patient survives the operation for three years or over, her life has been prolonged by the operation.

On this basis it will be seen that out of the 80 cases that recovered from the operation 49, or 61.2 per cent., had their life prolonged, namely:

Cured cases	...	...	39
Recurrent cases	...	...	7
Cases lost sight of	...	...	3
			49

Concluding Remarks.

This series of 100 cases of radical extirpation of carcinoma of the cervix uteri reviewed on an absolute cure basis is the first to be produced from a British source, all previous evidence as to the final value of the operation having come from the Continent. The attitude of characteristic cautiousness which distinguishes this country in taking up innovations from abroad extends to surgery, and there are not wanting those who still view the procedure askance or even with hostility.

The operation is one no surgeon can undertake lightly, for beyond the considerable mental and physical strain which accompanies its performance he may have to face the anxiety of a critical convalescence or the disheartenment of failure, and the more so the more advanced cases he ventures upon. His reward comes five years later, and, as this paper shows, is one well worth the striving for.

REFERENCE.

¹ *British Journal of Obstetrics and Gynaecology*, vol. xxiv, No. 3, 1913.

THE USE OF INSECTICIDES AGAINST LICE.

By A. BACOT,

ENTOMOLOGIST TO THE LISTER INSTITUTE OF PREVENTIVE MEDICINE.

THE scheme followed in the undernoted trials was to arrange the conditions on as nearly natural a basis for the insects as was consistent with their control and strictly comparative results, particular care being taken that the insects should have the opportunity of feeding during the experiments. Most of the remedies were those already in common use. The tests with cytisine were made at the suggestion of Dr. H. H. Dale, who very kindly supplied me with the preparation.

Cytisine is an alkaloid showing similar physiological properties to those of nicotine, but much less volatile. It was for this reason and the fact that, as it is extracted from the seeds of gorse and laburnum, an abundant supply of the raw material necessary for its manufacture is easily obtainable, that Dr. Dale suggested its trial as a remedy. (Dale and Laidlaw on the physiological action of cytisine, *Journ. Pharm. Exper. Ther.*, 1912, 3, 205.)

Preliminary trials carried out with naphthalene showed that the diffusion of vapours over the body surface beneath clothing is restricted to a very small area round the centre of distribution, in so far as it had any effect on lice. Presumably this depends partly on the curved surface of the body and partly

FIG. 1.—Small bags of silk gauze (motor veil chiffon) kept from collapsing by a wire gauze circle.

on the difference in temperature between it and the surrounding air.

Twenty-five grams of flake naphthalene were placed in a long tube of fine muslin (nainsook) which was worn as a belt next the skin. Lice in small bags of silk gauze (motor veil chiffon), kept from collapsing by a wire gauze circle (Fig. 1), were suspended between the skin and

clothing at various parts of the body above and below this belt—back, chest, abdomen, and hips—the greatest distance being 5 or 6 in. from the belt. One bag slipped from its fastenings and fell to within an inch of the belt. After a three hours' trial, it was found that the insects in the fallen bag alone were affected, some of the lice in it being paralysed, though none were actually dead.

In a second trial 5 grams of naphthalene were wrapped up in a small packet of motor veil, and this was put into one of the bags containing a number of lice and placed next the skin. A second bag, also stocked with lice, was placed in close proximity to the first, the edges of the two bags being separated by a space of only half an inch. In the first bag, in which the lice might actually come in contact with the naphthalene, the insects were killed within 3 hours, but in the second bag, although they were not noticed to feed after the first 2 hours, they were found on examination to be still active after 6 hours; many had relaxed their hold after 11 hours, but some were still active. This bag was removed after 11 hours from its proximity to the one containing the naphthalene. When examined next morning most of the lice had recovered; only two larvae and one adult were dead out of thirty in all stages of development.

This experiment was repeated—using three bags, one on either side of that containing the naphthalene. The quantity used was again 5 grams, and the surface area of the packet was 4 square inches. After 3 hours the great majority of the lice in the central bag were dead, but three or four larvae and nymphs about to undergo a moult were active. No effect at all had been produced in the adjoining bags. After 9 hours all were dead in the central bag, but in the bags on either side a few adults only had been affected and none were actually dead, though some were partially paralysed.

In order to test the relative effects of contact and diffusion of a number of remedies with greater accuracy a small apparatus was designed (Fig. 2), consisting of five wire gauze frames, each capable of being covered by a small gauze bag; they constituted a series of five small

FIG. 2.—Set of five wire gauze square frames, three of them covered by small gauze bags, one with cover removed, and one in the middle containing a square inch of thick lint.

cages, each 1 in. square by $\frac{3}{4}$ in. deep; they were fixed to a flexible bar with their edges in contact and so arranged that the whole could be tied firmly against the body, the gauze on one side coming in contact with the skin so that the captive lice could feed.

In the central chamber, referred to as "contact" in the experiments, was placed a 1 in. square of thick lint impregnated with the fluid or substance it was desired to test. This lint was carefully weighed before and after impregnation, so that the weight of substance in relation to area of surface was accurately determined. Lice were placed in all five chambers—their relative position being referred to as 2 left, 1 left, contact, 1 right, and 2 right, respectively.

In one case three substances were tested at once, the substances being placed as follows:

REMEDY	CONTROL	REMEDY	CONTROL	REMEDY
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The lice in the control chambers served to indicate either the action by diffusion, if any, or the fact that the substances tested were in no way interfering with each other's action on the lice.

The tests conducted with this apparatus were usually of 8 to 12 hours' duration, it being impracticable to sleep with it bound to the body. When the apparatus was removed at night the chambers were placed in separate boxes for a complete examination next day.

Naphthalene.

The 1 in. square of lint was dipped in a 30 per cent. solution of naphthalene in "benzole"; after the "benzole" had completely evaporated the lint held 0.133 of a gram of naphthalene; 45 lice put into the "contact" compartment were all killed within three hours. A few were immobile in chambers 1 right and 1 left, but most of them were active, as well as all those in 2 right and 2 left.

After 10 hours:
1 right ... 24 immobile, 3 active.
1 left ... 35 " 4 "
2 right and 2 left ... Many immobile, a few active.

An examination next day showed that many had recovered.

Result:
"Contact" ... All killed (in 3 hours).
1 right ... 8 killed, 19 living.
1 left ... 4 " 35 "
2 right ... 1 " 24 "
2 left ... All living.

The lint was weighed next day; the loss of naphthalene was approximately half, 0.070 gram. It was left on a shelf exposed to the air at about 65° F. On the second day crystals were still visible in the fabric with the aid of a lens. On the third none were visible, but it smelt strongly. On the fourth day it smelt faintly. On the sixth no smell was perceptible.

Sulphur.

Flowers of sulphur were dissolved in carbon bisulphide; the solution contained 15 per cent. of sulphur. The lint, after a thorough evaporation, retained 0.138 gram of sulphur.

No effect was observed on any of the lice in any of the chambers after 12 hours. Examination next morning showed the following result:

"Contact" ... 15 dead, 20 living.
1 right ... 2 " 14 "
1 left ... 9 " 12 "
2 right ... All 28 "
2 left ... All 20 "

A loss of weight (presumably by the dusting out in fine powder) to the extent of 0.034 gram took place.

The survivors were kept in a box and fed; 2 more died within the next 24 hours.

"Cresylic Acid."

A few small drops were distributed over the surface of a piece of lint; by weight the quantity was 0.240 gram. After 3 hours all were immobile in the "contact" chamber, but activity was still seen in the adjoining ones. After 9 hours no movements were observed in 1 right or 1 left, but activity was still observable in 2 right and 2 left.

The cresylic acid spread on to the gauze caused a burn on the skin, and no doubt had spread also on to the gauze of the adjoining chambers, 1 right and 1 left.

Result:
"Contact" ... All dead (24).
1 right ... " (27).
1 left ... " (27).
2 right ... 5 dead, 1 paralysed, 16 living.
2 left ... 3 " 2 " 21 "

Two of the survivors died, and one became paralysed within the next 24 hours. The lint retained its smell for 6 days. No smell was noticeable after 8 days.

Iodoform.

One gram was dissolved in 10 c.cm. of ether, and the lint was immersed in the solution. After the evaporation of the ether the lint retained 0.112 of a gram of iodoform. After 4 hours the lice in "contact" chamber were immobile, but had not loosed their hold; they were active in the other chambers. After 9 hours some of the lice in 1 right and 1 left were immobile.

Result:
"Contact" ... 16 dead; 3 nymphs show feeble movement.
1 right ... 2 " 15 living.
1 left ... 2 " 20 "
2 right ... 3 " 19 "
2 left ... 1 " 14 "

All the living were very active.

The lint retained its smell of iodoform for several weeks.

Vermijelli.*

0.350 gram was smeared on to the lint. After three hours the

* An insecticide prepared by Messrs. Bowley and Son, Battersea, on the basis of Professor Maxwell Lefroy's formula, as stated in the appendix to his pamphlet, *Measures for Avoidance and Extermination of Flies, Mosquitoes, Lice, and other Vermin*:-

"Bolton" oil or grease (cracking point above 600°) ... 20 grams
(Texas) fuel oil (sp. gr. 0.86, boiling point 200° C. to 350° C.) ... 50 grams (58 c.cm.)
Pure soft soap ... 30 "
Water (about) ... 6 c.cm.

lice were active in all chambers. After nine hours none were observed to be affected.

Result:
"Contact" ... 3 dead, 1 feeble, 18 active.
1 right ... 20 "
1 left ... 2 dead ... 19 "
2 right ... 25 "
2 left ... 1 dead ... 21 "

Five of the lice in the contact chamber died two days after the experiment.†

Vaseline: Naphthalene: Kerosene Oil: Benzole.

Vaseline, 1 gram 10 per cent. solution of naphthalene in kerosene 1 c.cm.; 30 per cent. solution of naphthalene in benzole 1 c.cm. The benzole would certainly have evaporated prior to use; 0.400 gram of this mixture was rubbed into the lint. After 3 hours: "Contact" all immobile. Some active in all the adjoining chambers. After 9 hours: Those in "contact" certainly dead; some still active in side chambers.

Result:
"Contact" ... All dead.
1 right ... 2 dead, 20 living.
1 left ... 2 " 18 "
2 right ... 20 "
2 left ... 1 dead, 19 "

Vermijelli with Cresylic Acid.

The cresylic acid was added to a concentration of 10 per cent.; 0.212 gram rubbed into the lint. After 3 hours: "Contact" all immobile; some active in side chambers. After 9 hours: No change observed.

Result:
"Contact" ... All dead.
1 right ... 1 dead, 17 living.
1 left ... 1 " 19 "
2 right ... 23 "
2 left ... 1 dead, 23 "

Cytisine.

0.100 gram dissolved in chloroform. The chloroform was entirely evaporated before the test. After 3 hours: "Contact" all immobile; movement occurring in all the other chambers. After 8 hours: All have relaxed their hold in contact; some are immobile in 1 right and 1 left.

Result:
"Contact" ... All dead.
1 right ... 3 dead, 20 living.
1 left ... 2 " 18 "
2 right ... 20 "
2 left ... 1 dead, 20 "

Vermijelli with Phenol.

The phenol was added to a concentration of 10 per cent. and 0.219 gram rubbed into the lint. After 3 hours: "Contact" all immobile; movement observed in all the other chambers. After 9 hours: In contact all have relaxed their hold; movement still to be seen in the other chambers.

Result:
"Contact" ... All dead.
1 right ... 1 dead, 21 living.
1 left ... 21 "
2 right ... 2 dead, 17 "
2 left ... 1 " 22 "

Iodoform, Cytisine, and Sulphur.

A further trial was carried out between iodoform, cytisine, and sulphur, all of which, being very slow in dispersion, would presumably be effective for a long period.

The pieces of lint used were those employed in the previous tests; having been freely exposed to the air in a room since the previous trials, that with sulphur for one month, with iodoform for twenty-three days, and with cytisine for seven days. The trials were all made at one time. The chambers 1 right and 1 left were stocked with lice to act as controls in case of diffusing effects. The position in the chambers was as follows:

SULPHUR	CONTROL	CYTISINE	CONTROL	IODOFORM
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After 3 hours—Sulphur: lice clustered together, but apparently all living. Cytisine: nearly all immobile. Iodoform: a few immobile—one or two possibly dead, others active. After 9 hours—No change to record.

Result:
None of the controls in intermediate chambers were affected.
Sulphur ... 1 dead, 19 active.
Cytisine ... 2 dead, 17 paralysed, 1 active.
Iodoform ... 10 dead, 3 paralysed, 5 partially paralysed, 3 active.

† It is doubtful to what extent the deaths were due to the vermijelli. No doubt some were, but in this and all the experiments an allowance must be made for natural deaths; when using lice from a stock box some will be old and may die naturally during the course of the experiment.

All the living insects were kept two days and given opportunity of feeding.

The final result then was:

Sulphur	...	...	19 living; mortality 5 per cent.
Cytisine	...	...	2 " " 90 "
Iodoform	...	...	2 " " 90 "

The action of both iodoform and cytisine after so considerable a lapse of time was hopeful and rendered further tests desirable.

To impregnate the pieces of lint the cytisine was dissolved in chloroform and the iodoform in ether. The quantities used were 6 mg. of cytisine and 5 mg. of iodoform on pieces of lint 1 in. square.

After 5 hours—Cytisine: all but one seem paralysed. Iodoform: 6 appear paralysed and 4 of these may be dead; 22 can walk, and one pair are copulating. The trial was then stopped and the insects boxed for examination next day.

Result:

Cytisine ... 6 are dead, the rest partially or wholly recovered.

Iodoform ... 1 is dead, the rest apparently recovered.

Two days after the trial:

Cytisine ... 2 more have died—8 out of 28.

Iodoform ... 7 " " 8 " 28.

The net results of the trials is to suggest that the diffusive effects of all the substances, except possibly naphthalene, is so slight as to reduce them all to a common level of contact remedies. Viewed in this light it is necessary to impregnate or thoroughly dust underclothing with them to obtain any effect. For this purpose the cost of iodoform and cytisine is likely to prove prohibitive, although their use might be practical for impregnating the seams of trousers in the neighbourhood of the fork. For this purpose the long period of their effectiveness would be a set-off against the high first cost of treatment. Cytisine has the advantage of being odourless and quicker in action than iodoform.

Naphthalene used as a powder is likely to be wasted, and when made up into sachets with sawdust, as suggested by Noel,¹ or moulded into tablets, will probably lose its effectiveness just in proportion to the slowing of its evaporation. If used in a form in which garments can be impregnated with it, it is an almost perfect remedy, as it kills quickly, and where there is any risk of infection is probably the best means available. The chief objection is its rapid evaporation; by the second day after impregnation of flannel shirting its power has either greatly waned or has already departed, according to the original quantity used. As Kinloch² has already pointed out, nothing is gained by the addition of iodoform to naphthalene as in the N.C.I. powder.

Insecticidal Effect when Substances are Used in Diluted Condition to Impregnate Cloth.

Attention was next directed to remedies of low cost and slow action with a view to testing their effectiveness in preventing breeding when used to impregnate garments. For this purpose the system and apparatus used in the previous experiments were not suitable, because it was necessary to keep adult lice confined for several days in order that there might be ample time for egg laying and for the eggs to develop. The following method was found to work satisfactorily in preliminary trials.

Shallow card boxes, 1 in. in diameter by $\frac{3}{4}$ in. deep, were lined at bottom and sides with flannel shirting material that had been washed and dried by ordinary laundry process and then dipped in the solution it was desired to test, and dried off rapidly. The open top of the boxes was covered with fine chiffon, through which the insects fed. These boxes were kept by day in a linen bag suspended beneath the clothing; at night they were placed beneath a belt with the chiffon against the skin, the period available for feeding being about seven hours.

Three, or more usually four, females and two males were placed in each box; they were removed from the boxes after a week; the eggs laid were then counted and their position noted. All those laid elsewhere than on the treated material were removed and the test continued until the eggs hatched and the young lice had passed the first moult and recommenced to feed.

Control (untreated flannel used): 1 died; 121 eggs were laid on the flannel, none elsewhere. *Result:* The eggs hatched in due course, the larvae fed, moulted, and recommenced to feed.

Sulphur.—Flannel dipped in colloidal solution of sulphur: 1 female died; 117 eggs laid on flannel, none elsewhere. *Result:* Same as control.

Vermijelli.—Flannel treated with a 4 per cent. solution of vermijelli in water: 2 females died, 72 eggs on flannel, 1 on box, 6 on gauze cover. *Result:* Same as control.

Vermijelli.—Flannel treated with a 4 per cent. watery solution of vermijelli, to which cresylic acid had been previously added to a concentration of 5 per cent.: 1 male died, 74 eggs laid on the flannel, and 14 on the gauze cover. *Result:* Same as control.

Vermijelli and Cresylic Acid.—Flannel treated with a 10 per cent. watery solution of vermijelli, to which cresylic acid had been previously added to a concentration of 5 per cent.: 2 females and 1 male died, 70 eggs laid on flannel, and 21 on the gauze cover. *Result:* Two or three larvae died, otherwise same as control.

Vermijelli and Naphthalene.—Flannel treated with a 5 per cent. watery solution of vermijelli, to which 20 per cent. of naphthalene had been added before making the solution. *Result:* All the lice killed within 1 hour, no eggs laid.

In these experiments the tests were commenced as soon as the prepared flannel was thoroughly dry.

The last remedy is open to the objection already recorded against naphthalene, namely, the short period—about two days at most—for which it remains effective. The use of naphthalene in this series, employing the box method, however, affords a standard of comparison with the gauze bag trials of the earlier series, and indicates that the condition of these later trials favours the remedies as against the insects. In making this comparison it must be borne in mind that the quantities of vermijelli used in the later series was very much smaller than in the former when the undiluted preparation was smeared over the lint.

In the further trials with the box method, the flannel after treatment and drying was generally exposed to the air in a room with a temperature of about 65° F. for a longer or shorter period before the trial.

The following additional preparations were experimented with: An emulsion consisting of equal parts of soft soap and "crude liquid carbolic acid"; also several preparations of a rosin soap—crude carbolic acid emulsion allied to the Isthmian mosquito larvicide used by the Panama Canal authorities. This preparation did not give a perfect emulsion and consequently proved unreliable for impregnating flannel. The same remarks apply to emulsions of soft soap and crude carbolic, in which less than 40 per cent. of soft soap was used.

Flannel Treated Two Days before Use; Period of Test 18 Hours.

Five per cent. solution of an emulsion consisting of equal parts of soft soap and "crude carbolic." *Result:* 4 females and 1 male killed; 1 male paralysed, no eggs laid.

Five per cent. solution of vermijelli to which 20 per cent. of naphthalene had been added. *Result:* None of the adults were killed and a number of eggs were laid.

The contrast between the results of the first and second trials of the vermijelli-naphthalene preparation affords clear evidence of the rapid evaporation and consequent deterioration of effectiveness of this remedy if a couple of days be allowed to elapse between the impregnation of the flannel and its use. The smell of naphthalene was only faintly discernible when the test was made.

A method was next instituted to test not only the effectiveness of the remedy as against lice, but its action on the skin.

Pieces of flannel, about 2 in. by 3 in. were treated and dried. A pocket of fine chiffon was then stitched on to the flannel, a number of lice inserted, and the open end stitched down, thus imprisoning the insects between the gauze and flannel. These pieces of flannel were then pinned on to the inside of the shirt in a suitable situation for the insects to feed through the chiffon, which was set against the skin.

Series I.—The following trials were made with flannel treated two days previously to test with:

1. A 3 per cent. solution of an emulsion consisting of 100 parts crude carbolic, 20 parts naphthalene, 70 parts of soft soap.
2. A 3 per cent. solution of an emulsion consisting of 100 parts crude carbolic and 70 parts of soft soap.
3. Treated with a solution of naphthalene in benzole at the time of trial; the flannel held 0.05 gram by weight.

After 20 hours the results were as under:

1. Two dead, 16 living; a few eggs laid.
2. Nine dead (this number includes all the females), 11 living (all males or nymphs); no eggs laid.
3. All living (20); a number of eggs laid.

No irritation caused to skin.

Series II.—In another series the flannel was treated one day prior to use, the remedies being:

4. A 10 per cent. solution of a kerosene soft soap emulsion containing naphthalene.

*The suppliers state that the fluid supplied consists chiefly of cresols mixed with a little phenol, and a certain proportion of higher homologues.

5. A 5 per cent. solution of an emulsion consisting of 100 parts soft soap, 100 parts crude carbolic, and 20 parts naphthalene.
6. A 5 per cent. solution of an emulsion consisting of 100 parts soft soap with 100 parts crude carbolic acid.

After 24 hours' trial the results were as under:

4. Seventeen living, 4 dead; a few eggs laid.
5. Fifteen living, 5 dead, 1 paralysed; 1 egg laid.
6. One living, 19 dead; no eggs laid.

No irritation was caused to the skin.

A Jaeger flannel shirt was then impregnated with a 10 per cent. solution of an emulsion consisting of equal parts of soft soap and crude carbolic. The shirt took up 1,000 c.cm., and after wringing out held 600 c.cm. After drying, lice were imprisoned in pockets of chiffon stitched on to the inner side of the shirt in the following positions: (1) On the chest; (2) in the lumbar region of the back; (3) on the outer side of the upper arm.

None were killed within 3 hours. After 5 hours a number in situations 1 and 2 were either dead or paralysed. After 10 hours all or nearly all were dead at 1 and 2, but many were still active on the arm. After 18 hours all were dead in situations 1 and 2, while of those at 3, 7 were dead and 4 paralysed. No eggs were laid. The effect on the skin was a slightly disagreeable irritation at the armpits and lumbar region. The lice fed at the commencement of the trial.

The test was repeated, using a 5 per cent. solution of the same emulsion; the wringing out process was rather more drastic—the garment retaining only 500 c.cm. It was dried during the night, lice being confined under covers of chiffon on the following day in the same situations as previously. After 10 hours some were still living in positions 1 and 2, and all were active at 3.

First Day.—After 24 hours all were dead in 1 and 2, but a few still lived in 3. No eggs were laid. Pockets 1 and 2 restocked.

Second Day.—Twenty-four hours later all were dead in the restocked pockets, also the survivors in 3. No eggs were laid.

Third Day.—The shirt was worn the next 48 hours without restocking.

Fourth Day.—The old pockets were then restocked.

Fifth Day.—Twenty-four hours later a number had died in pockets 1 and 2, but others were still living; in 3 a few were dead, others active. The frayed condition of the old pockets 1 and 2 necessitated their renewal; they were renewed and restocked. No. 3 was left.

Sixth Day.—After another 24 hours it was found that many of the lice were still living in 1 and 2; those in 3 were now all dead—a few eggs having been laid. No. 3 was not restocked. Pockets 1 and 2 were left, and a new one (No. 4) was placed on the upper part of chest and stocked.

Seventh Day.—After a further 24 hours nearly all the survivors in No. 1 were dead. No eggs laid; in No. 2 some were still active. In No. 4 all were active.

Eighth Day.—In No. 1: 9 were dead, 4 living; 36 eggs had been laid. In No. 4: 4 were dead, 16 living; 40 eggs had been laid.

The garment still smelt of carbolic, perhaps sufficiently to have some deterrent effect, but the lethal effect had evidently passed away.

No unpleasant skin irritation was noticed; a slight tingling that could just be discerned was experienced on two occasions after the start.

It may be concluded that the practical effect of the impregnation lasts about six or seven days, while the smell would possibly act as a deterrent for a few days longer.

Another shirt was impregnated with a 3 per cent. solution; after wringing, it was found to hold 500 c.cm. It was dried during the night and lice were placed in a pocket on the chest next day. After forty-eight hours, although one or two were dead, the great majority were still active.

Cytisine.

Further experiments with cytisine were made with the kind assistance of my friend Dr. A. J. Ewins, to ascertain the minimum quantity that would be of practical service for impregnating garments, and the period during which this preparation retains its efficacy.

The method employed was to impregnate pieces of flannel shirting, similar to that used for army shirts, with weak solutions. After thoroughly drying, a piece of fine silk gauze was stitched on, forming a pocket, under which the lice were placed. The piece of flannel was then pinned on the inside of the shirt, so that the insects were able to feed through the silk gauze.

Using 1 mg. per square inch of surface, 7 out of 16 lice were killed in two days, but none of the survivors died within the next three days.

Using 5 mg. per square inch, 11 out of 12 were killed within the first 24 hours, one young larva remaining active. The pocket was then restocked, and 10 out of 15 were killed within two days. A further restock resulted in 6 out of 14 dying in the

next two days. A number of eggs were laid by the survivors. The piece of flannel was then completely extracted with chloroform, with the result that only traces of cytisine were recovered.

Using 10 mg. per square inch:

1st stock: 19 lice were all killed within 24 hours.

2nd stock: 15 lice—9 were killed and 3 paralysed within 24 hours; 3 remained active.

3rd stock: Of 15 lice, 10 were killed and 1 paralysed within 24 hours; 3 remained active.

4th stock: Of 14 lice, 10 were killed and 4 remained active after 24 hours.

5th stock: Of 12 lice, 3 were killed and 9 remained active after 24 hours.

6th stock: Of 12 lice, 9 were killed and 3 were paralysed within 24 hours.

7th stock: Of 10 lice, 8 were killed and 3 remained active after 28 hours.

8th stock: Of 10 lice, all were active after 24 hours, but within the next 26 hours all were killed.

9th stock: Of 9 lice, all were active after 24 hours; 6 were active after 48 hours; 5 after 72 hours; 4 after 96 hours; 5 dying during the course of the test.

The apparent falling off in lethal power at the period of the 6th stock was probably due to the fact that a cool day checked sweating.

Although quite satisfactory from an experimental point of view, there are two apparently insurmountable difficulties which prevent the use of cytisine as a practical remedy. First, its possible toxic effect if used to impregnate garments. At a concentration which, after drying, would leave 10 mg. per square inch, the quantity required to treat a shirt would amount to some 12 to 15 grams; while, if the absorption over a large area of skin proved to be cumulative, the presence of such a quantity might lead to serious or even fatal poisoning. Secondly, the high cost of production would tend to make it an extravagantly expensive remedy.

These latter trials suggest that a practical remedy may be found for preventing the spread of lice among troops by the use of a "crude liquid carbolic acid" and soft soap emulsion for the impregnation of shirts and underclothing. The emulsion should consist of 45 per cent. to 50 per cent. of soft soap, combined by heating with 50 per cent. to 55 per cent. of the crude carbolic. The strength of the solution used to impregnate the garments should be 5 per cent. of the emulsion in warm water, 3 per cent. being too weak for practical use; while solutions above 5 per cent. might cause irritation to the skin. After dipping, the garments should be wrung and thoroughly dried before wearing. A normal sized flannel shirt after wringing will retain about 500 to 600 c.cm. of the solution, and the cost would probably, apart from labour, be about one halfpenny per shirt.

What is now required is a test on a practical scale to ascertain (a) what percentage of men are likely to have irritable skins which might be susceptible to the small percentage of cresols in the shirt, and (b) to ascertain the efficacy of the remedy to keep men free from lice in the field.

I desire to record my thanks to my colleague, Dr. Harriette Chick, for valuable suggestions and advice.

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- 2 J. Parlane Kinloch, M.D.: An investigation of the best methods of destroying lice and other body vermin. *BRITISH MEDICAL JOURNAL*, June 3rd, 1916, p. 789 et seq.

DR. C. A. LAUBACH has published the result of an investigation to determine the possible share played by books in the dissemination of disease (*Bulletin Johns Hopkins Hospital*, 1916, xxvii, p. 183). The books examined were seventy-five dirty school library books used by children living in unfavourable sanitary conditions, 150 books handled by diphtheria patients, and a series of books artificially contaminated with *B. coli*, *typhosus*, and *diphtheriae*. The library books contained no dangerous germ, though in two instances the colon bacillus was discovered. The diphtherial bacillus could not be detected in any one of the 150 books. The *B. coli*, *typhosus*, and *diphtheriae* remained virulent for months when lodged artificially inside books, and continued as active when placed on the outer side of the covers if the volumes were kept in the dark. On the other hand, when the books were exposed to diffuse daylight, the typhoid and diphtheria bacilli never lived for over twelve days, and were destroyed by direct sunlight within a few hours.