drug in the urine are obtained much more quickly following administration of sulfaguanidine than following administration, for example, of sulfadiazine. This was demonstrated in 90% of experiments with 40 students—using the method of Marshall, Emerson, and Cutting (*16*) as modified by Bratton and Marshall (*17*) and as described in the Department of the Army Technical Manual TM 8-227, except that smaller total quantities of sample and reagents were employed in a semimicrochemical method.

Excretion of sulfaguanidine by five other persons was further investigated. Free drug levels of sulfaguanidine in urine and percentage yields of the dose over short intervals after administration were determined (Table 1). The rapidity with which the drug appears in the urine was also studied (Table 2).

The amount of drug passed in the urine following administration of a single dose was measured. This varied from a low of 17.3% of the dose recovered as free drug to a high of 84.3% of the dose recovered as total drug (free sulfaguanidine plus acetylsulfaguanidine). In the last instance, a total of 2.53 g from a 3-g dose was excreted; 79% of this was in the free form and 21% acetylated.

The renal clearance for sulfaguanidine was calculated as the volume of blood which would contain the amount of material excreted in one minute. The renal clearance of sulfaguanidine often approached 120 ml/min. This figure indicates some tubular resorption, but less than occurs with urea. Thus the kidney can remove sulfaguanidine from the blood more effectively than it removes urea from the blood. Throughout these studies on renal excretion, blood levels remained at the expected low titers, usually below 1 mg % and never exceeding 2 mg %.

The literature gives ample evidence that sulfaguanidine is effective, especially in intestinal infections, but sulfaguanidine is being replaced to some extent by other drugs now used for intestinal infections. It therefore seems desirable to reevaluate the drug's therapeutic potential. In regard to the therapeutic potential for sulfaguanidine, there is an important piece of pure research in the literature by Clapper and Kurita (*18*). They found that urea and sulfaguanidine at concentrations of 10 mg % each are synergistic against *E. coli*. This is particularly interesting in view of such work as that of Gershenfeld and Sagin (*19*) who found that 220 mg % of sulfaguanidine did not inhibit *E. coli in vitro*.

Since a normal adult passes at least 25 g of urea and rarely passes more than 2500 ml of urine a day, the concentration of urea in urine will almost invariably exceed 1000 mg % or 100 times the concentration needed for a synergistic effect with 10 mg % of sulfaguanidine.

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Communications

Is the Black Widow Spider Invading New England?

DURING the middle nineteen-thirties a number of biologists were showing considerable interest in the distribution of the black widow spider, *Latrodectus mactans* (Fabricius), and from time to time short notes were published indicating an extension of its known range in the United States, particularly in the North. In early 1937 I showed that records had existed for some of the states for many years (*1*). Later that year the known records indicated that the spider had been collected in every state of the U.S.

This revival of interest occasioned numerous comments in the public press, and the impression received by many laymen was that black widow spiders were spreading northward. It appeared that this idea was particularly prevalent in New England, and at the request of the officials at the New England Museum of Natural History I prepared a short article about the spider for their *Bulletin* (*2*). In this paper were listed all the records then known for New England, which revealed that the black widow had been collected as far back as 1883 for Massachusetts, and 1884 for New Hampshire. It was also shown that although the species is not particularly common in New England, many records exist; and on occasion a large number of specimens has been picked up in a restricted locality.

In 1945 renewed publicity was given the spider after the appearance of a book (*3*) which includes a "Table of Reported Spider Bites by States." In this

table every New England state is listed as having "reports," yet no references are cited. A thorough search of the literature fails to lend support for the listings. As with a good many other statements appearing in the book, the reader is simply misinformed. The "report" for Maine is particularly interesting because as I have shown (*2*), there was not even a record that the black widow had been observed or collected in Maine. What previously had been taken for a valid record was an error, presumably based upon a misidentification. However, I had remarked "the spider undoubtedly occurs there [i.e., in Maine]." It is now possible to report a valid record, for recently I examined a specimen collected at Gorham, Maine, on October 25, 1953, by Frederick Robie. This particular specimen shows no vestige of an hourglass mark, nor does it show the red spot above the anal tubercle, which is present in all other specimens of *L. mactans* I have seen. It is entirely black except for two very small spots in the mid dorsal line on the anterior half of the abdomen.

Again in 1949 further newspaper publicity was given *L. mactans,* shortly after the appearance of a paper in the *New England Journal of Medicine* entitled "Arachnidism," by Greer, a Boston physician (*4*). A careful perusal of the article reveals that less than one page is devoted to an account of six cases seen in a "tropical area." The remainder of the four-page paper is concerned with the symptoms of, and treatment for, black widow spider bite, as well as a rather extensive account of the life history and distribution of *L. mactans* in the U.S. Upon inquiring of the author I was informed that the six cases were those seen while he was stationed in the Philippine Islands, a fact which definitely indicates that another spider was involved, as *L. mactans* does not occur there. There are papers in the literature that describe cases of arachnidism for the Philippines, but these generally appear in journals devoted to tropical medicine. Greer did not cite any of these, but confined his discussion to American spiders. Is it any wonder that, considering the circumstances, newspaper articles based on Greer's article intimated that people in New England had been, and were being, bitten?

Finally, during the past summer the finding of a few black widows in the vicinity of Milford and Bridgeport in Connecticut set off another series of "scare" newspaper articles. Several of the accounts purported to quote an authority to the effect that since this is a rare spider the finding of several would indicate that apparently the black widows must be coming up from the South perhaps in shipments of bananas—this despite the fact that there are records for Connecticut going back to 1912 (*2*) and a large number of more recent ones (*1, 5*). It would seem more reasonable to account for the abundance in some years on the basis of other factors. For example, these could include the variation in the parasite population, and the severity of the preceding winter. Also not to be overlooked is the possibility of more people hunting for specimens when someone else in the neighborhood has his find reported in the newspapers. After one such story, 40 spiders were brought into one laboratory although only two turned out to be black widows. Possibly, all these might have lived and died undisturbed and undiscovered had not the publicity created large numbers of new collectors.

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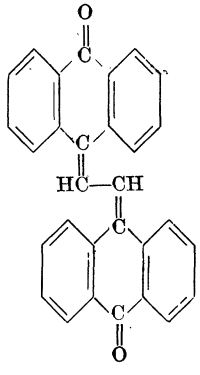
Thermochromism and Vinylogy

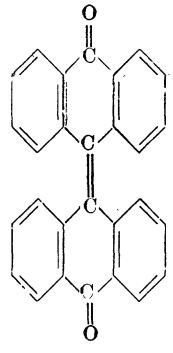
IT seems that the question has not yet been raised whether the vinylene homologs (*1*) (II) of thermochromic ethylene (I)

$$\text{Ar} > \text{C}{=}\text{C} < \text{Ar}' \rightarrow \text{Ar} > \text{C}{=}\text{CH}{-}\text{CH}{=}\text{C} < \text{Ar}'$$

(I) (II)



(III)



(IV)

are also thermochromic. We found that 1,2-bis(9,9′-anthronylidene)ethane (*2*) (III), the vinylene homolog of the thermochromic bianthrone (IV), is strongly thermochromic: dilute solutions of (III) in ethyl benzoate are yellow at 0° and orange at the boiling point of the solvent; the phenomenon is reversible. Strong reversible thermochromic effects also were observed with the powdered solid (III) (orange 0° → deep violet at 240°). The importance of these findings for the theory of thermochromism will be discussed in a separate paper.

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