alter the potency of such vaccine lymph. The results are given in table IV.

TABLE IV

Potency titration on rabbits after the number of colonies was reduced to below 20,000 per ml. with phenol treatment

Vaccine number	Dilutions			
	1/8,000	1/16,000	1/32,000	Control 1/8,000
M 58 (1 : 20) ..	c	c	sc	c
M 65 (1 : 30) ..	c	c	c	c
M 184a (1 : 20) ..	c	c	c	c

The figures in brackets against the vaccine numbers indicate the dilution of the seed lymph used for vaccinating that particular batch of calves from whom that number of vaccine has been manufactured.

(c = confluent, sc = semi-confluent.)

The results of 1 : 20 dilution of lapine gave similar results on being used for vaccinating the calves for the production of seed lymph.

After having studied all the aspects connected with the use of the diluted seed lymph or lapine it can safely be concluded that 1 : 20 or even greater dilution can be used for vaccination of calves without in any way effecting the potency or the average yield per calf of vaccine lymph. Thus a reduction in the cost of production of lapine or seed lymph can be achieved and so many animals can be spared.

Summary

1. The author has studied the effect of dilution of the seed lymph on the average yield per calf and has shown that it can be diluted to 1 : 20 or even greater without in any way effecting the average yield per calf.

2. Although a greater dilution than 1 : 20 has given equally good results the author has preferred to dilute the seed lymph to 1 : 20 for the present.

3. There is no decrease in the colony count following vaccination with diluted seed lymph.

4. High potency vaccine lymph can be produced by vaccinating calves with diluted seed lymph.

5. Diluted lapine can be used for manufacture of seed lymph.

The author is indebted to Dr. A. N. Das, Deputy Director of Medical and Health Services for permission to carry out this work. He also wishes to thank Dr. R. D. Katiyar, Veterinary Assistant Surgeon, and his laboratory staff for having helped the author in carrying out the various tests.

ANDROGRAPHOLIDE, THE ACTIVE CONSTITUENT OF *ANDROGRAPHIS PANICULATA* NEES

A PRELIMINARY COMMUNICATION

By

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Andrographis paniculata Nees is a shrub of the natural order Acanthaceæ and grows widely throughout the plains of India. It is well known under the name of *Kalmegh* which forms the chief constituent of a household medicine called *Alui* extensively used in Bengal in cases of bowel complaints of infants specially in cases of griping, irregular stools and loss of appetite. The roots and leaves are also said to be useful as a febrifuge and anthelmintic. It is intensely bitter and appears to be in no way inferior to other bitters mentioned in the pharmacopœia.

Systematic chemical investigation of the plant was first carried out by Gorter (1911) who isolated the active constituent, andrographolide, in a pure crystalline state. According to Gorter's original findings andrographolide is an unsaturated trihydroxy lactone having the molecular formula $C_{20}H_{30}O_5$. The work was later taken up by Guha-Sircar and Moktader (1939) who showed the presence of a methylenedioxy group and a hydroxy group in the molecule instead of the three hydroxy groups as found by Gorter. The presence of the methylenedioxy group was inferred from the fact that it gave formaldehyde when boiled with 33 per cent sulphuric acid.

The present work has been undertaken with the idea of clearing up the fine structure of andrographolide which is extremely important from the standpoint of proper use of this important drug. Andrographolide has been found to give a positive Legal test with sodium nitroprusside and sodium hydroxide. This fact indicates that the compound is an $\alpha:\beta$-unsaturated lactone and in this respect it appears to be similar to the various physiologically active unsaturated lactones occurring in nature. To settle the controversy between Gorter on the one hand and Guha-Sircar and Moktader on the other regarding the oxygenated functions of andrographolide, an attempt was made to detect formaldehyde by boiling the product with 33 per cent sulphuric acid following the procedure of Guha-Sircar and Moktader. No trace of formaldehyde could, however, be detected under these conditions. It has also been found that andrographolide does not respond to Gabel's test nor does it give any green coloration with gallic acid and concentrated sulphuric acid. It has thus been possible to establish that andrographolide is a trihydroxy lactone as found by Gorter and does not contain any methylenedioxy group. This

fact has been further established by the preparation of the triacetyl derivative by a modification of Gorter's method.

Hydrogenation of andrographolide has been carried out in acetic acid solution in presence of platinum catalyst and also in methanolic solution in presence of palladium catalyst and in each case three molecules of hydrogen are absorbed with the formation of two isomeric tetrahydrodeoxy-andrographolides melting at 141°C. and 217°C., respectively. It is thus clear that andrographolide contains two ethylenic double bonds and a tertiary hydroxy group which is easily eliminated during hydrogenation. The presence of an exocyclic methylene group or a methylene group at the end of a chain is inferred from the fact that on ozonolysis a molecule of formaldehyde is obtainable from each molecule of andrographolide. An extremely important observation has been made in the selenium dehydrogenation of andrographolide at 300°C. The product is a liquid which in all probability consists of a mixture of polycyclic aromatic hydrocarbons. On distillation under reduced pressure from a small bulb it gives two constant boiling liquids along with a trace of a solid product. The lower boiling liquid, which forms the major fraction, gives an orange red picrate crystallizing in needles from ethanol, m.p. 133°C., and appears to be a polyalkylated naphthalene. In this respect andrographolide appears to be somewhat similar to the diterpene lactone, Marrubin, isolated from *Marrubium vulgare*. The higher boiling fraction also gives an orange red crystalline picrate melting at 150 to 153°C. It thus appears that the molecule of andrographolide consists of :

(1) a reduced naphthalene ring,

(2) two ethylenic double bonds,

(3) three hydroxy groups of which one is tertiary in nature,

(4) an $\alpha:\beta$ -unsaturated lactone system and

(5) an exocyclic methylene group or a methylene group at the end of a chain, *i.e.* a methylene group attached to an ethylenic double bond.

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A Mirror of Hospital Practice

CHLOROMYCETIN IN TYPHOID

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CHLOROMYCETIN is a newly discovered life-saving antibiotic drug manufactured by Parke, Davis & Company of America. Towards the beginning of the year 1948, reports of successful treatment of some of the most dreadful diseases, which had no chemotheraputic agents whatsoever for cure, came out in the press. Towards the later part of the year 1949, the drug was available in small quantities in the markets of India but it could not be made available earlier than the beginning of the year 1950 in Pakistan.

The drug is a white crystalline fine powder, partially soluble in water, produced by the metabolic activity of *Streptomyces venezuelæ*. It can also be produced synthetically. It is a complex organic chemical known as chloramphenicol having the formula of :

D-(—)-threo-1-p-nitrophenyl-2-dichloroacetamido-1, 3-propanediol.

Administration in man is essentially per oral route. It is rapidly absorbed from the gastro-intestinal tract, mainly small intestine, and reaches the height of serum concentration within two hours after which the blood level declines and is free of the drug at the end of 24 hours. In experimental animals the drug has also been detected in bile, cerebrospinal fluid, kidney, liver in high concentration and smaller amounts in lung, spleen, heart-muscle, and brain substance. Bulk of the drug is excreted through the urine. Excretion is almost as rapid as absorption and hence the advocacy of repeated doses at three- or four-hourly intervals.

It is claimed that all rickettsiæ, some gram-negative organisms like the salmonella group, some virus infections like those of the primary atypical pneumonia, psittacosis, pertussis, etc., and some bacilli, *viz*, *V. comma*, are susceptible to the new wonder drug.

I have given a trial recently to this drug. Though only a single case could be treated with the drug supplied, yet it is worth while to record the effects obtained by me.

Case note

M. Faruque, 13, Mohammedan, male, school boy, was admitted to the Begum Hospital on 6th April, 1950, at 7 p.m. with fever for six days and constant headache for 3 days. The temperature