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LOUSE CONTROL IN THE UNITED STATES ARMED FORCES

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Introduction

The history of the development of louse control technology in the Armed Forces of the United States has been marked by periods of vigorous activity during wartime followed by periods of relative inactivity during peacetime. Consequently, U.S. forces have in the past entered wars armed with obsolete louse control techniques poorly suited to the situation at hand. At the beginning of World War II, louse control procedures had not progressed far beyond the techniques used during World War I (4). Louse infestations during the former war were common and concern about louse-borne disease was so great that after the armistice in 1918, returning troops were deloused at ports of embarkation and at ports of debarkation, where they were quarantined for 14 days (10). Insecticides available at this time consisted of various dusting formulations, such as NCI powder (96 per cent naphthalene, 2 per cent creosote, 2 per cent iodoform), and various substances designed to be smeared along the seams of clothing, such as "vermijelli" (crude mineral oil, soft soap, and water, mixed 9:5:1) (12). These substances were of limited effectiveness, however, and louse control strategy was based primarily on the involved procedure of bathing, with simultaneous disinfestation of clothing in steam autoclaves (10).

At the beginning of World War II, a moderately effective mixture of pyrethrins and rotenone was available. Shortly thereafter, however, a formulation called MYL (a mixture of substances including pyrethrins as the main toxicant plus an ovicide) was developed at the Orlando, Florida, laboratory of the U.S. Department of Agriculture (USDA) and introduced into the military supply system (7). Although this formulation was eventually replaced by 10 per cent DDT dust, stocks of MYL were still on hand in Europe in the mid-1950's, and were found to be completely effective in killing lice, even after 11 years of storage (13). The story of the discovery of the insecticidal properties of DDT and the impact of this compound on the control of medically important insects is well known. Incorporation of DDT into the military supply system resulted in a drastic change in louse control strategy. Research at the USDA's Beltsville, Maryland, laboratory in 1942 enabled steam sterilization to be replaced by methyl bromide fumigation for disinfestation of clothing and bedding. The following year, the multi-nozzle, gasoline engine-driven power delouser, which could be used to treat large numbers of people with their clothing on,
was developed based on ideas submitted by members of the U.S.A. Typhus Commission and the Rockefeller Foundation (4).

Although the materials and equipment have changed through the years, these basic techniques developed in 1942 and 1943 remain in use by the U.S. Armed Forces today. The agreement between the War Department and USDA for cooperative research on the control of arthropods of military importance which resulted in most of these developments has continued in force to the present. Louse toxicant development is specifically covered at present in a Memorandum of Understanding between the Armed Forces Pest Control Board (AFPCB), the Department of the Army Surgeon General, and USDA. This memorandum outlines testing procedures to be performed by USDA and toxicologic tests to be performed at the U.S. Army Environmental Hygiene Agency (AEHA), Aberdeen Proving Ground, Maryland. It also covers the role of AFPCB in evaluating results and coordinating the adoption of new materials.

Developments after 1945

At the outset of the Korean War, we were armed, as before, with the louse control technology of the previous war: DDT and MXYL, and methyl bromide fumigation. Early in 1951, failure to control lice with DDT on prisoners of war and refugees in Korea was reported and discovered to be due to resistance to the insecticide by the lice (8). Japanese strains of the body louse were also found to be resistant (3). Lindane was found to be highly effective for the control of resistant lice and was included in the military supply system for that purpose (6). Beginning in the mid-1950's, reports of lindane resistance in body lice began to appear in various parts of the world, and the USDA's Orlando laboratory developed a 1 per cent malathion dust for use against chlorinated hydrocarbon-resistant lice (5). After field testing in Korea by the U.S. Army, it was incorporated into the supply system. Interestingly, 1-per cent lindane was completely ineffective in the field trials, although parallel laboratory tests showed the same strain of lice to be highly susceptible to lindane (2).

In 1965, because of DDT resistance by body lice on a global scale, the decision was made to drop 10 per cent DDT dusts from the military supply system. No significant additions or deletions to the supply list of anti-louse insecticides have been made since that time.

The current conflict in Vietnam has not seen the intense investigation of louse control materials and techniques that was evident during World War II and the Korean War. Since this military activity is confined to a tropical climate, lousiness has not assumed the importance it did during past operations in temperate climates. Research and development activities have nevertheless continued in the areas of both chemical control and dispersal equipment.

Current materials and usage

The following louse-control materials are now included in the military supply system: 1 per cent lindane dust, 1 per cent lindane ointment (a medical item, for scabies and pubic louse control), 1 per cent malathion dust, methyl bromide, a hand-operated, plunger-type dust gun, and a gasoline engine-driven mass delousing outfit. Also, a 0.3 per cent lindane emulsion may be made from the standard 12 per cent lindane emulsifiable concentrate and used to impregnate underclothing.

All of these items are used to some extent for louse control in various areas of the world. Treatments for louse control reported by U.S. Army Corps of Engineers entomologists consist mainly of spot residual treatments of living quarters with 2 per cent diazinon as a supplement to individual treat-
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The power delouser now in use was designed in the 1950's to replace the World War II model and is capable of treating 600 people per hour. Ten dust guns may be operated simultaneously and 10 additional guns are included in the set. The latter may be loaded with insecticide while the other guns are in operation (1). Methyl bromide may be used in semi-fixed fumigation vaults or with a portable kit which is also a standard item. It weighs 81.6 kg and contains complete tools and equipment to fumigate clothes or bedding (1).

Recent Developments

Reports of malathion resistance in body lice in Burundi (9) and of poor user acceptance of 1 per cent malathion dust because of odor led to an AFPCB request to USDA to develop a candidate material to be adopted for use against lindane-resistant lice. Actually, under the previously mentioned Memorandum of Understanding, the USDA laboratory in Florida (now moved to Gainesville from Orlando) had been engaged almost continuously in screening new louse toxicants and since 1966 had participated in a testing program with the Naval Medical Field Research Laboratory at Camp Lejeune, North Carolina, and the Army Surgeon General's Office. On the basis of test results from this program, including toxicologic tests made at the AEAHA and field tests made in Korea (11), the AFPCB has taken steps to adopt a 2 per cent Abate dust as the standard louse powder, to be used on a single treatment basis pending additional toxicologic testing.

A new, light-weight, electric motor-driven mass delouser has been developed by the U.S. Army Medical Equipment Research and Development Laboratory at Fort Totten, New York (since moved to Fort Detrick, Maryland). The unit weighs 24.9 kg as against the 90.7 kg of the current gasoline engine-driven model. It should be easier to maintain than the current model as well, since the only moving parts are in the electric motor and the blower.

In recent years, the Armed Forces have moved away from methyl bromide for fumigation in favor of aluminum phosphide (Phos-toxin). Although it is now authorized for use only with stored products, including raw agricultural products, its use in the disinestation of clothing and bedding appears promising. Several laboratories are investigating its effectiveness for this purpose.

Conclusions

Although emphasis on louse control research has not been pushed with the sense of urgency evidenced during World War II and the Korean War, the Armed Forces are very much aware of the potential threat of louse-borne diseases and the complicating factor of insecticide resistance in lice. Efforts are made continually to keep new materials and equipment in research and development channels to be available when needed.

REFERENCES


