 : 4 dihydro-1 : 2 benzphenanthridone' *read as follows*—'Sanguinarine and dihydro-sanguinarine have not yet been synthesized but one of their degradation products, N-methyl-7 : 8 : 4′ : 5′-tetramethoxy-9 : 10-dihydro-1 : 2-benzphenathridine, retaining the full skeleton of sanguinarine, has lately been synthesized by Bailey, Robinson and Staunton (1950).'

(2) 'Sanguinerine' should *be read* as 'Sanguinarine'.

(3) Page 172, Reference No. 6—*in place of* 'Chopra, R. N., Chaudhuri, R. N., and De, M. N.', *read* 'Chopra, R. N., Chaudhuri, R. N., and De, N. N.'

(4) Page 170, col. 1, line 9 : *in place of* 'sclerotomy' *read* 'sclerectomy'.

A Mirror of Hospital Practice

A CASE OF SUBMUCOUS FIBROID SIMULATING PREGNANCY

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MRS. U. B., aged 24 years, para 4, last child 8 years before, all the children are living, all deliveries were normal, no history of any abortion.

Suddenly I was called in at about 8 p.m. on 7th December, 1945.

Complaints.—(1) Bleeding per vaginum, slight for the last few days, increased since morning and profuse since evening.

(2) Pain in the lower abdomen, slight for about 15 days, increased since morning.