known. Fleas, too, need attention. The dreaded plague is spread by means of infected rat-fleas that leave their natural host and pass to man. Fleas also convey other diseases, and apart from this, the broken rest due to flea-bites is a factor that makes even such an insignificant insect worthy of consideration.

Blood-sucking leeches occur in Belgium and Germany, and also in parts of India, Ceylon, Egypt, and Palestine. These animals, although not belonging to the arthropoda, constitute a

From "The Minor Horrors of War."

very real pest in some places, as they may occur in drinking water. The straining or filtering of drinking water and boiling it before use are simple means of avoiding distressing throat and lung troubles. The existence of voracious Indian land leeches, lurking among foliage in wait for their prey, will probably be news to many, but provides a useful hint with regard to sites for camping.

Man is affected by insect parasites not only through direct attacks upon himself, but also by infestation of his dwellings and his food. Flies

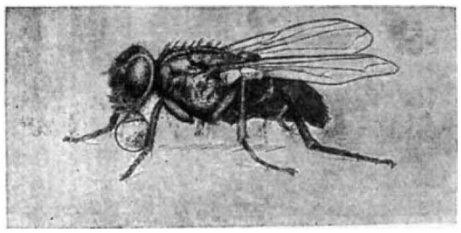

FIG. 3.—*Musca domestica*, the house-fly, in the act of regurgitating food. ×4½ (After Gordon Hewitt.) From "The Minor Horrors of War."

and flour moths are therefore discussed. Fortunately, the occurrence of "maggotty" biscuit (Fig. 2) is not so common as formerly, but the possibility of its recurrence under war conditions should be remembered. Flies are a more serious pest. House-flies are concerned with the conveyance of several diseases to man, typhoid fever perhaps being the best known. The typhoid bacilli can live for six days in the intestine of a house-fly, and food and milk can be polluted by its promiscuous visits during this period (Fig. 3). Insight into the life-history and habits of flies is sufficient to cause anyone to join in the anti-fly crusade. The love of filth and carrion displayed by the various blow-flies or meat-flies, too, is a means of spreading disease, and there are records, even in the present war, of wounded men suffering agony from the presence of fly larvæ in their neglected wounds. The abolition of filth is the simplest means of securing freedom from flies by destroying their breeding places.

The relation of insect pests to the health of men and animals is a subject of interest to all, and it is not surprising that the large first edition of Dr. Shipley's book was practically exhausted in a month, and that a second edition is in preparation. The combination of literary charm and scientific information of practical utility, particularly at the present time, is certain to ensure its continued success. H. B. FANTHAM.

THE SUPPLY OF OPTICAL GLASS.

THE serious position in which this country was placed at the outbreak of hostilities by the almost complete stoppage of the supply of optical glass and of the import of optical instruments, is at last attracting the attention of the public which should have been much sooner focussed upon it. The importance of the subject was early recognised by the British Science Guild, which referred its consideration to its Technical Optics Committee. This committee, after fully investigating the evidence then available, reported, and the guild forwarded an important report to the Board of Trade; the report was printed in full in our issue of March 25 (page 104). So far as can be ascertained, however, no official action appears to have resulted.

Quite recently, Sir Philip Magnus, the member for the University of London, put on the order paper of the House of Commons questions addressed to the representatives of the War Office and the Admiralty, asking whether the supply of optical glass and optical instruments for the use of the Services was keeping pace with their immediate requirements. To these questions official replies of the stereotyped order were given and, in addition, the representative of the Admiralty informed the House that a large firm of makers of optical glass in this country "had greatly increased their output and were still adding to their plant." Before these replies were given, a long letter on the subject was published in the *Times* over the signature of Dr. Walmsley, the Principal of the Northampton Polytechnic Institute, an institute which is intimately associated with technical instruction in applied optics. There had also been other allusions to the matter in the Press.

In the report of the British Science Guild, referred to above, the main points involved are clearly indicated; and with regard to the supply of optical glass for instruments required by the Government, the report states that at the time of its issue there seemed to be no call for any special

effort. This statement, however, was made in January, and things have not been standing still since. More especially there was no indication then that either the country or the Government was aware of the necessity for enormous efforts for the adequate supply of "munitions," amongst which must be included "optical appliances." As is well known, the only firm supplying optical glass in this country is the firm referred to in the House of Commons, namely, Messrs. Chance Brothers, of Birmingham; and a paragraph appeared in the *Times* on April 26 to the effect that this firm will now supply optical glass only to those manufacturers of optical instruments who can produce a War Office or Admiralty certificate showing that the glass is needed for the fulfilment of a Government contract. This means that, notwithstanding the large increase in the capacity of the plant at Birmingham, the whole of the optical industry of this country, other than that engaged in Government work, cannot be supplied at the present time with any optical glass whatever. When we consider the important trades which require such glass in fairly large quantities for other than Government purposes, there is no doubt of the great seriousness of the position. But so optimistic is the Government that it has declined a patriotic offer of Lieut.-Col. J. W. Gifford to hand over to the nation free of cost practically the whole of a collection of fine optical glass, considerably over a ton in weight, which he has accumulated during twelve years of laborious research, some of the results of which have been published by the Royal Society from time to time.

The definite proposal made in Dr. Walmsley's letter to the *Times* is that the Government should at once take over the optical glass branch of Messrs. Chance's factory. We understand that this proposal is, as yet, a suggestion of Dr. Walmsley's only, and that, for obvious reasons, he did not communicate beforehand with the firm in question. In passing, we may say that great credit is due to this firm for its very vigorous and patriotic efforts to deal with the situation, but the matter appears to us to have got beyond the point at which any private firm should be required, for the good of the whole community, to undertake such heavy capital expenditure as it has already made and to risk the great sacrifices which may be called for if this expenditure be rendered unproductive after the war. As pointed out by Dr. Walmsley, the natural solution, that competing firms should instal plant and enter the market, is not applicable in this case, because the whole amount involved is too small to make it worth while for any important firm to enter into competition. The supply of fine optical glass for the United Kingdom involves probably an outside turn-over of not more than 20,000*l.* a year, an amount which is not worth dividing. But the supply of this small quantity of raw material, in the form of unwrought optical glass, affects an industry in which the value of the finished products runs to millions of pounds' worth of goods per annum, and in which the greater part of the cost of output goes in wages to highly skilled labour.

It is true that the firm named already has risen to the occasion, has octupled its plant, and, if Ministerial replies are taken at their full face value, has succeeded so far as to supply present Government requirements. But what of the rest of the industry, and, moreover, what is to happen when the war is over? The foreign supply of this vital "key" product will doubtless be resumed, surrounded by the *ante bellum* "wire entanglements" to which Dr. Walmsley refers, such as restrictive contracts on users, the lodging of dummy and blocking patents in our Patent Office, and all those means by which officially-nurtured foreign competition in the past has endeavoured to kill the production in this country of the far more vital and more costly finished products. Is it too late in the day to ask that these methods of competition should not be used against private firms without any greater safeguards available than those which have proved so ineffective in the past?

It seems to us that the proper course is to act generally in the direction of Dr. Walmsley's suggestion, with such modifications as may be found desirable on full investigation. This would mean, in substance, that the Government should undertake the supply of this "key" product. With a Government department empowered to deal with eventualities, full attention could be given to the other important matters dealt with in the report of the British Science Guild, namely, the adequate development of research, better provision for the testing of the physical and optical properties of samples of glass, and, most important of all, provision for adequate technical training and research in applied optics, so that this country may recapture speedily the position it held for so long in the forefront of the world's optical developments.

ASPHYXIATING GASES IN WARFARE.

DR. J. S. HALDANE'S report on his investigation of the nature and effects of the asphyxiating gases, used by the Germans in their attack last week on the French and British lines near Ypres, leaves but little doubt that chlorine or bromine was the chief agent employed, whilst shells containing other irritant poisons were also used.

Prof. H. B. Baker, who accompanied Dr. Haldane, is carrying out an investigation as to the chemical side of the question, and until his report is available, surmises as to the nature of the poisonous gases and the methods adopted for their use would be premature, but the evidence seems to point clearly to the fumes floated by the wind on to the Allies' lines being chlorine, as at ordinary pressure bromine is a liquid below 59° C., and at ordinary temperatures would not give off its vapour with sufficient rapidity to cause the seven-foot bank of vapour that drifted on to the Allies' trenches, whilst the colour of the cloud would have been a rich brown and not the "green-