though the gnathosoma was pressed against the substratum and the opisthosoma was expanded and contracted, it is doubtful whether the nymphs were successful in taking food. On one occasion a nymph was seen to engage an injured culture mate in such a way that it gave the appearance of attempting to eat the injured nymph. The claws of the anterior pair of legs were sunk into the dorsum of the injured one, and the gnathosoma of the attacker was brought as close to the back of the wounded nymph as the long setae on the back of the latter would permit. The injured nymph then moved while the other remained anchored. The opisthosoma of the retreating nymph was stretched to twice its length before the hold was broken and the injured nymph made good its retreat. This observation suggests that occasionally one nymph may eat another. Therefore, culture experiments, even though successful in producing adults from nymphs, cannot be used as indubitable proof of the suitability of a material offered as food unless many nymphs in a culture become adults.

While observing the behavior of a captured adult which appeared to be guarding her recently laid egg, a second adult was seen to drive the first away by beating it across the propodosoma with its club-like forelegs and then to suck the egg dry. This observation suggested that eggs might be suitable food. An ant's nest was excavated, and eggs were collected from the jaws of the nurses carrying them. Upon examination, the egg masses were found actually to consist of eggs and first-instar larvae. Both eggs and larvae were offered to adults, five of which were seen to feed on a first-instar larva. That these adults actually fed was substantiated by the following facts: (1) the chelicerae were inserted through the larval skin; (2) pumping action of the muscular pharynx was observed; (3) air bubbles occasionally appeared in the mouth, and thus the flow of fluid was visible as it passed into the mite; (4) the larva being devoured decreased in volume, and, consequently its integument became wrinkled; (5) the opisthosomas of the feeding adults became enlarged and distended.

Eggs and first-instar larvae of ants were then offered to nymphs, but no feeding was observed. Since the eggs and larvae appeared to be too large for the nymphs to manipulate, six kinds of smaller eggs were offered. Six unidentified, small (approximately 300 microns in diameter) spherical eggs found in an ant's nest were placed in a culture bottle containing eight nymphs. Twenty-four hours later all of the eggs were collapsed. Eggs of three species of mosquitoes (*Culex quinquefasciatus, Culex jepsoni,* and *Aëdes aegypti*) were obtained from the insectary of U. S. Naval Medical Research Unit No. 2. Naturally laid eggs and eggs dissected from gravid females were placed in culture bottles containing reared nymphs and in some bottles containing captured nymphs and adults. From 5 to 20 eggs were added to each culture every day. Uneaten eggs that had been placed in the bottles the previous day were removed. The nymphs and adults were frequently seen feeding on the eggs, and after 20 days adults appeared in all of the six cultures of reared nymphs fed on the eggs of mosquitoes. One culture of reared nymphs was fed eggs dissected from a species of flour beetle (*Tribolium* sp.), and eggs of *Drosophila* sp. were used as food for four cultures. The eggs of the beetles and flies were added to the cultures daily, the uneaten eggs remaining from the previous day being removed. Adults were seen in all these cultures after 20 days.

While no information is available on the food which serves *N. indica* in nature, it is reasonable to assume that eggs and early larval instars of the many small arthropods associated with it in the debris of rats' nests and covered runways comprise a significant part of, if not the entire diet. Certainly the eggs used in the present studies are sufficiently nutritious to produce active adults of healthy appearance.

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Period of Effective Weed Control by the Use of 2,4-Dichlorophenoxyacetic Acid

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Early reports (*1, 2, 3*) on the use of 2,4-dichlorophenoxyacetic acid (2,4-D) as a selective herbicide for killing weeds in lawns and other grassy areas have shown that such common pests as plantain (*Plantago lanceolata*), dandelion (*Taraxacum officinale*), Indian strawberry (*Duchesnea indica*), and others can be readily cleared out by spraying the infested area with a water mixture of this chemical. A number of years of testing are required, however, to evaluate fully a chemical treatment of this nature. After a lawn or pasture area is cleared of weeds, the presence of numerous weed seeds in the soil, as well as those that may be blown in from bordering areas, constitutes a continual threat of reinfestation. Of further concern may be the possible accumulative effect of the

chemical on lawn grasses that may result from repeated use of the herbicide in a given area.

This report concerns the behavior of experimental lawn grass plots treated with 2,4-D during a period of two years. Some of the plots were sprayed with the acid only once, others were sprayed twice, while still others were sprayed three times, but in all instances a full year has elapsed since the last application was made. In experiments for the eradication of dandelion, plots 6.5 × 6.5 feet were established (*2*) in a lawn heavily infested with this weed, with three replications of plots that received either 500 or 1,000 ppm spray concentration of 2,4-D. A similar lawn area heavily populated with narrow-leaved plantain was also used (*2*), four replications of 6 × 6 feet plots per treatment being involved. Spray treatments consisting of 0, 125, 250, 500 and 1,000 ppm concentration of the acid were prepared in a water mixture containing 0.5 per cent Carbowax 1500 and were applied with uniform coverage by means of a three-gallon hand pressure sprayer at the measured rate of five gallons per 1,000 square feet.

TABLE 1

DANDELION CONTROL IN KENTUCKY BLUEGRASS LAWN PLOTS THROUGH THE USE OF 2,4-D ACID SPRAYS

Spray concentration (ppm)	Number of applications*	Original dandelion count on 5 September 1944 (Av. 3 plots)	Dandelion count on 9 May 1946 (Av. 3 plots)
Unsprayed control	0	118.0	126.0
500	3	94.6	3.7
1,000	3	117.0	2.2

* Repeated applications were made on 2 September 1944, 28 September 1944, and 2 June 1945.

Experimental plots sprayed with the 500 or the 1,000 ppm concentration of 2,4-D were almost free of dandelions (96.1 and 98.1 per cent kill, respectively) a full year after the last spray application was made (Table 1). Repeated applications, made on 2 and 28 September 1944 and 2 June 1945, of each spray concentration used, had no adverse effect on the growth of the lawn grasses. Bluegrass developed and filled in the scattered bare areas left following the destruction of the large dandelion plants.

In other plots, sprays containing 125 and 250 ppm of the acid gave excellent control of narrow-leaved plantain (Table 2). Older plantain plants were completely eradicated by a single application of the 1,000 ppm spray made on 28 August 1944 and by two applications of 500 ppm made on 28 August and 7 September 1944. Plantain seedlings appeared in considerable numbers in the plots of both of these series following the summer and fall treatments, but one spring application (15 April 1945) was sufficient to kill all of these plants, even in the case of the lowest spray concentration. Grass in all sprayed plots showed no burning effects of the chemical even in those plots that received three applications of the highest spray concentration (1,000 ppm). The grass in plots receiving this amount of the chemical was darker green in appearance during the first year of the experiment than was the grass on comparable unsprayed plots, but after this time there was no apparent difference in the color of the grass in treated and untreated plots.

During the fall of 1944, preliminary experiments[1] showed that 2,4-D could be applied dry, together with various mineral and dry organic fertilizers, so as to kill various kinds of lawn weeds and enrich the soil in one application. On 6 November 1945 a series of plots 2 × 25 feet were used to test further the effects of dry applications of 2,4-D and fertilizer in killing narrow-leaved plantain and at the same time enriching the soil of a sod area. Commercial-grade fertilizer (10–6–4) was used at the rate of 600 pounds per acre as a carrier for 2,4-D. Various amounts of the acid were added and mixed with measured amounts of the fertilizer so that the acid was applied in the mixture to separate randomized plots (five plots per treatment) at the rate of 1½, 3, 6, or 9 pounds per acre. The various mixtures were prepared dry by the use of a concrete type mixer, and the weighed amounts were applied by hand. The shape of the plots permitted the use of a lawn mower fitted with a grass catcher to obtain records on the subsequent growth

TABLE 2

EFFECT OF CONCENTRATION AND NUMBER OF APPLICATIONS OF 2,4-D SPRAY ON ERADICATION OF NARROW-LEAVED PLANTAIN FROM KENTUCKY BLUEGRASS LAWN PLOTS

Spray concentration (ppm)	Number of applications*	Original plantain count on 28 August 1944 (Av. 4 plots)	Plantain count on 3 May 1946 (Av. 4 plots)	Percentage of original plants killed
0	0	62.4	176.2	
125	1	61.5	0.0	100
	2	68.2	3.5	94.9
	3	58.7	3.0	94.9
250	1	56.5	1.0	98.2
	2	52.5	0.5	99.0
	3	54.2	0.0	100
500	1	60.2	0.0	100
	2	53.7	0.0	100
	3	63.0	0.0	100
1,000	1	55.4	0.0	100
	2	45.5	0.3	99.3
	3	50.2	0.0	100

* One application—15 April 1945; two—28 August 1944 and 15 April 1945; three—28 August 1944, 7 September 1944, and 15 April 1945.

[1] In cooperation with F. F. Davis, National Capitol Park Service, U. S. Department of Interior.

of both grass and weeds. After collection, weeds and grasses from each plot were hand sorted and weighed separately while fresh.

Preliminary results of the November 1945 treatments, as shown by the first clippings made on 4 April 1946, are briefly as follows: The clippings from the fertilized control plots (no 2,4-D applied) contained an average fresh weight of 62.2 grams of weeds, while the weight of weeds in plots receiving 1½, 3, 6, and 9 pounds per acre of 2,4-D in the fertilizer was 7.4, 6.0, 2.4, and 1.8 grams, respectively. Weed clippings from plots receiving the two highest rates of 2,4-D consisted entirely of sheep sorrel (*Rumex acetosella*). Black medic (*Medicago lupulina*) was eliminated from all 2,4-D-treated plots, while white Dutch clover (*Trifolium repens*) appeared to be eradicated only at the rates of 6 and 9 pounds of 2,4-D per acre. No significant difference was found in the weight of grass clippings at this date. The grass in plots receiving either 6 or 9 pounds per acre were noticeably greener in spite of the fact that they had received the same kind and amount of fertilizer.

From these results it appears that once the established weeds have been killed by means of 2,4-D sprays, and young seedling weeds that subsequently germinate in the surface soil layers have been eradicated by further spraying, it is feasible to maintain a weed-free lawn by judicious use of this chemical. Repeated sprayings have not proved harmful to established grasses, and in the absence of weeds the sod has developed a uniformly dense coverage of the soil surface which in itself tends to discourage infestation by most of the common lawn weeds.

Preliminary results with dry mixtures of fertilizer and 2,4-D are promising for weed control in lawns, pastures, and other grassy areas. In the absence of spraying equipment this method provides a convenient method of application. By this means it is possible to apply an effective weed-killing and fertilizing treatment in the same operation, which saves both time and labor.

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News and Notes

House Action on Science Legislation

Before last week's issue containing an appeal from Howard A. Meyerhoff addressed to supporters of S. 1850 had reached any considerable number of readers, House action had definitely killed all National Science Foundation Bills for this session.

On 19 July the Priest Subcommittee on Public Health of the Insterstate and Foreign Commerce Committee refused to take action on the competing bills: H.R. 6672 embodying the proposals of S. 1850; H.R. 6448 reasserting the principles and structure of the original Magnuson Bill; or S. 1850 as amended and passed by the Senate.

The Subcommittee said that the issues were "too involved and too important" to be acted on in the few final days of the 79th Congress.

Legislative observers said that "by failing to present a united front scientists themselves caused the legislators to doubt the wisdom of any of the competing measures." They pointed out that only a few days before this committee had approved, and the House had passed, the solidly supported National Mental Health Act providing for the establishment of a National Psychiatric Institute and grants-in-aid for psychiatric research.

Next week *Science* will carry a final and authoritative analysis of the legislative picture as it appears in mid-summer, 1946.

About People

H. Jermain Creighton, Swarthmore College, has been awarded the Edward Goodrich Acheson gold medal and $1,000 prize by the Electrochemical Society for his "outstanding accomplishments in electrochemistry."

Charles F. Kettering, chairman of the AAAS Executive Committee, became chairman of the Board of Trustees, Ohio State University, on 1 July.

John Green, Cambridge University, has been appointed Alexander Blain Hospital fellow in anatomy, Wayne University College of Medicine, for the year 1946–47.

Eugene C. Crittenden, chief of the Electrical Division, National Bureau of Standards, has been awarded the I.E.S. medal, given by the Illuminating Engineering Society in recognition of meritorious achievement