D.D.T. failing to control flies even with high dosages. Although no thorough survey has been made, we have enough information to show that populations of flies resistant to D.D.T. in greater or less degree occur commonly in most parts of Denmark, and dominate in some districts.

In almost all cases of which we have information, the flies did not show high resistance during the first D.D.T.-treatments. In some cases resistance was noticed the year after the first D.D.T.-treatment; but, in general, resistant flies were not observed until after two to three years of successful control with D.D.T.

Obviously the resistance has developed simultaneously in a great number of populations (the flies of a single farm probably often acting as an isolated population), and to us the most reasonable explanation is that these populations already contained a small proportion of flies with genes determining D.D.T.-resistance; through a number of generations this proportion has increased rapidly as a result of a continuous selective extermination of non-resistant flies, until finally the entire population consists of the resistant genotype.

In our attempts to find ways of controlling the D.D.T.-resistant flies, tests have been made with six contact insecticides, which may be grouped as follows:

(1) Compounds with a D.D.T.-like structure:
'Methoxychlor': 2,2-di-*p*-anisyl-1,1,1-trichloroethane;
'Gix': 2,2-*bis*(*p*-fluorophenyl)-1,1,1-trichloroethane;
D.D.D. or T.D.E.: 1,1-*bis*(*p*-chlorophenyl)-2,2-dichloroethane.

(2) Other chlorinated cyclic hydrocarbons:
Benzene hexachloride (B.H.C.): 1,2,3,4,5,6-hexachloro-*cyclo*hexane;
'Chlordane': 1,2,4,5,6,7,8,8-octachloro-4,7-methano-3*a*,4,7,7*a*-tetrahydroindane;
'Toxaphene': a chlorinated camphene.

Using the same technique as mentioned above, but supplementing it with tests with restricted time of exposure, we found that the *r*-flies showed a similar resistance towards the insecticides of group 1 as towards D.D.T., the difference in 'knock-down' and kill between the *r*- and lab-flies being very considerable. Towards group 2, on the other hand, the *r*-flies and the lab-flies reacted uniformly (unlike the D.D.T.-resistant flies developed in the laboratory in Orlando, U.S.A.[4]).

Practical trials have already shown that benzene hexachloride can be used to control D.D.T.-resistant flies, although the residual effect in many cases has been rather short-lived. In fact, this substance has already been used on many Danish farms.

In addition to the publications on D.D.T.-resistant flies developed in laboratories in the United States[5,6,7], we have been able to find published reports on only two naturally occurring cases of D.D.T.-resistance in house-flies, these reports coming from Sweden[8] and Italy[9,10]. From verbal information and from correspondence we know, however, that similar phenomena have been noted in other places, where D.D.T. has been used against flies for some time, not only in Europe but also in the United States.

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[3] Anon., *Soap Blue Book* (1945).
[4] Wilson, H. G., and Gahan, J. B., *Science*, **107**, 276 (1948).
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[6] Blickle, R. L., Capelle, A., and Morse, W. J., *Soap Sanit. Chem.*, **24** (8), 139 (1948).
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[8] Wiesmann, R., *Mitt. Schweiz. Ent. Ges.*, **20**, 484 (1947).
[9] Saccà, G., *Riv. di Parassit.*, **8**, 127 (1947).
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AWARDS OF STALIN PRIZES IN THE U.S.S.R.

A LIST of awards of Stalin Prizes for 1948, for distinguished achievement in the U.S.S.R., has been published in *Izvestia* of April 9; the awards are of 200,000 roubles (first class) or 100,000 roubles (second class). A translation of the names of recipients and grounds of awards is given below:

A. PHYSICO-MATHEMATICAL SCIENCES

First-class prizes: S. N. Vernov, professor in the University of Moscow, for the study of cosmic rays; Academician M. A. Lavrentiev, for theoretical studies on hydrodynamics; G. D. Latyshev, corresponding member of the Academy of Sciences, for the study of the atomic nucleus.

Second-class prizes: G. A. Grinberg, corresponding member of the Academy of Sciences, for theoretical studies in mathematical physics relating to electricity and magnetism; L. V. Kantorovich, professor in the University of Leningrad, for work on functional analysis; I. A. Khvostikov, professor in the military aero-engineering Academy, for studies on atmospheric optics.

B. TECHNICAL SCIENCES

First-class prizes: G. V. Kourdumov, corresponding member of the Academy of Sciences, for work on metallography; G. I. Petrov, member of the Central Institute of Aviation Motors, for work on gas dynamics.

Second-class prizes: I. I. Kirillov and S. A. Kantor, professors in the Leningrad Polytechnic Institute, for joint work on the theory and construction of steam turbines; A. P. Krylov, M. M. Glogovsky, M. F. Mirchink, N. M. Nikolaevsky and I. A. Charnom, members of the Moscow Petroleum Institute, for a joint work on the scientific exploitation of petroleum deposits; Y. M. Parkhomovsky, N. V. Alkhimovich and L. S. Popov, members of the Central Aero-Hydro-dynamic Institute, for theoretical and experimental studies in mechanics; E. P. Popov, professor in the Military Aero-Engineering Academy, for studies in the theory of elasticity; K. A. Rakhmatulin, Academician, Usbek Academy of Sciences, and professor in the University of Moscow, for work on the theory of waves; M. I. Yanovsky, corresponding member of the Academy of Sciences, for work on steam turbines.

C. CHEMICAL SCIENCES

First-class prize: Academician B. A. Kazansky, for work on the catalytic transformations of hydrocarbons.

Second-class prizes: B. A. Dolgoplosk, professor in the Synthetic Rubber Institute, for work on polymerization; V. V. Korshak, professor of the Moscow Chemical-Technological Institute, for work on high-molecular compounds; S. S. Perov, member of the Agricultural Academy, for work on the biochemistry of proteins.

D. BIOLOGICAL SCIENCES

First-class prize: Academician T. D. Lysenko, president of the Agricultural Academy, for work in biology as presented in a book entitled "Agrobiology" published in 1948.

Second-class prizes: L. S. Davitashvili, member of the Georgian Academy of Sciences, for a book entitled "History of Evolutionary Palæontology from Darwin to the Present Time", published in 1948; V. A. Movchan, professor in the University of Kiev, for work on the biology of the carp; M. V. Fedorov, professor in the Moscow Agricultural Academy, for work on the fixation of atmospheric nitrogen by soil bacteria.

E. AGRICULTURAL SCIENCES

First-class prizes: K. E. Bakhtadze, doctor of agricultural sciences, for work on the biology of the tea plant; S. M. Boukasov and A. Y. Kameraz, members of the Plant-growing Institute, for joint work on selection of potatoes.

Second-class prizes: A. M. Dmitriev, professor in the Moscow Agricultural Institute, for work on meadows; V. P. Timofeev, professor of forestry, for work on forestry.

F. MEDICAL SCIENCES

First-class prize: T. P. Krasnobaev, member of the Medical Academy, for work on bone and joint tuberculosis in children.

Second-class prize: P. F. Zdrodovsky, member of the Medical Academy, for work on infectious diseases.

G. ECONOMIC SCIENCES

First-class prize: P. I. Lyashchenko, corresponding member of the Academy of Sciences, for studies in the economics of the U.S.S.R.

H. LEGAL SCIENCES

Second-class prize: A. V. Venediktov, professor in the University of Leningrad, for work on the State socialistic property.

I. HISTORY-PHILOLOGICAL SCIENCES

First-class prizes: B. A. Rybakov, member of the Institute for the Study of Material Culture, for work in the history of crafts in Old Russia; S. P. Tolstov, professor in the University of Moscow, for historical-archæological work.

GROWTH OF SMALL BUSINESSES

THE paper, 'Problems of Growth in Industrial Undertakings', presented before the British Institute of Management by Colonel L. Urwick on January 12, has now been issued as No. 2 of the Winter Proceedings, 1948–49, together with a report of the discussion, including written contributions. Colonel Urwick emphasizes that re-organisation is a continuous process requiring specific provision, and that one of the main tasks of re-organisation is to keep the different parts of a business in balance. Growth is essential if individuals employed by an undertaking are to grow as individuals, and balance is essential in terms of time as well as in terms of the relative strength of parts. Col. Urwick considers that factual research is needed to determine whether growth should be continuous or interspersed by periods of consolidation.

In the development of a unit business there are three critical points. First, that at which the owner-manager, or chief executive, who has, up to that point, dealt single-handed with all the major functions of the business, has to start delegating full responsibility for the initiative, as opposed to routine supervision, in one of the major functions. This involves both a personal and a personnel problem, and these problems recur with the delegation of full initiative in each of the major functions. Second is the point at which the chief executive has to start delegating full responsibility for initiative in the ancillary functions. Again, the problem recurs as each of the ancillary functions is specialized. Since such functional or specialized control cuts across ordinary line authority, its development greatly increases the volume of co-ordination required; and the third critical point is accordingly that at which this additional co-ordination compels the chief executive to take special measures to prevent himself being overwhelmed.

One measure Col. Urwick suggests here is the use of officials in a true 'staff' capacity; but he points out that, at each stage, organisation tends to lag behind requirements and the chief executive to exceed his span of control, either because he is temperamentally unable to delegate or because he is unaware of the importance of leaving himself sufficient time to lead his team. Col. Urwick's paper is illustrated with a series of organisation charts setting out the development of a one-, two-, three- or four-man business into complete functional control of a unit business.

EFFECTS OF LIGHT INTENSITY AND DAY-LENGTH ON REPRODUCTION IN THE ENGLISH SPARROW

THE effects of light intensity and day-length on reproduction in the English sparrow have been studied quantitatively in the laboratory by George A. Bartholomew, jun. (*Bull. Mus. Comp. Zool., Harvard*, 101, No. 3; Feb. 1949). He has also considered the ecological significance of these factors in controlling the breeding season of this species in Nature.

A quantitative evaluation of the effects of five different intensities of light was obtained by exposing sparrows to these light intensities during uniform day-lengths of sixteen hours. In the male, 10 foot-candles was more effective than lower intensities and was as effective as either 52 or 244 foot-candles in causing gonadal development in the winter. During the autumn, however, 10 foot-candles was much less effective than 244 foot-candles, indicating a seasonal variation in response to light intensity. The minimum light intensity which caused full spermatogenic activity was 0·7 foot-candles; but slight testicular activity was caused by 0·04 foot-candles.

Experiments testing the effect of differing light intensities during sixteen-hour days showed that in the female, as in the male, gonadal growth increased with increasing intensity. These experiments, limited to the winter, showed that after forty-six days the highest intensity used (244 foot candles) caused more ovarian development than any of the lower intensities. By eighty-six days, however, gonadal regression had set in and ovarian size was no longer correlated with light intensity. This confirms the observations of previous investigators that light alone will not cause full ovarian development in this species.

The effect of light intensity during uniformly short days was investigated, and it was found that 270 foot-candles was no more effective than 25 foot-candles in causing testicular development after an exposure of twenty-five days to ten hours of light per day during winter.

A quantitative evaluation of the effects of different lengths of day was obtained by exposing male and