

concerning these points could not be introduced into this paper, but will form the subject-matter of a separate communication from the Department of Chemistry.

3. *Description of the method.*—The standard technique of the British Standards Institution was followed. The Lister Institute strain of *Bact. typhosum* of 1931 was used for the test. Phenoleum of Merck was utilized as the standard for comparison. Eupeptone not being available at present, bacto-peptone (Difco) had to be substituted in the standard broth media.

The preparation of different dilutions of the essential oils was done in sterile distilled water, using triethanolamine oleate, 1 gm. per 100 c.cm. of solution, as the emulsifying agent.

The mean results of our experiments are given in the table:—

TABLE

The comparative Rideal-Walker coefficients of seven essential oils of indigenous origin

Name of oil	Carbolic coefficient
1. <i>Ocimum basilicum</i> ..	7
2. " <i>sanctum</i> (green) ..	6
3. " " (red) ..	3
4. <i>Curcuma aromatica</i> ..	< 1
5. <i>Hemidesmus indicus</i> ..	< 1
6. <i>Pistacea integerrima</i> ..	< 1
7. <i>Homalomena aromatica</i> ..	< 1

Discussion

It is evident from the table that, of the seven essential oils, judged from the standpoint of Rideal-Walker coefficient values, the *Ocimum* group proved to be the most potent, *O. basilicum* and *O. sanctum* (green variety) showing carbolic acid coefficients of 7 and 6 respectively may be considered to have quite appreciable antiseptic properties against *Bact. typhosum*. This value compares very favourably with that of many disinfectants manufactured by local firms, which show lower figures.

The carbolic coefficient of *Ocimum sanctum* (red) is only 3 and that of *Curcuma aromatica*, *Hemidesmus indicus*, *Pistacea integerrima* and *Homalomena aromatica* is about 1. It would naturally be useless to investigate any further the disinfecting properties of this latter group. Whether they possess any specific bactericidal action against some other organisms, *in vitro* or *in vivo*, is a question which could be settled only by further investigation.

Conclusions

1. The Rideal-Walker coefficient values of seven indigenous essential oils have been studied for the first time by following closely the standard method for the test.

2. The family *Ocimum* and especially *basilicum* and *sanctum* (green) showed definite antiseptic properties against *Bact. typhosum*.

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LATENT SYPHILIS AND FALSE-POSITIVE WASSERMANN REACTION IN THE TROPICS

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In a previous communication (Greal, Sen Gupta and Das, 1938) it was shown that (i) latent syphilis was encountered in an unselected hospital population rather infrequently, (ii) that many conditions other than syphilis were responsible for a positive Wassermann reaction, and that (iii) the Wassermann-positive rate in an unselected Indian population was likely to be under 10.25 per cent rather than 20 to 22 per cent of the previous writers. The work commenced in connection with the aforesaid items, in the Carmichael Hospital for Tropical Diseases, Calcutta, in 1937, has been continued. More figures are now available. They confirm the previous findings and reduce the Wassermann-positive rate still further.

Wassermann reaction of 1,525 cases admitted for diseases other than syphilis

The reaction was in the majority of cases repeated at intervals. The accompanying

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3. This action appeared to be negligible with *Ocimum sanctum* (red), *Curcuma aromatica*, *Hemidesmus indicus*, *Pistacea integerrima* and *Homalomena aromatica*.

4. It is suggested that further studies on the specific action of the essential oils of *Ocimum basilicum* and *Ocimum sanctum* be made in the treatment of infections for which they are now being only empirically used.

Acknowledgments

Our thanks are due to Mr. J. N. Rakshit, Prof. S. Ghosh, and his staff for the extraction of these essential oils.

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tabular statement gives the initial and subsequent reactions of two series of cases.

The cases with 3 possible exceptions (obscure nervous complaint suspected to be syphilitic and treated with malaria) were suffering from diseases other than syphilis.

The technique of the reaction was that of No. 4 of the Medical Research Committee, 1918, (now Council) modified and standardized by the senior writer (Greval, *et al.*, 1930, 1938, 1939, 1940). The essential features of the technique are: (i) the quantity of complement added to the serum control is 2 M.H.D., (ii) red cell suspension and antigen are standardized, (iii) complement is classified, (iv) antigen-complement system is adjusted according to the class of the complement found, (v) repeatable, therefore comparable, reading is obtained by the aid of titrated controls of pooled positive sera, and (vi) a positive reaction with 4 M.H.D. of complement and uncholesterinized antigen is termed +++.

In the tabular statement the last but one item, 'finally positive or doubtful' reaction, is recorded to make the result comparable with those of treated syphilis: the persisting doubtful reaction of a recently treated case of syphilis still indicates a diagnosis of syphilis; on the other hand, an initial doubtful reaction in the absence of presumption of syphilis does not indicate a diagnosis of syphilis. For the purpose of detecting the false-positive Wassermann reaction the last item, 'finally positive (excluding doubtful)', gives the desired figure.

Two series are tabulated separately to bring out the variations such figures are subject to; statistical analysis, involving mathematical refinements, is not attempted.

The following points emerged:—

(i) Percentage of +++ cases is low. It is $\frac{100 \times 11}{1,525} = 0.72$. In the Wassermann register of this laboratory which undertakes serological work for nearly all hospitals and clinics in Calcutta, and which tested 15,615 sera in 1939-40, it is of the order of 6. Probably +++ cases give a truer latent syphilis rate than other cases, although this reaction has been encountered in at least one non-syphilitic case (Greval, *loc. cit.*). In series one, the reaction of half of such cases fell to ++ without anti-syphilitic treatment.

(ii) Of 90 ++ cases, 24 could not be repeated: of the remaining 66, 21 became negative and 9 doubtful (\pm) without anti-syphilitic treatment.

(iii) Of 33 + cases, 3 could not be repeated: of the remaining 30, 17 became negative and 5 (\pm) without anti-syphilitic treatment.

(iv) Of 63 \pm cases, 20 could not be repeated: of the remaining 43, 28 became negative without anti-syphilitic treatment.

(v) There was a rise in reaction too during the course of the disease. Two reactions rose from ++ to +++, 4 from + to ++, 8 from

\pm to + or ++. This rise is as much a proof of the non-specific nature of the reaction as the fall in *ii*, *iii* and *v*.

Conditions other than syphilis responsible for a positive Wassermann reaction

The following conditions have been held responsible for a false-positive reaction:—

1. Other diseases—leprosy, yaws, malaria, trypanosomiasis, pinta and bejel frequently. Septicemia, endocarditis, pneumonia, tuberculosis, relapsing fever, spotted fever, typhus fever, scarlet fever, infectious mononucleosis, pernicious anaemia, leukæmia, xanthomatosis, severe jaundice and lymphopathia venereum less frequently. Others very infrequently.

2. Bacterial growth in serum.

3. Excess fat and digestive products in serum.

4. Passive transfer from mother.

5. High barometric pressure increases tendency.

6. Improperly prepared, titrated and mixed reagents.

7. Probably some 'cured' cases of syphilis (Smith, 1940).

Item no. 6 may be eliminated. It is not likely to interfere in a standardized technique.

Attention is drawn to three other conditions: (i) kala-azar, (ii) 'lecithinophile eosinophilia' and (iii) 'lecithinophile hepato-gastro-intestinal syndrome'. The first two conditions have been discussed previously (Greval, Sen Gupta and Napier, 1939; Greval, 1940): the third will be summarized briefly now:—

Lecithinophile hepato-gastro-intestinal syndrome.

It is a state of ill health (i) characterized by chronic indigestion, distention after food, looseness of bowels or constipation, enlargement of liver with or without jaundice, discomfort or diffuse pain in the epigastrium or right hypochondrium, low fever, loss of weight, anaemia and a positive or doubtful Wassermann reaction, and (ii) not covered by a definite diagnosis of a known disease of the digestive system or of syphilis. All the signs and symptoms may not and usually do not occur together. A strong enough combination in the absence of the usual manifestations of syphilis, however, establishes the presumption that one is not dealing with intentionally concealed, naturally latent or congenital syphilis, but with a more-or-less chronic and hitherto undescribed disease or disorder of the digestive system. The presumption is converted into proof when the positive or doubtful reaction weakens and disappears with the improvement and reappears with the relapse.

The condition is non-syphilitic. The positive or doubtful Wassermann reaction is false. It will be better to call the reaction simply an affinity of the blood for lecithin in complement fixation. Hence the adjective lecithinophile.

The disappearance and reappearance of the positive (or doubtful) reaction are too rapid and intimately connected with the characteristic clinical symptoms to be regarded as the usual

variations in a true positive Wassermann reaction due to meteorological causes (Hoverson, *et al.*, 1935) and even passage of time (Becker, 1937). Variations due to qualitative differences in the complement are effectively controlled by the adjustment of the antigen-complement system in the writers' technique (Greval, Chandra and Das, *loc. cit.*).

The writers have read with great interest a publication by Bakhsh (Bakhsh, 1940) on gastro-intestinal disorders related to liver. The Wassermann reaction, however, was not done on the cases reported (private communication from Bakhsh).

The syndrome attracted the senior writer's attention some time ago and was mentioned in two communications quoted in the present communication but was not then so named. A communication on this item alone has been sent abroad, but it is not yet known whether it reached its destination and will be published.

The Wassermann-positive rate in an unselected Indian population

Twenty-two per cent (Iyengar, 1919) and 20 per cent (Lloyd, Napier and Mitra, 1930) were the positive rates given by previous workers. The rate calculated from the figures collected in this communication is :—

$$1,525 : 100 : 134 = \frac{13,400}{1,525} = 8.7 \text{ per cent, crude}$$

$$\text{or}$$

$$1,525 : 100 : 82 = \frac{8,200}{1,525} = 5.3 \text{ per cent, corrected.}$$

The crude rate is based on the number found positive initially. The corrected rate is based on the number found positive finally, with the improvement in the disease the patients were suffering from *and without anti-syphilitic treatment*. The period of observation was limited. It is reasonable to suppose that an extension of the period will reduce the corrected figure further. The true-positive rate, indicative of latent syphilis, must be *below* 5.3 per cent. Only this figure will be compatible with the economic and social orders of things in India. Nearly everybody of marriageable age in this country is married and his main concern is food, not gratification of illicit sexual desires.

Besides, this figure is a figure for a town. The figure for the country, where the scope of irregularities of human conduct is much smaller than in towns, will be lower.

The reasons for previous workers' high rate appear to be two : (i) the technique did not at times differentiate between a doubtful and a positive reaction, and (ii) the reactions of cases suffering from certain diseases were not repeated.

Presumption of syphilis in Wassermann-positive cases and latent syphilis rate

Of the 134 initially positive and 63 doubtful cases in the two series, signs and history of

syphilis could only be obtained in 23 cases distributed as follows :—

	1st series	2nd series
+++	4	2
++	5	8
+	1	1
±	2	0
	<hr/> 12	<hr/> 11

As these cases were admitted for diseases other than syphilis, 23 per 1,525 or $\frac{100 \times 23}{1,525} = 1.5$

per cent could be regarded as the latent syphilis rate, provided other causes leading to a false-positive reaction in a cured case of syphilis could be eliminated.

The true ascertainable latent syphilis rate must be under 1.5 per cent.

Summary

1. Wassermann reaction of 1,525 cases admitted for diseases other than syphilis is tabulated. Some positive reactions disappeared, others weakened with the improvement in the

A tabular statement of Wassermann reaction of two series of cases totalling 1,525

Series	I	II
Period	10-7-39 to 9-7-40	10-7-40 to 15-4-41
+++ :-	6 :-	5 :-
Not repeated ..	1	1
Same reaction ..	2	4
Fell to ++ ..	3	nil
++ :-	36 :-	54 :-
Not repeated ..	8	16
Same reaction ..	9	17
Rose to +++ ..	1	1
Fell to + ..	5	3
Fell to ± ..	5	4
Turned - ..	8	13
+ :-	21 :-	12 :-
Not repeated ..	nil	3
Same reaction ..	3	1
Rose to ++ ..	4	nil
Fell to ± ..	3	2
Turned - ..	11	6
± :-	41 :-	22 :-
Not repeated ..	13	7
Same reaction ..	6	1
Rose to ++ ..	3	2
Rose to + ..	1	2
Turned - ..	18	10
- :-	785	563
Total tested :—	869 :-	656 :-
Initially positive, +++ , ++ and +.	63	71
Finally positive or doubtful.	44	52
Finally positive (excluding doubtful).	36	46

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THE EFFECT OF STOCKING RICEFIELDS WITH SULLAGE ON ANOPHELINE BREEDING AT KHURDA ROAD

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THE report of a preliminary experiment on the effect of stocking ricefields at Khurda Road with sullage during the dry season, on anopheline breeding, was published in the *Indian Medical Gazette* (Rao, 1941). As the results were promising, it was considered necessary to repeat the

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patients' conditions and without antisyphilitic treatment. Some doubtful and positive reactions grew stronger without any manifestation of syphilis.

2. Attention is drawn to three conditions responsible for a false-positive Wassermann reaction: (i) kala-azar, (ii) 'lecithinophilia' and (iii) 'lecithinophile hepato-gastro-intestinal syndrome'.

3. Wassermann-positive rate for unselected Indian population, indicative of syphilis, must be below 5.3 per cent for towns. For the country it should be lower.

4. The ascertainable latent syphilis rate for the cases admitted, as judged by the Wassermann-positive rate, was 1.5 per cent. It must be really lower.

The reaction given collectively opposite the signs are the initial reactions, not those observed later as a result of rise or fall.

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experiment on a large scale, not only to confirm the previous findings, but also to ascertain the effects of this method on the rice crop.

It has been recognized that naturalistic methods of malaria control are of particular importance because they have special adaptability to rural areas, where, up to the present time, little or nothing has been accomplished (Hackett *et al.*, 1938). Naturalistic measures are even of greater importance in those rural areas where the local vectors breed in large numbers in ricefields. On account of their great extent, ricefields are very costly to deal with. They cannot be effectively drained away in those large areas where the flooding of rice is entirely dependent on an intermittent seasonal rainfall (Hackett, *et al.*, *loc. cit.*). Even in areas that can boast of an irrigation system, drying of fields for two or three consecutive days in each week cannot be effective during periods of daily rainfall (Russell and Rao, 1940). The use of chemical larvicides in ricefields frequently leads to opposition, which, though groundless, is difficult to overcome. Therefore, any antilarval measures, which do away with chemical larvicides and which do not interfere with the irrigation of the ricefields, are to be welcomed.

Rice cultivation is not properly carried out in many areas where malaria exists to any marked degree. The fields are not well manured or ploughed in the dry season, which results in a poor crop. The *ryots*, therefore, continue to be poor, and, as a result of lowered resistance to disease, they fall easy victims to malaria. The whole thing moves in a vicious circle. 'Malaria, weak men, late ploughing, more anophelines, poorer food, more malaria' (Senior White, 1936). Any method, which prevents breeding of anopheline vectors without the aid of chemical larvicides and which, at the same time, improves the rice crop, is desirable.

Besides better crop and malaria control, there are other considerations too. In most villages, sullage accumulates near houses or is allowed to run to waste and, in any case, it is not only not disposed of in a proper manner but it is allowed to become a positive nuisance. Sullage waters are eminently suitable for the breeding of *C. fatigans*, which carries the infection of filariasis. Any method which attempts to dispose of the sullage satisfactorily constitutes an improvement in rural sanitation, besides controlling filariasis, which is widely prevalent in certain parts of Madras and Orissa.

The place where this experiment (as the previous one) was carried out is Khurda Road, a railway settlement on the east coast of India, about 280 miles south of Calcutta. The sullage from this settlement empties itself into a *kutchra* drain, which passes through a large number of ricefields and is finally led into the Daya river, one of the deltaic branches of the Mahanadi. Usually, the *ryots* divert the sullage into their fields during the dry season, to facilitate ploughing. When they take the sullage, they do not