in man is to diminish gastric acidity, not to increase it. This we have observed here, in confirmation of other workers. Our experiments do, however, raise the question whether those with impaired kidney function should be allowed to smoke.

Summary

Nicotine exerts an antidiuretic effect in the rat. This effect does not occur if the pituitary body is removed.

Smoking exerts an antidiuretic effect in man. In a sensitive subject one cigarette will inhibit diuresis for 2 to 3 hours.

The same antidiuretic effect is produced in man by the injection of nicotine intravenously in an amount approximately equal to the amount absorbed from one cigarette.

It is probable that the nicotine absorbed from cigarette smoke stimulates the supra-optic nucleus of the hypothalamus and causes a discharge of the hormone from the posterior lobe of the pituitary gland.

Our thanks are due to those already mentioned in the paper, and also to Mr. E. M. Vaughan Williams and Mr. R. P. Michael for their care in making observations.

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ENFORCED LEISURE

A STUDY OF THE ACTIVITIES OF OFFICER PRISONERS OF WAR

BY

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 Captain, R.A.M.C.

Recent articles and correspondence in the medical press on prisoner-of-war mentality have naturally caused considerable discussion in P.O.W. camps. Whether rehabilitation on a large scale will be necessary or not is difficult for the individual to say. Nevertheless some observations on how the P.O.W. spends his time may be of general interest. In this paper an attempt is made not to produce an average individual but to assess what contribution the average prisoner makes to the life of the camp.

Ofag VII/B was originally formed as a camp for young officers. Its strength varies, but in the period under review is about 1,700, of whom 110 are Canadians, 117 are Australians, 87 are New Zealanders, and the rest are from the British Isles. There is a sprinkling of officers from other parts of the Empire. One is justified in regarding it as presenting a fair cross-section of the educated classes of the Empire. The living conditions, as regards accommodation, are fairly similar, while the food is completely standardized. Facilities for recreation, study, sport, etc., are available in exactly the same measure to everybody. The extent to which these facilities are exploited naturally depends on the individual.

Despite the limitations of the questionnaire form of investigation, it was chosen as being the only one practicable in the peculiar circumstances of captivity. A questionnaire covering all possible forms of camp activity was drawn up. This was issued to a number of patients in hospital, who were asked to allocate times on the basis of an average day to the various activities. The data thus collected proved interesting, and it was decided to extend the investigation to get a fair sample of the camp as a whole. The questionnaire was issued to various people, with a request that in each case every member of the mess or room should answer it. In some cases the return was 100%, in others there were one or two men who, for various reasons, refused to co-operate. Nevertheless I think that the return represents a fair cross-section of the camp.

It will be observed that no name is asked for; nevertheless, by inquiry it was generally possible to trace individuals when any point required clarifying. One objection raised was, What

Form of Questionnaire

Country (or Dominion) of Origin :	Age :
Previous Occupation :	Educational Standard :
Length of Captivity :	
Average Day :	
I. Camp official (administrative, parcel, education, medical, sports, etc.)	 hrs.
II. Activity for benefit of community (non-official): e.g., work on wood pile, gardening, tutoring, block cooks, T.O.C. nursing, voluntary massage, or any other altruistic activity	 hrs.
III. Study: (a) Prescribed course for examination	 hrs.
(b) Language—which?	 hrs.
(c) General study	 hrs.
IV. Handicrafts: Model-making, woodwork, tinsmithing, knitting, etc.	 hrs.
V. Art: Painting, drawing, sketching, modelling, etc.	 hrs.
VI. Music: (a) As performer. What type of instrument?	 hrs.
(b) Listening	 hrs.
VII. Writing: (a) Books or articles for possible publication	 hrs.
(b) Diary or scrapbook for own amusement	 hrs.
VIII. Dramatics: (a) Actor	 hrs.
(b) Producer, stage hand, scenery designer, etc.	 hrs.
IX. Reading: (a) Serious	 hrs.
(b) Light	 hrs.
X. Sport or exercise: (a) Active	 hrs.
(b) Spectator	 hrs.
XI. Indoor games, chess, or cards for amusement or nominal stakes	 hrs.
XII. Gambling	 hrs.
XIII. Serious discussion	 hrs.
XIV. Aimless gossip (war, reminiscences, local gossip)	 hrs.
XV. Sleeping and eating	 hrs.
XVI. Time spent on household fatigues	 hrs.
XVII. Hobbies: bird-watching, flowers, collecting (types of cigarettes, etc.)	 hrs.
XVIII. Do you attend general interest lectures?	
XIX. Do you work to a time-table?	
XX. Have you improved, or not, physically? How? Since when?	
XXI. Have you improved, or not, mentally, especially with regard to interest, concentration, and memory?	

is the difference between "study" and "serious reading" or between "light" and "serious" reading? To me it seems purely an individual distinction. Most people know what they are trying to study and they also have their own standards of serious and light reading, and I have accepted these standards.

Results

TABLE I.—Returns Collected from 300 Officers

Average age: 29.8 years.	
Educational standard: High, in that 97—i.e., 32.3%—were either University graduates or undergraduates; 16—i.e., 5%—had various professional qualifications.	
I. Official duties	35 mins.
II. Altruistic activities	46 "
III. Study: (a) Course for exam.	1 hr. 5 mins.
(b) Languages	29 "
(c) General	55 "
IV. Handicrafts	14 "
V. Art	6 "
VI. Music: (a) Performer	9 mins.
(b) Listener	14 "
VII. Writing: (a) For public	4 "
(b) Diary, etc.	3 "
VIII. Dramatics: Actors and stage assistants	3 "
IX. Reading: (a) Serious	1 hr. 1 min.
(b) Light	1 " 5 "
X. Sport: (a) Active	1 " 1 "
(b) Spectator	23 "
XI. Cards	20 "
XII. Gambling	11 "
XIII. Serious discussion	24 "
XIV. Aimless gossip	1 hr. 16 "
XV. Sleeping and eating	10 hrs. 37 "
XVI. Household fatigues	1 hr. 3 "
XVII. Hobbies	6 "
Unaccounted time	1 " 50 "
	24 hrs. 00 mins.
XVIII. General interest lectures	Yes = 57.3%; No = 42.7%
XIX. Work to time-table	" = 29.0%; " = 71.0%
XX. Feeling physically impaired	" = 33.7%; " = 66.3%
XXI. Feeling psychologically impaired	" = 40.0%; " = 60.0%

Discussion of Table I

The first two groups cover most of the actual work required for the running of the camp. The average time of 35 minutes per head for camp administration may appear high to an efficiency expert. 100 forms recorded some kind of activity. Three claimed to work 7 hours and one 6 hours a day, but the majority worked 1/2 to 1 hour a day. (Frequency Diagram 1.)

In Group II 45 minutes also appears high. Nevertheless, in a P.O.W. camp there is a considerable amount of reciprocal service. The massage department in the hospital is entirely staffed by volunteers, all of whom have learned massage in captivity. Block cooking is also done by volunteers; while, apart from the teaching organization, there is an enormous amount of private tuition.

III. *Study*.—The overall averages in this group are misleading (see Frequency Diagrams 3, 4, and 5). (a) *Courses*:—29% claim to be following courses of study, and on an average they study 3 hours 46 minutes a day. One claims 11 hours, one 9 hours a day. Although these figures seem high they are not incredible. From reveille onward the study rooms are continuously occupied. (b) *Languages*:—Most prisoners have studied some language—usually

DIAGRAM 1

DIAGRAM 3

DIAGRAM 5

DIAGRAM 8

DIAGRAM 2

DIAGRAM 4

DIAGRAM 6

DIAGRAM 7

DIAGRAM 10

DIAGRAM 9

FREQUENCY DIAGRAM 1.—Group 1, Camp Administration: 100 record some form of activity; 200 record *nil*. (In all these diagrams the “*nil*” column has been omitted owing to lack of space.)

FREQUENCY DIAGRAM 2.—Group II, Altruistic Activities: 135 record activity; 165 record *nil*.

FREQUENCY DIAGRAM 3.—Group III, Study; (a), group taking prescribed course: 87 students.

FREQUENCY DIAGRAM 4.—Group III, Study; (b), group studying languages: 93 students.

FREQUENCY DIAGRAM 5.—Group III, Study; (c), general study group: 153 students.

G rman—at one stage or another in their captivity. In the present sample 31% study, on an average, 1 hour 32 minutes daily. German and French head the list; Russian is popular; every European language has its students. Less well-known languages, such as Gaelic, Afrikaans, Urdu, Malayan, Arabic, receive attention. (c) *General study*:—51% register time spent on general study. This represents 1 hour 47 minutes per head, as contrasted with 3 hours 46 minutes in the group pursuing courses of study. It suggests that even in captivity study must have a purpose. The simple pursuit of knowledge is not enough.

IV. *Handicrafts*.—17% are occupied on hand work of some description. Towards the end of winter, knitting was fashionable. Tapestry, needlework, weaving, tailoring, watch-making, model-making, all occupy a certain amount of time, but the total time and the time per head are relatively small.

V. *Art*.—11% devote 32 to 35 hours to drawing, sketching, or painting. This represents about 57 minutes per head.

VI. *Music*.—(a) *Performers*:—There are enough musicians in the camp to provide music for all shows and, in addition, to stage a music festival covering symphonic, choral, orchestral, light orchestral, chamber music, and dance band programmes. This, however, is the work of a relatively small number. In the present sample 13 average 1 hour 8 minutes a day, but this figure includes one man who spends 4 hours a day orchestrating music for the various instruments in the camp. (b) *Listeners*:—Apart from the musicians the camp has an excellent record library and a fair number of gramophones. 132 people devote, on an average, 32 minutes a day to music—i.e., about two evenings a week.

VII. *Writing*.—(a) The number of potential or active writers at 12.3% is probably high. The actual “market” is small, and con-

FREQUENCY DIAGRAM 6.—Group IV, Handicrafts: 51 occupied; 249 *nil*. * Time claimed, less than 1/4 hour per day.

FREQUENCY DIAGRAM 7.—Group V, Art: 33 occupied; 267 *nil*. * Time claimed, less than 1/4 hour per day.

FREQUENCY DIAGRAM 8.—Group VI, Music; (a), Performer: 13 performers; 287 *nil*. * Less than 1/4 hour per day.

FREQUENCY DIAGRAM 9.—Group VI, Music; (b), Listener: 132 listeners; 168 *nil*. * Less than 1/4 hour per day.

FREQUENCY DIAGRAM 10.—Group VIII, Dramatics: 9 actors, etc.; 291 *nil*. * Less than 1/4 hour per day.

sists of two monthly camp magazines. (b) The number of people keeping diaries—25.3%—also seems high considering the unexciting round of ordinary camp life. However, it is a personal and unexciting form of self-expression, and is one of the few open to a prisoner of war.

VIII. *Dramatics*.—Only 3% claimed to be in any way occupied with the stage. The acting fraternity tend to live together, and it is possible that they are not fairly represented in the survey. Nevertheless, the plays staged in the camp are produced by a small number of good actors—so good, indeed, that the tyro has very little chance. (It is interesting that the most spectacular features of camp life—viz., the Arts and Crafts Exhibition and the theatre shows—are, basically, the work of very few and do not in any degree represent the industry and talent of the camp as a whole.)

IX. *Reading*.—Everybody reads to a greater or lesser extent. The only negative returns in this category were from men who spend several hours a day in study.

X. *Sport*.—Similarly, everyone takes some form of exercise. The limiting factor in some cases is not so much lack of energy or equipment as lack of space, and every sports field is used continuously by fresh teams throughout the hours of daylight.

XI. *Cards and Indoor Games*.—These are not as popular as one might have expected. However, the season (early summer) may to some extent account for this.

XII. *Gambling*.—10% are occupied in games of chance. The camp moralists are inclined to disapprove. Nevertheless it provides a harmless outlet for a variety of captivity and social impulses. The craving for excitement can be satisfied to a certain extent, and the acquisitive instinct can sometimes be gratified without the community being in any way affected.

XIII. *Serious Discussion*.—I consider an average of 24 minutes per head a modest understatement.

XIV. *Aimless Gossip*.—An average of 1 hour 16 minutes per head is probably fair. Normally, there are not enough rumours or camp trivialities to occupy very much more time than this unless one gravitates from group to group. So, for lack of subject-matter, an aimless gossip quite often becomes a serious discussion.

XV and XVI. —Rooms are divided into messes, numbering from 2 to 8 members. Members in turn prepare food and do the fatigues incidental to eating. Sleeping and eating are among the most important of camp activities.

XVII. *Hobbies*.—Naturally there is very little scope for this form of activity. Popular are bird-watching, butterfly-collecting, collecting various brands of cigarettes, coins (?), razor blades; designing homes, motor-cars, yachts. *Unaccounted Time*.—Roll calls occupy about 30 minutes a day. The remainder is taken up in various insignificant ways—"doing nothing," as one man expressed it. No allowance on the questionnaire was made for meditation. Two people claimed 4 hours a day under this heading.

XVIII. *General Interest Lectures*.—"Occasionally" and "Sometimes" were interpreted as affirmatives.

XIX. *Work to a Time-table*.—I had assumed that most prisoners would slip into some form of daily routine, and, as a matter of habit, stick to it. Apparently the majority do not.

XX.—In an endeavour to avoid the suggestion contained in the words "impaired" or "deteriorated" the question read, "Have you improved, or not, physically?" To my surprise a few admitted to actual physical improvement. 66.3% consider themselves unimpaired or are not certain about it. Of the impaired group the deterioration is expressed as "loss of weight," "no stamina," "teeth and eyes affected," "sinusitis," "asthma developed," "migraine started." In the last two instances I naturally tried to establish some connexion between captivity and the onset. In migraine I was unsuccessful, in that each of the patients had actually had migraine for some years, but the label had been attached only during captivity. Regarding asthma, several cases have developed since capture. Clinically, headache, sciatica, and rheumatism are fairly common, and are to a large extent, no doubt, somatic manifestations of mental strain. Whether competent psychological treatment would, in the circumstances, be successful is an academic matter, because such treatment is not available. In its absence, headache is described as probably due to sinusitis or eye strain and treated accordingly. The other conditions are treated symptomatically—not, unfortunately, with uniform success.

XXI.—It was rather difficult to assess answers, in that a number of replies confused "interest" with "interests," and so some of the men replied: "Memory and concentration worse. Interest wider and improved." In general, it appears that memory and concentration have suffered, while interest is erratic. A few regard their captivity as a total loss, while others, making a virtue of necessity, have used their leisure for broadening their interests. Naturally there is no strict line of demarcation between the physical and mental states, and replies expressing a deterioration in one often express a similar deterioration in the other.

Grouping by Length of Captivity

By way of contrast, and in order to provide a kind of chronological "Prisoners' Progress," replies have been subdivided into four groups—1-, 2-, 3-, and 4-year prisoners respectively. Of further interest is the origin of the groups. Groups 1 and 4 are chiefly from the British Isles, Group 2 is predominantly Canadian, and Group 3 predominantly Australian and New Zealand.

The following is an analysis of the sample summarized in Table I. The number in Group 1 is probably high in proportion to the total number of 1-year prisoners in the camp. The other groups are roughly in proportion.

Group 1	..	..	Number 26	..	..	Average age 28.8 years
" 2	..	..	" 36	..	..	" 32.8 "
" 3	..	..	" 81	..	..	" 30.3 "
" 4	..	..	" 157	..	..	" 29.1 "

TABLE II

Group:	1-Year	2-Year	3-Year	4-Year
I. Official duties	22 m.	35 m.	31 m.	39 m.
II. Altruistic activities	37 m.	31 m.	56 m.	45 m.
III. Study:				
(a) Course	1 h. 0 m.	48 m.	1 h. 0 m.	1 h. 12 m.
(b) Language	9 m.	22 m.	34 m.	31 m.
(c) General	50 m.	1 h. 3 m.	1 h. 1 m.	52 m.
	1 h. 59 m.	2 h. 13 m.	2 h. 35 m.	2 h. 35 m.
IV. Handicrafts	2 m.	11 m.	26 m.	11 m.
V. Art	7 m.	2 m.	4 m.	9 m.
VI. Music:				
(a) Performer	1 m.	2 m.	10 m.	11 m.
(b) Listener	19 m.	7 m.	14 m.	15 m.
VII. Writing:				
(a) Publication	5 m.		3 m.	6 m.
(b) Diary (percentage writing)	38%	31%	23%	23%
VIII. Dramatics	No comparison possible			
IX. Reading:				
(a) Serious	47 m.	43 m.	1 h. 6 m.	1 h. 6 m.
(b) Light	2 h. 5 m.	1 h. 11 m.	48 m.	1 h. 2 m.
X. Sport:				
(a) Active	1 h. 0 m.	58 m.	1 h. 0 m.	1 h. 2 m.
(b) Passive	37 m.	33 m.	16 m.	23 m.
XI. Indoor games and cards	21 m.	35 m.	19 m.	18 m.
XII. Gambling	5 m.	25 m.	12 m.	7 m.
XIII. Serious discussion	13 m.	26 m.	25 m.	25 m.
XIV. Gossip	1 h. 35 m.	1 h. 0 m.	1 h. 0 m.	1 h. 25 m.
XV. Sleeping and eating	11 h. 0 m.	10 h. 40 m.	10 h. 32 m.	10 h. 35 m.
XVI. Fatigues	1 h. 9 m.	1 h. 11 m.	1 h. 9 m.	1 h. 2 m.
XVII. Hobbies (percentage with)	8%	22%	23%	25%
Unaccounted time	1 h. 36 m.	2 h. 37 m.	2 h. 14 m.	1 h. 44 m.
	24 h. 0 m.	24 h. 0 m.	24 h. 0 m.	24 h. 0 m.
XVIII. General interest lectures: Yes	31%	61%	58%	61%
XIX. Work to time-table: Yes	12%	22%	37%	29%
XX. Feeling physically impaired: Yes	15%	47%	40%	33%
XXI. Feeling psychologically impaired: Yes	19%	55%	41%	38%

Discussion of Table II

The similarity between Groups 3 and 4 may be due to two causes: (a) larger numbers in groups eliminate the swings in either direction owing to individuals recording high figures in a particular activity; (b) possibly, after two years, adjustment to captivity is fairly complete and a more or less stereotyped "average" routine is adopted.

Study.—It is remarkable how quickly first-year prisoners have got down to courses of study.

Music.—Several of the older prisoners have learned music in captivity, which probably accounts for the slight increase in time.

Writing.—The number writing diaries decreases after the first novelty wears off.

Physical Impairment.—In Group 1 this is due to temporary unfit-ness from wounds. The same applies to a few in Group 2, but, apart from that, there is no clinical difference between the groups. Nevertheless, this survey is, of course, purely subjective, and indicates what the individual thinks about his physical and mental state. The relatively low figures for the 4-year group may be due to three factors: (a) They represent a rather younger age group; (b) they show more complete mental adjustment; (c) possibly a matter of pride, and refusal to admit to impairment after a long spell in adverse circumstances.

Analysis of Effect according to Age

Finally, in order to determine the effect of age on the use of leisure and the mental attitude towards captivity, the sample has been divided into two groups—under 30 and over 30. A sharper contrast would naturally have been provided by an under 30 and over 40 comparison. However, the number of prisoners over 40 is too small to permit this. (See Table III.)

Group I: Under 30	..	Number 179	..	Average age 26.4 years
" II: Over 30	..	" 121	..	" 35.8 "

Discussion of Table III

The older age group is, not unexpectedly, occupied to a greater extent on administrative and altruistic activities. Comparison of the two groups with regard to study is interesting because of (a) the large number of men over 30 who are following courses, and (b) the amount of time devoted by this group to study. The older group appears to be slightly ahead on art, music, writing, and dramatics. The figures for light and serious reading are what one would

TABLE III

	Under 30	Over 30
I. Official duties	28 m.	45 m.
II. Altruistic activities	40 m.	55 m.
III. Study: (a) Course	(30%) 1 h. 8 m.	(27%) 1 h. 0 m.
(b) Language	33 m.	23 m.
(c) General	59 m.	50 m.
IV. Handicrafts	2 h. 40 m.	2 h. 13 m.
V. Art	18 m.	9 m.
VI. Music: (a) Performer	5 m.	9 m.
(b) Listener	8 m.	10 m.
VII. Writing: (a) Publication	15 m.	12 m.
(b) Diary	4 m.	5 m.
VIII. Dramatics	22% 2 m.	30% 6 m.
IX. Reading: (a) Serious	52 m.	1 h. 16 m.
(b) Light	1 h. 11 m.	55 m.
X. Sport: (a) Active	1 h. 7 m.	52 m.
(b) Spectator	25 m.	20 m.
XI. Indoor games and cards	18 m.	20 m.
XII. Gambling	9 m.	13 m.
XIII. Serious discussion	23 m.	26 m.
XIV. Aimless gossip	1 h. 20 m.	1 h. 10 m.
XV. Sleeping and eating	10 h. 37 m.	10 h. 38 m.
XVI. Fatigues	1 h. 6 m.	1 h. 6 m.
XVII. Hobbies	22% 1 h. 52 m.	22% 1 h. 56 m.
Unaccounted time	24 h. 0 m.	24 h. 0 m.
XVIII. General interest lectures: Yes	55%	60%
XIX. Work to time-table: Yes	25%	35%
XX. Feeling physically impaired: Yes	32%	39%
XXI. Feeling psychologically impaired: Yes	40%	41%

normally expect. Similarly, the amount of time spent by the younger group on sport is naturally rather higher. That the over 30 group should attend general interest lectures to a greater extent is unexpected; but that they should be more apt to work to a routine is natural. The older age group would feel that they had suffered deterioration physically to a greater extent than the younger. Under any circumstances physical activity would tend to be less over the age of 30. With regard to mental deterioration the two groups are almost equal.

General Conclusions

Under wartime conditions most people are forced to "waste time" in the sense that individual studies and careers are interrupted. The prisoner of war, in this respect, is no worse off than anyone else, except that he has leisure which, although unlimited in time, yet in space is very strictly limited. He utilizes this in activities which may be roughly grouped under three headings.

(a) *Work*.—Official and altruistic activities, study and fatigues amounting to about 5 hours a day per head.

(b) *Vegetative and—Predominantly—Time-consuming Activities*.—These are represented by: sleeping and eating, gossip, card-playing, and unaccounted time, amounting to about 14½ hours a day per head.

(c) *Creative and Recreational*.—Art, music, handicrafts, writing, dramatics, reading, hobbies, sport, and lectures, amounting to about 4½ hours a day.

From this it would be rash to draw general conclusions, but, under P.O.W. conditions, I doubt whether the time spent on creative and recreational activities could be much increased even with unlimited facilities. Apart from reading and sport, the average English education makes no provision for leisure. (Judging from camp activities, the Australian and New Zealand systems follow the English fairly closely.) The North American education is worse in this respect. The 2-year group seem to reflect a high level of specialized education in that there are more university degrees than in the other groups, yet the average time spent in Category C is only 2½ hours per head.

My general impression is that the physical and mental well-being of the P.O.W. largely depends on his daily activities and, of course, conversely. This is rather strikingly illustrated by the case of an ex-schoolmaster who worked conscientiously 6 hours a day for 3 years, passed two difficult exams., and then quite suddenly developed sciatica and polyneuritis, which incapacitated him for further study. Few of the replies were as clear-cut as this. Nevertheless, in replies which devoted most time to vegetative and time-consuming pursuits, there was a greater tendency to admit physical and mental impairment or to complain of symptoms for which an organic basis could not be found. This may represent a "P.O.W. neurosis" similar to the commoner "war neurosis," which, according to Gillespie, arises

at a superficial level and will presumably disappear when the conditions causing it are removed.

It is a pleasure to acknowledge the work done by the various branches of the Red Cross and other charitable organizations in providing the necessary facilities to enable P.O.W.s to lead a fairly normal life in captivity. I am indebted to Major G. Hadley, R.A.M.C., and Major E. Parker, R.E., for help and criticism, and to numerous officers in camp for assistance.

SUBSTANCES USED IN TREATMENT OF PEDICULOSIS CAPITIS THEIR RELATIVE VALUE

BY

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The objects of the investigations here described were to test the efficiency of substances which have recently been recommended for the destruction of head lice and their nits, and to compare these with older methods. The substances were first brought to trial by laboratory tests in which their insecticidal and ovicidal actions were observed under the conditions of controlled bench experiments. They were then tried by direct observation of their effects on subjects kept under controlled clinical conditions. Some of the substances were tried by a third method of attempting infestation in volunteers whose heads had been treated with the test substance.

The newer substances on trial were: (1) 50% lethane 384 special in a white oil (Busvine and Buxton, 1942); (2) 25% technical lauryl thiocyanate in a white oil (Busvine and Buxton, 1942); (3) ascabiol (new formula), a non-irritating preparation of benzyl benzoate emulsion (Blackstock, 1944); (4) emulsion

D.D.T. (dichloro-diphenyl-trichloroethane)

of D.D.T.: 4 parts D.D.T. in (30 parts heavy solvless naphtha + 10 parts "amoa A.S.X."). Diluted with water to give 2% D.D.T. This D.D.T. emulsion was supplied by the Ministry of Health for experimental purposes.

The older substances tried for the purpose of comparison were: carbolic acid solution (1 in 40 and 1 in 60), "derbac" soap, 20% solution of dettol, concentrated infusion of quassia, quassia mixture (Jørgensen, 1940), 12.5% formalin soap mixture B.P.C. (Ministry of Health Memo., 1940), spirit soap, formalin, 0.1% mercuric chloride in spirit, 0.1% aqueous mercuric chloride, methylated spirits, 3 to 1 mixture of methylated spirits and water, 2% lysol, 2% β -naphthol in spirit, ol. abietis in spirit, oil of cedarwood, oil of citronella, oil of lemon-grass, oil of sassafras, oil of turpentine, paraffin oil, and 5% tar oil.

Laboratory Tests

Laboratory tests are carried out under arranged experimental environments which are to that extent artificial, but they are useful as a preliminary to clinical tests because they demonstrate which of the test substances have no lethal action. These substances can then be discarded as useless and requiring no further clinical test. Laboratory tests are useful also in indicating the manner in which the substances kill the lice. From this the most suitable methods of their application to the hair and scalp can be deduced. For example, a substance may be shown to act through its vapour, and so the best method of applying it (apart from elaborate mechanical devices: Lebailly, 1937) will be by soaking the head with the substance and covering it with a rubber cap to keep the maximum amount of the lethal vapour in contact with the hair. Other substances act directly on the lice, presumably entering their bodies through their external chitinous skeletons. The effect of each insecticide on the nit (or egg) has also to be determined, because if one application of any substance is to be effective it must kill all the nits as well as all the lice. If it does not kill all the nits, larvae will hatch out during 6 to 8 days after treatment, and the state of infestation will continue unless the insecticide persists on the hair and scalp over this period and kills the larvae as they hatch out.