quently five cases in one practitioner's practice must be considered most unusual. The age incidence is more or less in conformity with other people's findings. The sex incidence, however, is well worth noting: I had two males and three females, and another practitioner had one female—that is, four females and two males. Creed states that the relation is two males to one female—mine is the reverse. He also says that the reason why so many males are infected is that they only drink milk spasmodically and not often enough to keep up their immunity. Perhaps it is the females who don't drink milk sufficiently nowadays, in case they lose their figures! There is also one other point: a husband and wife were found to be suffering from the disease. It appears, from what Sir Weldon Dalrymple-Champneys says, that this is the first married couple that has been reported suffering from the disease. They were both ill at the same time. It is said that abortus fever is not transmitted from man to man. Here it may have been. It appears that one attack confers lasting immunity on the individual, and it may be possible that many people become immunized by repeated small doses of infected milk and yet never develop any definite signs of the disease.

I understand that there is a movement afoot by the Board of Agriculture and Fisheries to try to stamp out the disease.

Pasteurization of milk is the only safeguard against abortus fever. This must be done with a proper plant, as *home* pasteurization, which has been tried by one family, has not been a success, since each member complained that the milk was unpalatable.

I beg to thank Sir Weldon Dalrymple-Champneys for his great kindness and for many helpful suggestions in preparing these notes, and also Dr. Colville, medical officer of health for Bridlington, for reports on the herd and the milk.

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G. Frontali and G. Ferrari (*Minerva med.*, 1938, 29, 133) record their observations on fourteen cases of pellagra, five in men and nine in women. Seven had had from one to six previous attacks, and in seven it was the first attack. All had severe attacks with nervous symptoms, and in ten cases psychical symptoms were also present. Three cases were chronic forms with symptoms of dementia, and belonged to families in which other members had had psychoses associated with pellagra. Seven cases showed forms of amentia with depressive manifestations, and two of these were also chronic alcoholics with delirious ideas and visual and auditory hallucinations. All the patients were treated for periods ranging from thirty days (nine cases) to forty or fifty days (five cases) with nicotinic acid in doses of 160 mg., partly by mouth and partly by intramuscular injection. In four cases the treatment was associated with a diet likely to produce pellagra. The results were the same in all cases. There was: (1) complete cure of the pellagrous dermatitis in one or two weeks; (2) resumption of the normal digestive functions and a gain of 5 to 8 kg. in thirty to thirty-two days; and (3) a slow but sure disappearance of nervous symptoms in three or four weeks' time. As regards the psychical manifestations, the three chronic cases with dementia showed no appreciable change, while the others made a complete recovery.

THE SUPPRESSION OF LACTATION BY ORAL OESTROGEN THERAPY

BY

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Recent progress in the study of lactation has assigned to the anterior pituitary gland the initiation of yet another physiological process—namely, lactation. A large body of workers have demonstrated that injections of anterior-lobe extracts stimulate lactation in the mammary glands of guinea-pigs, rabbits, ferrets, goats, cats, dogs, sows, cows, and monkeys where previously they have been adequately treated with oestrogens. The literature is very well reviewed by Folley (1938).

It is common knowledge that lactation in the human does not begin until forty-eight to seventy hours after the birth of the child, and is preceded by a gradual engorgement and distension of the breasts, which are stimulated by the mechanical action of suckling; this causes release of the lactogenic hormone from the anterior pituitary (Selye, Collip, and Thomson, 1934). In view of the interrelation and antagonism of the various hormones in the body it is thought that the development of the breasts occurs under the influence of oestrogen and progesterone during gestation. Oestrogen causes growth of the duct system, while progesterone and oestrogen develop the lobule-alveolar system (Nelson, 1936). At parturition, and following the separation of the placenta, the oestrogen-progesterone level falls and the inhibition of the anterior pituitary is removed, with the result that the release of lactogenic hormone stimulates milk formation in the mammary glands (Nelson, 1936).

Clinically this knowledge is of considerable importance from two main aspects: (1) stimulation of lactation; (2) suppression of lactation.

Stimulation of Lactation

This depends upon treatment of cases showing a deficiency of milk secretion with the anterior pituitary lactogenic hormone called "prolactin" by Riddle. So far experiments have almost exclusively been carried out on animals, but Folley (1938) suggests that the extracts used must have/contained other pituitary factors. Kurzrok, Bates, Riddle, and Miller (1934) and Ross (1938) claim that there is a slight increase of secretion in women after administration of large doses of prolactin, and that the mothers treated were able to nurse their infants completely on discharge from hospital, whilst the untreated controls had to use artificial feeds. The impurity of the extracts at present available is probably responsible for severe local reactions which follow the injections of the larger doses, and, so far, the stimulation of lactation is of scientific interest only.

Suppression of Milk Secretion

This is a definite clinical application of great importance, but unfortunately it is as yet very little known. Once lactation is established, Folley (1936) has shown, in

the cow, that oestradiol monobenzoate and oestrone concentrate the fatty and non-fatty solid content of the milk. It is suggested that the administration of exogenous oestrin will inhibit the anterior pituitary also and depress the lactogenic principle. Various reports have appeared on this inhibitory action by injections of the follicular hormone in lactating rats (Folley and Kon, 1938; Herold, 1938) and women (Lindemann, 1938; Brea and Gándara, 1937; Adrian, 1938), mostly using quite large doses by the intramuscular route.

It is our object to show that small doses by mouth are perfectly adequate and that a definite advance can be claimed for such simple therapy. Our attention was called particularly to the action of oestradiol benzoate injections in suppressing lactation following attempts to induce labour and for sensitization of the uterus when the foetus was believed to be dead. It was found that after delivery the breasts were devoid of all secretion of milk.

Case A.—Mrs. H., aged 30, 1-para, was admitted at full term on October 7, 1937. Medical induction at 5 p.m. on October 7 and surgical induction on October 11 failed to start pains. Oestradiol benzoate (progynon) 5 mg. was injected intramuscularly as follows: On October 14 at 7 and 9 p.m.; on October 20 at 12 noon and 4 p.m.; on October 30 at 12 noon, 4 p.m., and 8 p.m. Labour commenced at 12 noon on November 1 of its own accord, and a normal male infant was born at 6.55 p.m. the same day, weighing 6 lb. 13 oz. As a result of this treatment with oestradiol benzoate the breast secretion was absent and the child was put on artificial feeds.

Case B.—Mrs. T., aged 29, 1-para; due May 5, 1937. No movements were felt on March 9, and it was thought that the uterus was becoming smaller. The patient was admitted on March 10, and oestradiol benzoate (progynon) 5 mg. was given the same day. Medical induction was tried on March 11. On March 13, 5 mg. of progynon was given at 2, 3, 4, and 5 p.m. A macerated foetus was expelled at 2 p.m. on the 14th with the cord around the neck five times. Breast secretion was absent.

A case of lactorrhoea was treated in September, 1936:

Case C.—Mrs. R., aged 38, had had three children, the youngest of whom was 2½ years old. She came to hospital on September 23 thinking she was pregnant, as her breasts had swollen and were leaking milk. Her periods had been regular from a month after the last baby, which she fed for four to five months. On June 27, 1936, she had noticed that her breasts had become full of milk, and this condition had persisted since. A sample was expressed for analysis, and was found to be normal human milk. Oestradiol benzoate in doses varying from 5 mg. once weekly to 15 mg. twice a week for periods up to a month effected a temporary suppression only. It was found also that small doses of oestrone (1,000 I.U.) given by mouth frequently had the same temporary effect.

Tage Kemp and Pedersen-Bjergaard (1937), in a paper on absorption and excretion of oestrone, state that "the hormone that is administered orally is rapidly absorbed, and is found for a short time in a fairly highly concentrated form in the blood," but it is also very rapidly excreted. "Nevertheless, since oral administration has many practical advantages it will often be preferred. The hormone must, then, be given divided into as many doses as possible during the course of the day, and so far as is possible in a form that will be absorbed slowly." Accordingly a few cases received oral therapy, using progynon dragees, which contain oestrone and also equilin, equilin, and naturally occurring lipoids. The number of patients available in private practice was small; consequently a series of cases were collected at

Table showing Case Details

Case	Age	Para	Birth	Indication	Treatment and Results
1	33	2	22/6/38	Macerated foetus; prolapsed cord	Tab. ii, 2-hourly for 12 hours then 4-hourly for 3 days. Breast secretion nil
2	20	1	1/5/38	Stillbirth, 36 weeks	2/5/38. Tab. v, b.d. 6/5/38. Breasts normal
3	41	2	23/3/38	Stillbirth ..	28/3/38. Tab. v, b.d. Breasts full 29/3/38. Still full, not painful 30/3/38. Breasts comfortable
4	32	1	8/6/38	Stillbirth, full term	11/6/38. Tab. v, b.d. 13/6/38. Breasts normal
5	18	1	14/5/38	Stillbirth, full term	15/5/38. Tab. v, b.d. 16/5/38. " " Comfortable
6	40	7	31/3/38	Stillbirth, overdue	31/3/38. Tab. v, b.d. 4/4/38. Breasts normal
7	20	1	27/3/38	Stillbirth, full term	31/3/38. Tab. v, b.d. 1/4/38. Breasts normal
8	26	1	27/3/38	Stillbirth, 42 weeks	28/3/38. Tab. v, b.d. 29/3/38. " " Breasts still active 1/4/38. " " Breasts still active 2/4/38. Breasts normal
9	39	1	13/3/38	Stillbirth, 42 weeks	17/3/38. Tab. v, b.d. 19/3/38. Breasts comfortable
10	33	6	1/8/38	A.P.H. and 36 weeks' macerated foetus	2/8/38. Tab. ii, 2-hourly; 5 doses 3/8/38. Breasts fair. Tab. ii, 2-hourly 4/8/38. Breasts normal
11	36	2	16/4/38	Stillbirth, full term	16/4/38. Tab. v, b.d. 17/4/38. " " 19/4/38. Breasts normal
12	28	2	19/4/38	Stillbirth, full term	19/4/38. Tab. v, b.d. 23/4/38. Breasts comfortable
13	32	2	7/8/38	Stillbirth, 32 weeks	8/8/38. Tab. ii, 2-hourly; 5 doses 9/8/38. Tab. ii, 2-hourly 12/8/38. Breasts soft and comfortable
14	25	1	20/1/38	Stillbirth, full term	24/1/38. Tab. v, at night 25/1/38. " " 26/1/38. Breasts normal
15	24	1	13/8/38	Stillbirth, 35 weeks	14/8/38. Tab. ii, 2-hourly; 5 doses 15/8/38. Tab. ii, 2-hourly 18/8/38. Breasts still full. Tab. v. 19/8/38. Tab. v and fluid restriction 21/8/38. Breasts normal
16	25	1	14/8/38	Anencephalic	15/8/38. Tab. v, b.d. 19/8/38. Breasts normal
17	33	1	19/5/38	Stillbirth, full term	23/5/38. Tab. v, b.d. Breasts heavy 25/5/38. Breasts normal
18	21	1	2/8/38	Anencephalic	7/8/38. Tab. ii, 2-hourly; 5 doses 8/8/38. " " 11/8/38. Breasts "normal"
19	26	1	10/3/38	Stillbirth, 7 months	11/3/38. Tab. ii, 2-hourly; 5 doses 12/3/38. " " 15/3/38. Breasts "normal"
20	40	5	5/5/38	Stillbirth, full term	7/5/38. Tab. v 8/5/38. " 9/5/38. " 10/5/38. Breasts normal
21	39	1	8/7/38	Stillbirth ..	11/7/38. Tab. v 13/7/38. Breasts normal
22	25	3	21/4/38	Stillbirth, full term	22/4/38. Tab. v, b.d. 25/4/38. Breasts soft. 26/4/38. Breasts full. Tab. v, b.d. 29/4/38. Breasts normal
23	25	1	1/8/38	Stillbirth, full term	2/8/38. Tab. v, b.d. 5/8/38. Breasts normal
24	24	1	13/1/38	Stillbirth, 37 weeks	17/1/38. Tab. v, b.d. 24/1/38. Breasts normal
25	28	2	21/6/38	Stillbirth, full term	24/6/38. Tab. v, b.d. 26/6/38. Breasts normal
26	28	2	25/7/38	Stillbirth, full term	26/7/38. Breasts painful. Tab. v, b.d. 27/7/38. Tab. v, b.d. 28/7/38. Breasts comfortable

Table showing Case Details (continued)

Case	Age	Para	Birth	Indication	Treatment and Results
27	27	1	9/6/38	Stillbirth, post-mature	11/6/38. Tab. v, b.d. 13/6/38. Breasts normal
28	29	1	28/7/38	Stillbirth, full term	29/7/38. Tab. v, b.d. 31/7/38. Breasts normal
29	32	1	12/6/38	Stillbirth, post-mature	13/6/38. Tab. v, b.d. 14/6/38. " " 17/6/38. Breasts heavy 19/6/38. Breasts comfortable
30	27	1	4/1/38	Stillbirth, post-mature	7/1/38. Tab. v, b.d. 8/1/38. Breasts engorged. Tab. v, b.d. 9/1/38. Breasts comfortable
31	25	1	22/3/38	Stillbirth ..	22/3/38. Tab. v, b.d. 25/3/38. Breasts normal
32	29	1	7/8/38	Death of child: haemorrhagic disease	12/8/38. Tab. v, b.d. 14/8/38. Breasts normal
33	20	1	12/8/38	Death of child	18/8/38. Tab. ii, 2-hourly; 5 doses 19/8/38. A little milk 20/8/38. Breasts normal
34	30	2	23/4/38	Child died at 7 days	2/5/38. Tab. v, b.d. 5/5/38. Breasts normal
35	21	1	1/8/38	Child died: spina bifida	4/8/38. Tab. v, b.d. 7/8/38. Breasts normal
36	27	3	27/3/28	Child died ..	31/3/38. Tab. v, b.d. 3/4/38. Breasts normal
37	30	7	21/1/38	Child died 7th day	29/1/38. Tab. v, b.d. 30/1/38. Breasts heavy. Tab. v, b.d. 1/2/38. Breasts comfortable
38	32	1	22/6/38	Child died 2/7/38	3/7/38. Tab. v, b.d. 4/7/38. " " 5/7/38. " " 7/7/38. Breasts normal
39	25	1	14/1/38	Child died 15/1/38	17/1/38. Breasts engorged. Tab. v, b.d. 18/1/38. Breasts normal
40	40	4	25/1/38	Twins died ..	29/1/38. Tab. v 30/1/38. Breasts heavy. Tab. v 31/1/38. Breasts normal
41	38	2	18/3/38	Died: spina bifida	30/3/38. Tab. v, b.d. Breasts exhausted 1/4/38. Breasts full. Tab. v, b.d. 3/4/38. Breasts normal
42	37	1	12/7/38	Child died 13/7/38	15/7/38. Breasts painful, emptied. Tab. v, b.d. 16/7/38. Breasts full. Tab. v, b.d. 18/7/38. Breasts comfortable
43	24	1	12/4/38	Tuberculosis of mother	12/4/38. Tab. v, b.d. 13/4/38. Breasts normal
44	26	2	13/8/38	Tuberculosis of mother	15/8/38. Breasts full. Tab. v, b.d. 17/8/38. Breasts painful 18/8/38. Tab. v, b.d. 19/8/38. Breasts normal
45	24	1	22/6/38	Tuberculosis of mother	24/6/38. Tab. v, b.d. 27/6/38. Breasts full. Tab. v, b.d. 28/6/38. Breasts normal
46	25	1	19/3/38	Mother "chesty"	31/3/38. Tab. v, b.d. 4/4/38. Breasts comfortable
47	24	1	12/8/38	Tuberculosis of mother	12/8/38. Tab. v, b.d. 13/8/38. " " 15/8/38. Breasts full. Tab. v, b.d. 18/8/38. Breasts painful. Tab. ii, 2-hourly 19/8/38. Breasts normal
48	30	3	27/7/38	Tuberculosis of mother	31/7/38. Tab. v, b.d. 1/8/38. " " 2/8/38. Breasts full. Tab. v, b.d. 3/8/38. Breasts normal
49	34	3	14/5/38	Pyrexial cold of mother	4/7/38. Tab. i, hourly; 10 doses 5/7/38. " " 6/7/38. Breasts "comfortable"
50	29	2	12/2/38	Pyrexia of mother and catarrh	4/4/38. Tab. i, hourly; 10 doses 5/4/38. " " " 6/4/38. " " " 7/4/38. Breasts "comfortable"
51	41	4	31/12/38	Illness of mother	31/1/38. Tab. ii, 2-hourly 1/2/38. " " 2/2/38. " " 3/2/38. Breasts comfortable

Table showing Case Details (concluded)

Case	Age	Para	Birth	Indication	Treatment and Results
52	25	1	27/12/37	Illness of mother	17/1/38. Tab. ii, 2-hourly 18/1/38. " " 19/1/38. " " 20/1/38. Breasts "comfortable and soft"
53	39	2	12/12/37	Weaning for adoption	14/1/38. Tab. ii, every 4 hours 15/1/38. Tab. ii, 4-hourly 16/1/38. Tab. ii, 2-hourly 17/1/38. " " 20/1/38. Breasts comfortable
54	21	1	22/2/38	Weaned 5/3/38	5/3/38. Tab. v, b.d. 8/3/38. Breasts normal
55	23	1	15/3/38	Weaned for adoption	5/4/38. Tab. v, b.d. 8/4/38. Breasts normal
56	34	2	14/6/37	Weaned for operation on mother	18/8/38. Tab. v, b.d. 19/8/38. " " 21/8/38. Less milk 22/8/38. Breasts comfortable
57	27	2	26/7/38	Weaned ..	6/8/38. Tab. v, b.d. 8/8/38. Breasts normal
58	26	1	4/8/38	Weaned for adoption	7/8/38. Tab. v, b.d. 8/8/38. " " 9/8/38. " " 15/8/38. Breasts soft 17/8/38. Breasts normal
59	24	3	8/6/38	Breast abscess	15/6/38. Tab. i, hourly; 10 doses 16/6/38. Tab. i, hourly 17/6/38. " " 18/6/38. " " 19/6/38. Breasts normal and soft
60	25	1	7/11/37	Breast abscess	20/1/38. Tab. ii, 2-hourly; 6 doses 21/1/38. " " " 22/1/38. " " " 23/1/38. " " " 24/1/38. " " " 25/1/38. " " " 26/1/38. " " " 27/1/38. Comfortable and soft
61	29	1	10/5/38	Breast abscess	18/8/38. Tab. ii, 2-hourly 19/8/38. " " 20/8/38. " " 21/8/38. " "
62	28	2	4/7/38	Puerperal mania	20/7/38. Tab. v, b.d. 28/7/38. Breasts full again. 31/7/38. Tab. v, b.d. Breasts normal

Southmead Municipal Hospital, where facilities were ideal.

The particular indications which made it necessary to suppress lactation are tabulated below, with the number of each type treated in this series.

Stillbirth, miscarriage, or monstrosity	31
Death of child	11
Disease or illness of mother (tuberculosis, disease of heart, eclampsia, etc.)	10
Weaning for adoption or operation	6
Breast abscess	3
Puerperal mania	1

Method of Treatment

The older method of using belladonna plasters has long since been discarded, and at the present time great reliance is placed on the use of saline aperients such as magnesium sulphate, given frequently, fluids being restricted, as well as binding and supporting the breasts. In the large obstetrical unit of Southmead Hospital it has been found that this gives the nursing staff much extra work; for if lying-in treatment is conscientiously carried out the frequent attention with bed-pans is a great trouble, while the use of considerable numbers of sterile pads is an additional expense. At the same time this treatment is distressing to the mother, and may still further weaken a patient whose resistance is already

reduced by a difficult labour. For these reasons such a simple method as oral follicular hormone therapy is welcomed.

In the beginning two doses of five dragees each were given twice daily. The preparation used was progynon (Schering), and each dragee contained 1,000 I.U. of oestrone. In many cases this dose was found to be sufficient, and rapidly all engorgement of the breasts had ceased and the patients became much more comfortable. Sometimes the treatment was continued for two to six days. Later, with the idea of keeping up a continuous supply of inhibitory hormone, five doses of two tablets each were given two-hourly throughout the day, while some patients received one dragee hourly during the day, and also during the night if they were awake.

Results in sixty-two cases have been consistently satisfactory. The ideal method is to start treatment soon after delivery, giving two doses of five tablets each on the first day, following with five divided doses of two tablets each, two-hourly, on the succeeding day or days if necessary. If treatment is not begun until the third day, or later still, it may be necessary to continue two tablets two-hourly for two to four days. No fluid restriction or aperients are necessary, and even binding of the breasts may be omitted in most cases, the support of a brassiere being adequate. The average effective total dose is twenty to thirty tablets, which for hospital practice represents a cost of approximately 3s. to 4s. 6d. It may be argued that magnesium sulphate is much cheaper, but this is offset by the saving in nurses' time and the cost of sterile dressings, whilst many patients who have experienced both forms of treatment for the suppression of milk have no hesitation in their preference for this oral therapy. The nursing staff are most enthusiastic about the method, which has reduced their labours and at the same time relieved many mothers of anxiety and distress.

Later in the period of lactation this therapy has been found of great value for breast abscess. It is suggested that by suppressing lactation at the onset of engorgement and congestion, with attempts at localization, the duration of the case is shortened considerably, and, if an abscess forms, this can be dealt with much more easily in the absence of active milk secretion. The most noticeable effect is the rapid softening of hard, swollen, congested breasts, with almost immediate relief of discomfort; but if the tablets are given immediately after parturition the breasts remain soft and comfortable. However, some milk may be forcibly expressed for many days, and complete disappearance of all milk in the ducts may take some time.

The dosage found to be effective in this series of sixty-two cases was:

- 5 tablets b.d. for 1 day, successful in 26 cases.
- 5 tablets b.d. repeated for 2 to 3 days, successful in 21 cases.
- 2 tablets every two hours in 5 doses for 1 to 4 days, successful in 12 cases.
- 1 tablet hourly in 10 doses for 2 to 3 days, successful in 3 cases.

The time after the birth of the child when treatment was begun is here shown:

Time	Patients	Time	Patients
1st day	9	11th day	1
2nd "	16	12th "	2
3rd "	10	16th "	1
4th "	9	5th week	1
5th "	3	8th "	1
6th "	1	11th "	1
7th "	2	12th "	2
8th "	1	13th "	1
10th "	1		

Breasts were comfortable and soft in two days in eighteen patients, in three days in nineteen, and in four days in fifteen (a total of fifty-two); whilst, of the remain-

ing ten cases, in five days two were comfortable, in seven days five, and in six, ten, and eleven days one each. Thus fifty-two cases (84 per cent.) were comfortable within four days, and in the remaining ten cases a marked relief in tension was noticed but the breasts did not regain normal comfort until a few days later.

Discussion

Experience in a few cases of acromegaly and thyrotoxicosis when attempting to inhibit anterior pituitary function in human beings (Foss, 1937), together with Zondek's statement (1936) regarding the quantity of oestrogen necessary to retard growth and gonadotropic function in rats, makes it difficult to realize that oral oestrone in doses of 20,000 to 30,000 I.U. given over a period of two to six days can inhibit a function of the anterior pituitary. Normally this is only held in check by massive amounts of oestrogen and/or progesterone in the placenta. It is much more possible, in our view, that oestrone acts specifically on the mammary gland, in some way preventing the action of the lactogenic hormone of the anterior pituitary, or even by a direct antagonism to this lactogenic hormone. At present an explanation of this clinical finding cannot justifiably be ventured. It is unlikely that such small doses will in any way influence the chemical constitution of human milk.

We should like to acknowledge our thanks to Dr. S. J. Folley for his helpful criticism, to Dr. R. H. Parry for facilities for carrying out much of this research in the Southmead Municipal Hospital, Bristol, and to Dr. Neumann of Schering, Ltd., for samples of "progynon" dragees which were supplied for the early cases.

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The National Smoke Abatement Society (Chandos House, Buckingham Gate, S.W.1) has published under the title of *Britain's Burning Shame* a survey of the ravages caused by atmospheric pollution. This pamphlet, with profuse illustrations, is presented in simple terms. A foreword by Professor John Hilton emphasizes that smoke, which he describes as aerial sewage, is not a necessary evil. Emphasis is placed upon the ceaseless fight of women against dirt and dust, much of which results from the smoke-laden atmosphere in which the majority of the population is compelled to live. The bare facts here marshalled in simple fashion present a dramatic picture of the smoke menace, which competent authorities have estimated costs us not less than £40,000,000 a year. The smoke pall over towns and cities, often shutting out at least half the sunlight, encourages in children diseases of darkness like rickets. The tarry matter and acids contained in the soot increase the sufferings of those affected by respiratory diseases, as shown by the increases in deaths from these diseases during periods of protracted fog. Added to this is the psychological effect upon hundreds of thousands of the population who live in conditions approximating to perpetual gloom.