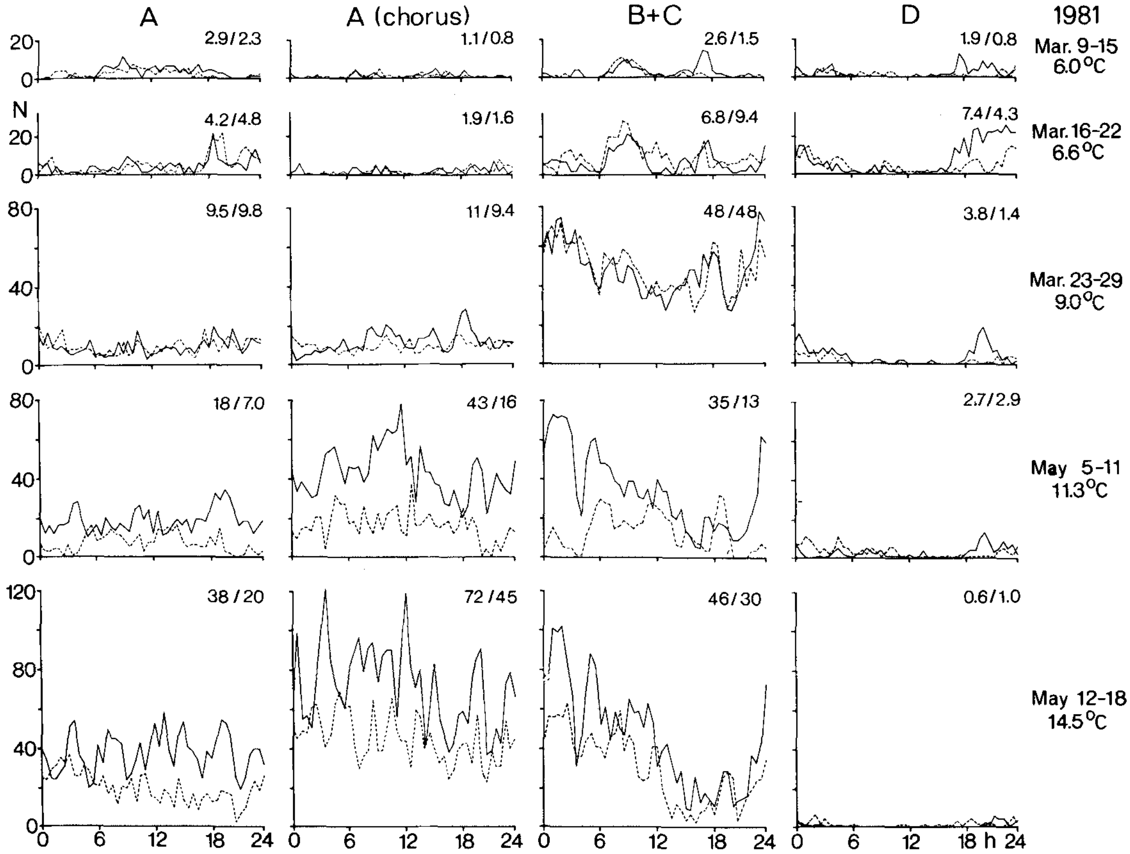

Figure 2. 24-h distribution of stridulatory activity of *C. dentipes* males from March 9-29 and May 5-18, 1981. The songs A, A (chorus), B+C and D are shown separately (A (chorus): Song A is simultaneously produced by 2-4 males; B+C: song combination of B and C[8]). N: number of songs of each kind produced during each half hour of the day, summed over a week in each graph. Two populations are represented, a group of 20 males (continuous line; mean given by the 1st number on the upper right) and a group of 10 males + 10 females (dashed line; mean, 2nd number on upper right). For each week the mean temperature at the cage floor is indicated.

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Feeding aversions in terrestrial slugs

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Summary. Terrestrial slugs *(Limax flavus)* were administered a feeding test in which they were presented 2 pieces of lettuce. One piece was treated with distilled water, the other with a solution of blended conspecifics in distilled water. Subjects consumed significantly more of the control lettuce treated with distilled water.

The release of alarm substances from stressed or injured invertebrates has been demonstrated for a variety of species including insects[2], earthworms[3,4], sea anemones[5], sea urchins[6], snails[7-10], and terrestrial slugs[11]. Organic gardeners have maintained that releasing alarm substances by grinding up agricultural pests such as insects and slugs is an effective means of controlling these animals, although the evidence for this claim is anecdotal[12,13]. The purpose of the present study was to laboratory test the hypothesis that a solution of blended slugs and water, applied to lettuce, will deter feeding by conspecific slugs.

14 adult slugs (2-3 cm), *Limax flavus,* obtained from gardens in Northern New Jersey served as subjects. They were individually housed in plastic petri dishes (12.7 cm in

diameter) lined with filter paper which was moistened with distilled water. All slugs were fed carrots and Iceberg lettuce, were maintained in a temperature controlled room (21 °C), and were exposed to natural lighting conditions.

All subjects were administered a single feeding preference test which consisted of presenting each slug with 2 square pieces of Iceberg lettuce (3 cm × 3 cm) during a 24-h period. Tests commenced at dusk. One piece of lettuce was dipped into distilled water (control group) and the other into a solution of blended slugs (experimental group). This solution was prepared in the following manner: 4 adult slugs were placed into a blender and mixed with 100 ml of distilled water until liquefied. The solution was then strained through 12-ply gauze sponges and immediately used for the feeding test.

For 3 consecutive days prior to the feeding test the slugs were fed a single 9-cm^2 piece of Iceberg lettuce. They were then food deprived for 36 h before the experiment. During the feeding preference test the 2 (control and experimental) squares of lettuce were placed 3 cm apart in the petri dish. The left-right position of the 2 lettuce squares were counterbalanced across subjects. Each pair of lettuce samples was cut from the same leaf and all squares were obtained from the same head of lettuce. Slugs were removed from the petri dishes during placement of the lettuce squares and when returned were positioned midway between the 2 samples.

After 24 h the remaining pieces of lettuce were removed and the percent consumed was calculated. This was determined by placing each remaining piece of lettuce under a grid marked off in 1 mm^2 and counting the number of 'squares' of lettuce consumed. Slugs were maintained in individual petri dishes on untreated lettuce for an additional 4 days and any mortality recorded.

Slugs consumed significantly ($p < 0.01$, 2-tailed Wilcoxon Test) more lettuce from leaves treated with distilled water than those treated with the blended slug solution. The mean ± SEM percentage consumed for the control lettuce was 44.0 ± 7.6, while only 6.1 ± 2.2% was eaten from the lettuce treated with blended conspecifics. One slug did not eat from either square of lettuce while the remaining 13 slugs all fed more from the lettuce treated with distilled water. Of these subjects, 38% fed only from the control lettuce and did not consume any of the blended slug treated lettuce. No mortality was observed during the 4 day post-experimental period.

This study has demonstrated that the terrestrial slug, *Limax flavus*, avoids food treated with a solution of blended conspecifics and water. This inhibition of feeding may be mediated through chemoreception[14,15] by detection of alarm substances. Since this study only examined the feeding responses of a single slug species to conspecific substances, it cannot be ascertained whether the phenomenon is species specific. The nature and source(s) of the substance(s) released, moreover, cannot be determined from this experiment because whole animals were blended. In a related species, *Lehmannia valentiana*, mucus from the dorsal surface of stressed slugs has been reported to be aversive to conspecifics[11]. The present experiment supports the contention of organic gardening enthusiasts who maintain that a solution of blended slugs and water will biologically control these garden pests[12,13].

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Effects of neurochemical lesions restricted to spinal cord monoaminergic neurons on blood pressure and sympathetic activity of spontaneously hypertensive rats

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Summary. Intraspinal (i.s.) injection of 6-hydroxydopamine or 5,7-dihydroxytryptamine in newborn spontaneously hypertensive rats (SHR) resulted, in the adult animal (30-week-old), in a marked decrease of spinal cord noradrenaline (NA) or 5-hydroxytryptamine (5-HT) levels, respectively. Since both neurotoxin- and vehicle-injected rats developed full hypertension and had similar plasma catecholamine concentrations, it is concluded that in SHR neither spinal cord NA nor 5-HT play a major role in development and maintenance of hypertension.

Studies performed in several animal models, including spontaneously hypertensive rats (SHR), indicate that both central noradrenaline (NA)- and 5-hydroxytryptamine (5-HT)-containing neurons are involved in the development of arterial hypertension[2-7]. Moreover, several experiments in which 6-hydroxydopamine (6-OHDA) and 5,6- or 5,7-dihydroxytryptamine (5,6-DHT, 5,7-DHT) have been injected i.c.v. support the view that both noradrenergic and serotoninergic neurons of the bulbospinal tract[9,10] participate in blood pressure regulation and development of hypertension[3,5,6,10,11]. However, neurotoxic lesions caused by i.c.v. injections of 6-OHDA, 5,6-DHT or 5,7-DHT, although relatively specific for NA- or 5-HT-containing neurons, are widespread in both brain and