c) Synthesis of the virus-induced RNA-replicase. L-cells, treated and infected as described above in section b, were collected at 2-h-intervals, and the amount of viral RNA-polymerase in the post-mitochondrial supernatant was extracted and the activity was tested according to Baltimore and Franklin[4-6], using as a marker [^{14}C]-UTP. Figure 2c shows that, in the presence of AEC, the activity of viral RNA-polymerase contained in Mengovirus-infected cells is not detectable.

Discussion. The results presented in this paper clearly show that the amino-acid analogue can efficiently block the replication of Mengovirus. At the same concentration AEC has no effect on the multiplication of another (although rather different) RNA-virus, replicating in the same host cell. This inhibitory effect is not due merely to a toxic effect on the host cell (see figure 1). 2 other considerations give additional support to this conclusion: a) a drastic reduction in virus yield is obtained when AEC is added to the incubation mixture just after infection, a time too short to produce a detectable effect on the host cell multiplication[2]; b) the lowest concentration of AEC tested (18 µg/ml) resulted in a reduction of 75% of the virus yield, whereas a 10-fold greater amount of AEC, continuously present in the culture medium for 48 h, has no effect on the cell's growth[2]. Viral protein synthesis seems to be less quantitatively impaired by AEC (see figure 2b); but no *active* viral RNA polymerase was detected in the cytoplasm of Mengovirus-infected AEC-treated cells (figure 2c). This result and the pattern of the viral RNA-synthesis in the presence of AEC strongly suggest that the virus-coded polymerase responsible for the *late* synthesis of virus RNA might be the target of this lysine analogue. This point is of great interest because the mechanism responsible for the change in the rate of virus RNA-synthesis from the logarithmic to the linear phase is at present unknown. Analysis of the RNA-structures and the polarity of the chains synthesized in the presence of the compound may help to clarify the issue. Work along these lines is in progress.

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Water, a powerful attractant for the gravid females of Plodia interpunctella and Cadra cautella

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Summary. In the sex pheromone controlling experiments, not only large number of the males of the almond moth and Indian meal moth, but also great number of ovipositional females were caught. The increased catch of the fertilized females was due to the presence of detergent in the water.

The almond moth Cadra cautella and the Indian meal moth Plodia interpunctella are serious grain pests in storage house in Taiwan. Their biology and physiological ecology have been reported[1-6]. Although modern controlling techniques, such as sterile male release[7], sex pheromone[8] and juvenile hormone [9,10] have been studied, no practical way of controlling the moths is known. In our sex pheromone attraction experiments, when the female sex pheromones were used in combination with water solvent and soap powder, a great number of males and fertilized females of these 2 species[11] were caught. It is hoped that if we can eliminate large numbers of the females by using soap water in combination with sex pheromone, eventually these 2 species could be controlled. In the granary at Hwa-Shan, a large grain storage house at Taipei City, the populations of these 2 species are quite stable throughout the whole year. In 1974, we confirmed that when the synthetic sex pheromones cis-9-tetradecenyl acetate and cis-9,trans-12-tetradecadienyl acetate were mixed in a polyethylene cap at a ratio of 1:1 to 1:2, the mixture could attract a large number of the males of both species[12]. First, we used sticky paper fastened within a tube pheromone trap to immobilize the attracted insects. However, these traps became soon useless because the air of the storage house contains much dust which decreases the holding power of the sticky paper. Recently, Yushima and Tamaki[13] in Japan have marketed a plastic pheromone trap which was originally designed for controlling bigger moths, such as Spodoptera litura and S. littoralis in the vegetable field. In the box-shaped trap, they used detergent water for killing insects. We also succeeded in using this kind of trap to catch a large quantity of Spodoptera male moths in field experiments[14]. In order to improve our traps in the storage house, we put several detergent (main ingredient is alkyl benzene sulfonate) water traps[15] in the storage house to see if they

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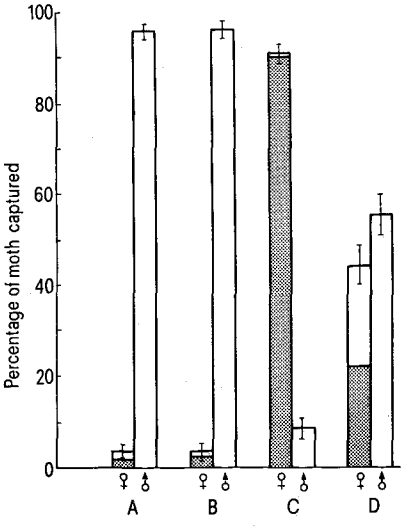
15 2 g of alkyl benzene sulfonate was dissolved in 800 ml of water. Other concentrations such as 0.1, 0.5, 1.0, 1.5, 2.0, 2.5 and 5 g per 800 ml were also tested.

Response of the almond moth and Indian meal moth trapped with different brands of detergent at granary of Hwa-shan

Chemical treatments*	Numbers trapped (with spermatophore)		Replicates	Average No. per trap (per cent of females with spermatophore)		Sex ratio, M/F (per cent of females)
1. Detergent water (alkyl benzene sulfonate in water 0.125–2.5 g/l)	1624 (1611)	243	21**	77.33 (99.20)	11.57	0.15 (86.98)
2. Soap water (sodium salt of stearate in water 0.125–6.25 g/l)	1042 (1009)	354	21**	48.76 (96.83)	16.86	0.34 (74.64)
3. Tween-20 in water (Polyoxyethylene sorbitan monolaurate in water 0.62–1.84%)	598 (574)	146	10	59.80 (95.99)	14.60	0.24 (80.38)
4. Soap powder and motor oil (20 gm/l)	51 (41)	234	10	5.10 (80.39)	23.40	4.59 (17.67)
5. Phenol in water (0.12–0.62%)	50 (46)	24	4	12.50 (92.00)	6.00	0.48 (67.50)
6. Water (0.8 l)	56 (50)	15	6	9.33 (89.28)	2.50	0.27 (78.87)
7. Blank detergent water (2.5 g/l)	85 (84)	20	4	21.25 (98.82)	5.00	0.24 (80.95)
8. Blank water (0.8 l)	73 (66)	38	7	10.43 (90.41)	5.43	0.52 (65.77)

*Treatments 1–6 baited with pheromone (2 mg), 7 and 8 without pheromone. **In order to see if there is a correlation between the female catch and detergent, different concentrations[15] of the detergent have been tried. Results were negative, so the individual data were combined, and therefore more replicates were obtained in these 2 groups.

also work there. The experimental condition of our storage house was 25.86 ± 0.75 °C and 90.75 ± 2.06% rh. Under these conditions, the detergent solution evaporates approximately 40 ml per day. Several days later, we found that the pheromone traps in our storage house did catch a large number of females as well as males. We brough back the insects caught to the laboratory, dissected the females and counted the spermatophores. The results showed that most of the females attracted had spermatophores, which means that they were fertilized. These results were quite different from that of the spodopteran insect, no fertilized females were caught by the detergent water trap in cabbage fields[13,14]. Then we tried using motor oil instead of detergent water in the pheromone trap in the storage house. Most of the insects thus attracted were males again. This means that there is a close relationship between the detergent water and the fertilized females. In order to realize the true sex ratio in the normal population of the 2 pests, we have random sampled insects out of the storage house by hand. The sex ratio of these random sampling was used as a control group in the following experiments. The traps each containing 1 mg of the synthetic pheromones and either sticky paper, motor oil or detergent water were placed on the top of rice packages in the storage room at a density of about 1 trap per 6 m². The results of 5 replicates were summarized and statistically analyzed in the figure. The true ratio of the pests (male/female) was 1.2 (figure, group D), almost identical with the data of Brady et al.[8]. Among these hand-caught females, only half were fertilized. In group A and B more males were caught because the sex pheromones which we used in the experiments were originally secreted by calling females. Therefore, higher percentages of males were attracted to the sticky paper and motor oil traps. While half of the females caught by these 2 pheromone traps were already fertilized, possibly they were caught by chance while flying. On the other hand, the insects attracted by pheromone traps with detergent water were mostly females (group C) and 90% of them were fertilized. The data of this group was significantly different from other groups, and our first observation has been confirmed. For clarification of whether the detergent powder contains any chemical constituents to lure the females, different brands of detergents were used with 2 mg of sex pheromones as attraction traps. Water alone was used as control trap. The data gained in these attraction ability test are presented in the table. From this table, it is easy to see that the difference between the sex ratio of the insects caught by different brands of detergents with water and motor oil were statistically significant ($p > 0.05$, t-test), whereas the difference between the individual groups which contained water were not significant ($p < 0.05$). The total number of insects caught by water (control) in each trap was also far less than that of



Attractive properties of the sex pheromones of the almond moth and Indian meal moth with 3 different killing agents expressed as percentages of the mean. Control group was obtained by hand catch. The shaded area represent percentages of fertilization and the bar for standard errors. *A* Sticky paper, *B* motor oil, *C* soap powder water, *D* hand catch.

soap water traps. The reason for this difference was probably due to the fact that the surface tension of pure water is too high to kill or to trap the attracted insects. Close examination of the water pheromone trap, shows a large amount of scales on the water, indicating that trapped insects can easily escape. We measured the surface tension of the detergent solutions used and found a significant correlation between the insect numbers caught and water surface tension. If the surface tension of the detergent water in our trap is higher than 71.2017 dyn/cm (0.05 g/800 ml) no moths are caught. The best results are obtained when the solution has a surface tension from 70.8427 dyn/cm to 69.6460 dyn/cm (0.5 g/800 ml to 1.5g/800 ml). In the second experiment, we trapped more male moths because the amount of female pheromone used was double that of the first experiment. So the percentage of females in the table was lower than that in the figure. In conclusion, it is evident that gravid females are attracted by water, probably because they need it for egg maturation. Thus low humidity is a limiting factor for the life of insects pests in a storage houses. The result may have some evolutionary or practical importance in the study of storage pests[16].

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Role of Friend-associated lymphatic leukemia virus in immunization against Friend leukemia complex[1]

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Summary. Mice inoculated with Friend leukemia complex (FLC) pretreated with concanavalin A are resistant to FLC challenge only when they have become infected with the FLC-associated lymphatic leukemia virus (LLV). In interpreting states of resistance to FLC induced by various immunizing procedures, the possibility that immunity is sustained by an unrecognized LLV infection should always be considered.

The strains of Friend leukemia complex (FLC) used in different laboratories may present dissimilarities, of which some (ability to infect and exert pathological effects in various mouse lines) are due to the passage history of the strains[2], and others (concerning the characteristics of the disease produced, such as production of splenic foci, induction of anemia or policytemia, tendency to regress) have less certain explanations and are attributed to variations in the relative proportions of the viruses forming the complex, to the presence of additional viral entities or to other factors[3–5]. Despite such dissimilarities, all FLC stocks must be assumed to contain a lymphatic leukemia virus (LLV) which is regarded as an indispensable helper of the FLC component responsable for the rapidly evolving hepatosplenomegaly with erythroleukemia characterizing Friend disease[6]. This assumption is not only justified by the nature of the interactions that are believed to occur between the FLC components, but finds experimental support in the fact that, whenever it has been looked for, LLV has invariably been detected[7–12]. LLV is in great excess over the other component(s) of the complex[7] and single infection of adult mice with LLV results in a chronic viremia with scanty signs (slight and transient hyperplasia of the spleen[7,13,14]) that can easily remain unrecognized. Thus some of the symptoms that are currently attributed to the entire FLC may in fact be due to LLV alone, and the presence of LLV should be constantly born in mind when the results of experiments with FLC are interpreted. Nevertheless, the multiviral nature of FLC has received adequate consideration in certain areas of research, signally in the genetics of host susceptibility[2], but not in others. For istance, the role of LLV in the immunodepressive properties of FLC has only recently received recognition[15]. A field that requires particular awareness of the complexity of FLC is the study of immune responses and of ways of inducing immunity to FLC, because mice infected with LLV alone become strongly resistant in a few days to FLC and to FLC-transformed cells[7,11,16], develope circulating antibodies

LLV infection and resistance to FLC in mice injected with Con A-treated FLC

Treatment	Presence of LLV in blood at day 0	Spleen weight at day +21
Con A-FLC at day –60, FLC at day 0	yes (8)	198 ± 57**
	no (10)	2121 ± 318
Con A at day –60, FLC at day 0	no (12)	2324 ± 513

*Number of mice in the group. **Mean ± SD.

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