Gorham² writes: "Though ice of considerable thickness had formed above them, and they could breathe only the air collected beneath the ice," living larvæ were found beneath the ice in natural waters in December. Gorham does not state whether the larvæ belonged to the genus *Culex* or *Anopheles*.

Wright's observation is of considerable interest, it is nevertheless to be regretted that he does not state to which species of *Anopheles* the larvæ belong which he found hibernating beneath the ice at Torphins. Grassi³ (p. 47) claimed that there is a difference between the species of *Anopheles* in respect to the seasonal occurrence of the larvæ in natural waters, for he and Ficalbi found the larvæ of *A. bifurcatus* in Italy in midwinter, whereas none of *A. maculipennis* could be found by a trained assistant. Grassi considered that the larvæ of *A. bifurcatus* were hibernating. Though his observation suggested this possibility, they do not prove that the larvæ do actually hibernate, for it might very well be assumed that the larvæ he found had issued from eggs laid late in the season or during the winter.

Of the larvæ collected by us in various parts of England during the last year three lots hibernated:

1. Larvæ caught August 12th, 1900, at Gainsborough. Some of these lived until April 12th, 1901—that is, eight months. They were kept in tanks in the laboratory, but all of them died without having pupated.

2. Larvæ caught September 10th, 1900, on the River Ure. A number died during the winter. The first larva pupated April 18th, 1901, the imago appearing four days later. The larval stage in this case had lasted over seven months. Two other flies subsequently underwent successful metamorphosis.

3. Larvæ caught September 10th, 1900, near Garstang. Of this lot one survived, the insect pupating April 18th, the imago appearing eleven days later. The larval stage in this case had lasted over seven months.

Last autumn we had a large number of larvæ of *A. maculipennis* and *A. bifurcatus* in our tanks, mostly larvæ of the former species. As the winter progressed all the larvæ belonging to the former species gradually died off, whereas those of *A. bifurcatus* alone hibernated. These observations therefore prove for the first time that the larvæ of *A. bifurcatus* hibernate, the same insects being under continuous observation during the periods of time stated above.

Grassi has drawn attention to the differences existing between the larvæ of *A. maculipennis* and *A. bifurcatus*. We have been able to confirm his observations. I might in addition state that I have learnt to distinguish the two species of larvæ by naked-eye inspection alone.

Annett and Dutton do not state to which species the larvæ belonged which they obtained from Mr Theobald in December. The necessity of stating accurately on what species observations are made is evident from what I have just related.

Observations relating to the hibernation of the imago of *A. maculipennis* in England have already been recorded in the tables which accompany our "Studies"; it is interesting to have these observations confirmed by Annett and Dutton. During the past winter we have also had the opportunity of observing the hibernation of *A. maculipennis* and *A. bifurcatus* in cellars and out-houses.

We are continuing our investigations upon the biology and geographical and seasonal distribution of this genus in Great Britain as a part of the "Studies" which have appeared in the *Journal of Hygiene*. I might state that I caught a male *A. bifurcatus* on May 7th at Clonbrock near Ahascragh, co. Galway, this being the first recorded finding of a member of the genus in Western Ireland. There is but one record of its having been found in that country, that is, in Holywood, co. Down, by Haliday, in 1833. Whereas young larvæ of *A. maculipennis* were first caught on May 10th, 1900, we have found them numerous in pools about Cambridge on May 1st of this year.

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ON A COMMON SOURCE OF DIPHThERIAL INFECTION AND A MEANS OF DEALING WITH IT.

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THE purpose of this communication is to illustrate the frequency with which children whose throats are presumably healthy may serve as sources of diphtheria. The appended tables show the number of children, male and female, admitted into the wards of the Victoria Hospital for Children during 1900. In every case the throat was swabbed on admission and the swab sent to the Jenner Institute of Preventive Medicine for examination. The results obtained are shown (see p. 1475). It will be seen that the figures support two statements which are commonly made, and that they suggest the importance of two procedures which are generally neglected.

The first statement is that the Klebs-Loeffler bacillus and pseudo-diphtheria bacillus exist in the throat in a large number of cases, especially in children, without producing any recognisable symptoms. Out of 385 children under the age of 14 admitted for operation or for some illness other than diphtheria, only 235 were free from both kinds of bacteria. In 92, or 24 per cent., the pseudo-diphtheria bacillus was found; in 58, or 15 per cent., the Klebs-Loeffler.

Neglecting for the moment the presence of the pseudo-diphtheria bacillus, the pathogenic power of which is uncertain, these figures suggest that 1 out of every 7 children, or at least 1 out of every 7 sick children, is a possible source of diphtheria infection.

The second statement is that the presence in a hospital ward of children under 2 years of age increases the risk of outbreaks of diphtheria. This assertion seems justified by the figures given. Of the cases (275) that had reached the age of 2 or upwards, there were only 60 per cent. whose throats were free from both kinds of bacilli; and of those cases (110) that were under two years of age, 64 per cent. were free. Of the remainder—that is, those from whose fauces either the Klebs-Loeffler bacillus or the pseudo-diphtheria bacillus was obtained, there was this remarkable difference. In the children 2 years and upwards, the pseudo-diphtheria bacillus was found in nearly 28 per cent., and the Klebs-Loeffler bacillus in less than 13 per cent.; while in the children who had not completed their second year, the pseudo-diphtheria bacillus was only found in 14.5 per cent., but the Klebs-Loeffler bacillus in 21 per cent. It thus appears that of children who have not completed their second year, 1 out of every 5 is a possible source of diphtheria infection, but that in children over that age only 1 out of every 8 is a source of infection.

The figures quoted are too few to establish with certainty either of these conclusions, but they seem of sufficient interest to merit publication, when considered in relation to other published results. It is of course possible that in some cases bacilli may have been present but yet have escaped detection. Any errors arising in this way can, however, only add to the importance of the conclusions. In view of this possibility it is interesting to note that in only 7 of the cases was there any clinical evidence in favour of diphtheria, and that, on the first examination, in 3 of these cases no Klebs-Loeffler bacillus or pseudo-diphtheria bacillus was found in the throat.

The morals deducible from these figures are almost too obvious to need detailed statement. It is clear that babies and young children are not the harmless and innocent creatures usually imagined, and that kissing and other similar artificial demonstrations of childish affection should be discouraged. It is, moreover, more important and perhaps more practicable that mouth cleaning in infants and teeth cleaning in young children should be insisted on more vigorously. It is remarkable that so many parents fail to realise the danger which may thus arise, and the ease with

TABLES SHOWING CASES ADMITTED INTO VICTORIA HOSPITAL FOR CHILDREN DURING THE YEAR 1900.
(Compiled by W. J. SUSMANN, M.R.C.S., L.R.C.P., House-Physician.)

TABLE A.—Male Patients.

Age Under	Number Admitted.	Bacteriological Report on Admission.			Clinical Evidence of Diphtheria.	Bacteriological Report.		Remarks.
		No D. B.	Pseudo-B.	D. B.		On Admission.	On Discharge.	
3 months	11	8	2	1	—	—	—	—
6 "	12	6	1	5	—	—	—	—
1 year	18	11	3	4	1	D. B. present	—	8 hours in hosp.; discharged same day to Fev. Hosp.
2 years	30	20	5	5	1	D. B. present	D. B. present	24 hours in hospital; discharged to Fever Hospital.
3 "	19	13	5	1	—	—	—	—
4 "	22	12	5	5	1	D. B. present	D. B. present	48 hours in hospital; discharged to Fever Hospital.
5 "	8	4	4	—	—	—	—	—
6 "	14	11	2	1	—	—	—	—
7 "	16	6	8	2	—	—	—	—
8 "	12	8	2	2	1	D. B. present	D. B. present	3 days in hospital; discharged to Fever Hospital.
9 "	14	8	2	4	—	—	—	—
10 "	7	3	2	2	1	D.B. not prsnt.	D. B. present	5 days in hospital; discharged to Fever Hospital.
11 "	9	7	1	1	—	—	—	—
12 "	6	5	—	1	—	—	—	—
13 "	5	1	4	—	—	—	—	—
14 "	5	1	4	—	—	—	—	—
Total ...	208	124	52	32	5	—	—	—

TABLE B.—Female Patients.

Age Under	Number Admitted.	Bacteriological Report on Admission.			Clinical Evidence of Diphtheria.	Bacteriological Report.		Remarks.
		No D. B.	Pseudo-B.	D. B.		On Admission.	On Discharge.	
3 months	6	5	1	—	—	—	—	—
6 months	4	4	—	—	—	—	—	—
1 year	9	4	2	3	—	—	—	—
2 years	20	13	2	5	—	—	—	—
3 "	16	9	5	2	—	—	—	—
4 "	6	—	4	2	—	—	—	—
5 "	19	13	5	1	—	—	—	—
6 "	12	9	3	—	1	No D. B.	D. B. present	23 days in hospital; discharged to Fever Hospital.
7 "	9	6	2	1	—	—	—	—
8 "	9	7	1	1	1	No D. B.	D. B. present	18 days in hospital; discharged to Fever Hospital.
9 "	10	5	3	2	—	—	—	—
10 "	11	8	2	1	—	—	—	—
11 "	11	8	2	1	—	—	—	—
12 "	4	3	—	1	—	—	—	—
13 "	12	4	3	5	—	—	—	—
14 "	19	13	5	1	—	—	—	—
Total ...	177	111	40	26	2	—	—	—

which it may be avoided. If after every meal, in the case of a breast-fed or bottle-fed infant, or night and morning in an older child, the mouth were swabbed or rinsed with some mild but efficient antiseptic, such as glycerine of boric acid and warm water or a diluted solution of chinolol (1 per 1,000), many cases of diphtheria might be prevented.

The swabs on reception at the Jenner Institute were thoroughly rubbed over the surface of tubes of blood serum, which were then incubated at 37° C. for about twenty hours. Cover glasses were prepared from the growths, stained with Loeffler's alkaline methylene blue, and examined microscopically. In doubtful instances Gram's method was also employed. By the pseudo-diphtheria bacillus is meant the Hoffmann bacillus, the short, plump, deeply and uniformly staining organism which is so definite an object microscopically. In three cases the diphtheria bacilli were tested as to their virulence. The cultures were plated out, and pure cultivations having been obtained, broth cultures were made, and after incubation for forty-eight hours were used for inoculation. The results were as follows:

- 1.—2 c.cm. 48-hours broth culture. No effect.
Repeat, 5 c.cm. 48-hours broth culture. } Slightly virulent.
Death in 24 hours. Repeat 2 c.cm. 48-hours }
broth culture. Death in forty-eight hours }
- 2.—2 c.cm. 48-hours broth culture. Ulcer at } Feebly virulent.
seat of inoculation. Not lethal }
3.—2 c.cm. 48-hour broth culture. No effect } Feebly if at all viru-
lent. }

Of the three tested, therefore, these experiments show that they were only virulent to a slight degree. The following are some of the results obtained by other observers with regard to the occurrence of the Klebs-Loeffler and pseudo-diphtheria bacilli in the throats of persons with no signs of diphtheria:

Loeffler¹ examined 160 healthy school children, of whom 4 showed diphtheria bacilli in their throats.

Park and Beebe,² out of 330–250 are described as "children"—healthy throats examined, in 8 virulent Klebs-Loeffler bacilli were present; in 24 bacilli existed which, though morphologically Klebs-Loeffler bacilli, were non-virulent to animals; in 27 the pseudo-diphtheria bacillus was present.

Rober³ has made an extensive series of observations upon the presence of diphtheria bacilli in the healthy throat. There were 128 persons examined who had been in contact with cases of diphtheria, and 600 who had not knowingly been exposed to the disease. Of the 128 persons, the diphtheria bacillus was found in 10, a percentage of 8; and of the 600 persons, it was found in 15, or 2.5 per cent. Further inquiry among these 15 showed that 10 could be considered to have been exposed, directly or indirectly, to the disease, reducing the percentage of unexposed individuals who carried the bacilli in their throats to 0.83. The organisms among the persons who had been exposed to the disease were all virulent, but of the non-exposed only 5 were virulent.

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³ Zeitsch. f. Hyg., 1899, xxxi, p. 433.