SOME FURTHER NOTES ON CRESOL AS A LARVICIDE.

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I HAVE read with great interest the article by Lieutenant-Colonel C. W. Holden, R.A.M.C., on "The Prevention of Malaria with a Division in the Field," published in the Corps Journal for April, 1924, but from experiments we have made, consider that, before cresol is recognized as an efficient larvicide, further work should be carried out, as local results do not in any way agree with those reported by Major Mayne, R.A.M.C.

The A.D.M.S., Lahore District, in his letter No. 6767/124 Medical, dated May 26, 1924, asked for experiments to be carried out in all hospitals in the district.

The following experiments were carried out at Dagshai, a hill station, but owing to larvae being scarce and hard to find, all had to be performed under "laboratory conditions," no large area of water being available for the purpose.

(1) Commenced at 11 a.m. on June 11, 1924. Second and third stage larvae and pupae being used. (a) 1 in 1 million cresol in tap water; (b) 1 in 10 million cresol in tap water; (c) control in tap water; (d) control in rain water. Dry cow-dung being used as food.

June 12, 1924.—One larva dead in (a), all others alive and healthy.
June 13, 1924.—One pupa dead in (b), adults emerged in (a) and (c).
June 17, 1924.—All larvae had pupated and most pupae had emerged as adults. Exception was taken to this experiment, as only large larvae and pupae were used, ova and early stages not being available, but under natural conditions one cannot arrange to deal with only one particular stage.

(2) Commenced at 10 a.m. on July 11, 1924. Newly emerged larvae only used. (a) 1 in 500,000 cresol in rain water; (b) 1 in 1 million cresol in rain water; (c) 1 in 10 million cresol in rain water; (d) control in rain water. Food supply as before.

July 12, 1924.—Larvae alive in all bottles.
July 15, 1924.
July 20, 1924.
August 2, 1924.
August 11, 1924.
September 11, 1924.

October 3, 1924.—One larva still alive in (a), nothing in (b), (c) and (d). This experiment is of interest owing to the long time the larvae lived without developing. Most of them died off in the second stage, the last survivor reached the third stage. The addition of cresol had nothing to with this...
delay in development as the larvae in the control jar developed in the same way as the others, most probably cold being the cause as this experiment was carried out in the rains.

(3) Commenced at 10 a.m. on July 31, 1924, all stages were used. (a) 1 in 500,000 cresol in rain water; (b) 1 in 1 million cresol in rain water; (c) 1 in 10 million cresol in rain water; (d) control in rain water. Food supply as before.

August 2, 1924.—All larvae alive.
August 4, 1924.—All larvae alive, some pupated.

(4) Commenced August 2, 1924, at 11 a.m. all stages. (a) 1 in 100,000 cresol in rain water. (b) 1 in 250,000 cresol in rain water. (c) Control in water. Larvae in (a) all died in about three hours.

August 3, 1924.—Larvae in (b) and (c) alive.
August 18, 1924.—The last of the larvae emerged from the pupal stage in jar (b). All the above experiments were carried out with culex larvae, no anopheline larvae being available in Dagshai.

(5) Commenced on September 18, 1924, at the British Station Hospital, Lahore Cantonment. Larvae of Anopheles rossii put in 1 in 250,000 cresol in tap water, with green weed as food.

September 19, 1924.—Larvae alive, one pupated.
September 23, 1924.—All larvae have pupated, one adult in dish.
September 24, 1924.—Remaining pupae emerged. The figures given in the original article were as follows:—

<table>
<thead>
<tr>
<th>Cresol Dilution</th>
<th>Water Dilution</th>
<th>Result</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 oz. 1 cu. ft.</td>
<td>1 in 1,000</td>
<td>Killed in 2 mins.</td>
</tr>
<tr>
<td>1 oz. 10 cu. ft.</td>
<td>1 in 10,000</td>
<td>Killed in 15 mins.</td>
</tr>
<tr>
<td>1 oz. 100 cu. ft.</td>
<td>1 in 100,000</td>
<td>Killed in 1 hour</td>
</tr>
<tr>
<td>1 oz. 1,000 cu. ft.</td>
<td>1 in 1 million</td>
<td>Killed in 4 hours</td>
</tr>
<tr>
<td>1 oz. 10,000 cu. ft.</td>
<td>1 in 10 millions</td>
<td>Killed in 12 hours</td>
</tr>
</tbody>
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This was not borne out in the above experiments.

By the kindness of Major A. C. Hammond Searle, M.C., R.A.M.C., D.A.D.M.S. (San.), Lahore District, I was allowed to see all the reports sent in from various stations in the district. Some results agreed with those given by Major Mayne, others did not do so. At the British Station Hospital, Multan, the following results were obtained:—

1 in 1,000 killed in 90 seconds.
1 in 10,000 killed in 6 minutes 20 seconds.
1 in 100,000 killed in 36 minutes.
1 in 1,000,000 killed in 6 hours.
1 in 10,000,000 killed in 36 hours.

At the British Station Hospital, Ambala, the results were:—

1 in 1,000 killed in 50 seconds.
1 in 10,000 killed in 12½ minutes.
1 in 100,000 killed.
1 in 1,000,000 killed.
1 in 10,000,000 killed.
At another British Station Hospital the report showed that:
1 in 1,000 killed in 65 to 70 seconds.
1 in 10,000 killed in 14 to 16 minutes.
1 in 100,000 alive in 36 hours.
1 in 1,000,000 failed.
1 in 10,000,000 failed.

British Station Hospital, Ferozepore, reported:
1 in 1,000 no record.
1 in 10,000 failed, presumably in the time stated.
1 in 100,000 failed.
1 in 1,000,000 failed.
1 in 10,000,000 failed.

The report from another British Station Hospital, was that:
1 in 1,000 no record.
1 in 10,000 killed in two hours.
1 in 100,000 failed.
1 in 1,000,000 failed.
1 in 10,000,000 failed.

The British Station Hospital, Dharamsala, stated, “Crude oil better.”
And finally the British Station Hospital, Jullunder, reported that it was
“Not much use.”

There is no doubt that the very strong solutions of cresol will destroy
larvae, but until further experiments are carried out it is unwise to take it
for granted that any solution weaker than 1 in 100,000 will prove of use.
An efficient larvicide is needed to destroy the thousands of larvae found in
most cantonments. So far the mixture of kerosene and crude oil has been
found the best for ordinary use, but of course cannot be used for drinking
water. To prove of any use the larvicide needs to be tasteless and non-
toxic to men and animals.

Anti-malarial squads in India do their best, but their efforts are
primitive, owing to lack of funds, and must continue to be so until more
funds are available to allow for much-needed major works to be carried out.