careful estimates of body weight in calculating paralytic doses to be administered (by means of the projectile hypodermic syringe) for the purpose of safely inactivating wild, feral, or dangerous and unmanageable animals.

S. D. FEURT, J. H. JENKINS,
F. A. HAYES, H. A. CROCKFORD
Schools of Pharmacy, Forestry, and
Veterinary Medicine, University
of Georgia, Athens, and
Georgia Game and Fish Commission

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9. This study was supported by the University of Georgia Research Budget, Athens, and the Palmer Chemical and Equipment Company, Inc., Atlanta, Ga. This report was presented, in part, before the Fourth Pan-American Congress of Pharmacy and Biochemistry, Washington, D.C., November 1957.

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Number of Species of Black-Widow Spiders (Theridiidae: Latrodectus)

The last revision of the black-widow genus *Latrodectus* was that of O. P.-Cambridge in 1902 (*1*). Chamberlin and Ivie in 1935 (*2*) made a study of the black-widow spiders north of Mexico, establishing several subspecies names subsequently used by nonarachnologists in this country. Although there is a steady flow of papers on the toxicology and distribution of black-widow spiders, the taxonomists have not kept pace with their colleagues. The common black-widow spider of the United States is now revealed to include two separate species. As a result of this, the specific toxicological properties of the two have been confused consistently in the literature (a further example of the dependence of physiological research upon accurate determination of the experimental animal).

There are two catalogs listing all the species of spiders known. Roewer's *Katalog der Araneae* (*3*) lists 21 species of *Latrodectus*. Bonnet, who covered the arachnological literature to the year 1938 in his *Bibliographia Araneorum* (*4*), also lists 21 species. Since the completion of these works, *Latrodectus rivivensis* Shulov, 1948, has been described, from Palestine.

In my systematic revision of the comb-footed spiders (Theridiidae), in progress for the last 6 years, I have now included the genus *Latrodectus*. The anatomy of all species was studied in some detail, and for the first time the many names created by Dahl (*5*) and Badcock (*6*) could be evaluated.

Although the structure of the genitalia is the usual criterion for separating spider species, some authors (mostly those otherwise unacquainted with spiders) state that genitalia are not useful in differentiating species of *Latrodectus*. My researches indicate that wherever two forms seem to occur in the same locality there are also differences in the genitalia of these two. Coloration and spines, however, are variable characters.

From a study of large series of specimens it can be concluded that there are three species in America: *Latrodectus geometricus* C. L. Koch, 1841, the cosmotropical brown widow; *Latrodectus mactans* (Fabricius, 1775), also limited to the warmer regions and apparently found in all continents; and *Latrodectus curacaviensis* (Müller, 1776) [= *L. bishopi* Kaston, 1938], endemic in America from Argentina to Canada but possibly more common in the temperate zones of North and South America. The last-named species has been confused with *L. mactans,* and much of the *L. "mactans"* literature of the United States may refer to either or both of the species. No conspicuous morphological differences could be found between *L. hasselti* (New Zealand to India), *L. indistinctus* (Africa), *L. tredecimguttatus* (Mediterranean region), and *L. mactans*. It is possible that they all represent one species. *Latrodectus hystrix* Simon, 1890, from Yemen, and *L. pallidus* O. P.-Cambridge, 1872, from Palestine, Asia Minor, and southern Russia, seem to be distinct. All other names in use appear to be synonyms of the names listed above. It is possible, thus, that the 21 nominal species cited in the literature may have to be reduced to five species.

In the males of *L. curacaviensis,* confused with *L. mactans* in this country, the palpal embolus is wider than and about three-quarters as long as the embolus in males of *L. mactans*. The connecting ducts of the female genitalia have three outside coils in dorsal view, while in *L. mactans* there are four or five. The legs of females of the former species are longer, although the coloration and spines are similar. There are differences in habitat: *L. curacaviensis* lives in trees and shrubs, above ground, in Florida; *L. mactans* lives on the ground. In northern states, *L. curacaviensis* lives under logs and stones in woods and fields and probably gets into urban surroundings only rarely, while *L. mactans* is usually found in trash and near dwellings. The northernmost localities where *L. mactans* is found are Maryland, Indiana, Wyoming, Utah, and central California, although this species may be found also in houses in the larger northern cities. The common black-widow spider of New England, most northern states, and, probably, southern Canada is *L. curacaviensis*.

Latrodectus geometricus has only occasionally been found in this country, in cities of Florida. The females are usually gray in color. The palpal embolus is narrower and about one-quarter longer than that of *L. mactans* (*7*).

HERBERT W. LEVI
Museum of Comparative Zoölogy,
Harvard University, Cambridge,
Massachusetts

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7. A more extensive paper, demonstrating, with figures, the differences between species and mapping their distribution, is in press (*Trans. Am. Microscop. Soc.*). This taxonomic study was made possible by the generous cooperation of the individuals and museums who have loaned collections of *Latrodectus* from various parts of the world. The work is supported by a grant from the National Institutes of Health (No. E-1944).

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New Absorption Peak of Tyrosine

While we were investigating the possible adaptation of the Holiday (*1*) method for the determination of small amounts of tyrosine in sea water, we observed a hitherto unreported absorption peak of tyrosine. This peak, at 330 mμ, arose when dilute solutions of tyrosine (1 to 100 mg/lit) in artificial sea water were autoclaved at relatively high pressures (70 to 90 lb/in.^{2}) in the presence of alkali concentrations ranging from 0.12 to 5.0*N* (Fig. 1, curves 1 and 2).

A similar peak, displaced 10 mμ toward the ultraviolet, was found when tyrosine solutions were autoclaved either in artificial sea water or in distilled water alone. Tryamine, 3,5-diiodotyrosine, and *p*-hydroxybenzoic acid behaved similarly (Fig. 1, curves 3, 5, 7), while other amino acids tested, including phenylalanine, proline, hydroxyproline, histidine, and tryptophan showed no such spectral change. Both crystalline albumin and plasma albumin solutions produced the

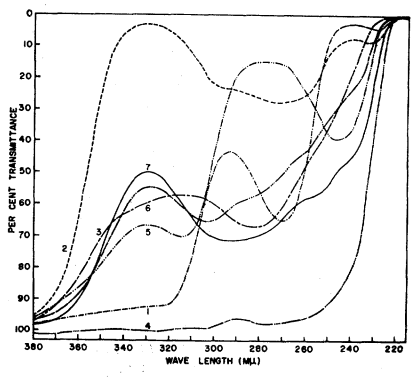

Fig. 1. Absorption peaks of tyrosine: (curve 1) 0.01 g of tyrosine per liter in 0.175*N* NaOH autoclaved 3 hours at 80 lb/in.^{2}; (curve 2) 0.01 g of tyrosine per liter in 0.175*N* NaOH; (curve 3) 3,5-diiodotyrosine in 0.125*N* NaOH autoclaved 4 hours at 80 lb/in.^{2}; (curve 4) plasma albumin in 0.125*N* NaOH; (curve 5) *p*-hydroxybenzoic acid in 0.125*N* NaOH autoclaved 4 hours at 80 lb/in.^{2}; (curve 6) plasma albumin in 0.125*N* NaOH autoclaved 3 hours at 80 lb/in.^{2}; (curve 7) tyramine in 0.125*N* NaOH autoclaved 4 hours at 80 lb/in.^{2}

same peak at 330 mμ following autoclaving with alkali (Fig. 1, curves 4 and 6); this is evidently due to the tyrosine content of the protein. The spectral evidence would indicate a structural change, perhaps to an *o*-quinoid structure, common to all the molecules mentioned above, rather than a conversion of the tyrosine to *p*-hydroxybenzoic acid (*2*).

ZOULA P. ZEIN-ELDIN
BILLIE Z. MAY
U.S. Fish and Wildlife Service, Galveston, Texas

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Effects of Handling and Eating on Plasma Electrolytes

Variations in the concentrations of plasma potassium and sodium in mammalian venous blood have been principally investigated in studies of response to the administration of chemical agents or to the application of severe stressor agents. The present report (*1*) describes fluctuations in concentrations of plasma potassium and sodium in the goat which were found to occur after the handling necessary to bring the well-trained animal into the laboratory and during the eating of a greatly desired food. In addition, hematocrit value and plasma glucose concentration were measured under the same conditions, since changes in these physiological variables may help to clarify the mechanisms affecting concurrent changes in plasma potassium and sodium concentrations.

Four dioestral female and two male goats, from 2 to 2½ years of age, served as subjects. In preparing these animals for previous experiments, each animal had been handled by laboratory personnel on from 30 to 50 days. Three weeks before the experiment described in this report, the subjects were quartered by pairs in rooms in the laboratory building, where they were not disturbed except for evening feeding. Water, a legume hay, and grain (G.L.F., 18% Dairy) were continuously available ad libitum. During this time, three of the animals were subjected to five sham experimental sessions in which no blood samples were taken. The remaining three animals had recently been subjects in a study very similar to that reported here and were thus already familiar with the experimental procedure. In their living quarters the animals would neither approach an experimenter voluntarily nor allow an experimenter to approach without showing some sign of flight. However, once leashed, the animals led easily and showed no overt sign of fear of the experimenter. A few days before the experiment began, a polyethylene catheter was inserted into the external jugular of each animal and held in place with collodion for the duration of the experiment. From the first day of the experiment, the animals received restricted quantities of grain, randomly varying daily from zero to 1 qt per animal. Water and hay intake remained unrestricted.

The experimental sessions took place in the morning, and each session lasted about 3 hours. The experimenter entered the living quarters, leashed an animal, and led it down a 25-ft hallway to a experimental room. There the animal leaped onto a platform, and a strap passing through a wall ring was fastened around the abdomen. This initial stress to the animal lasted about 2 to 3 minutes and constitutes what is here referred to as "handling." The experimenter then withdrew to an adjoining room within view of the subject, approaching only to draw blood samples, painlessly, by means of the previously prepared catheter. After about 1½ hours, a pail full of grain was fastened to the platform and the subject was allowed to eat until obviously satiated—a period of from 10 to 30 minutes. All subjects showed signs of excitement and attempted to walk off the platform towards the experimenter when he entered carrying the pail, and all subjects ate as soon as the pail was sufficiently near. The experimenter then approached only to draw further samples, and the session was ended about 1½ hours after the presentation of food. Each subject was subjected to four experimental sessions, at least two of which were on successive days.

A total of 10 to 15 samples, of 5 ml each, were obtained during each experimental session (*2*). This report presents analyses of the samples obtained within 2 to 5, 15 to 25, 35 to 45, 55 to 65, and 75 to 85 minutes after the experimenter entered the animals' living quarters and of the samples obtained within the same time intervals after the presentation of grain—a total of 240 samples.

Each sample was withdrawn into a syringe containing about 0.01 mg of heparin and was immediately transferred to a 15-ml graduated tube and centrifuged for 5 minutes at 3000 rev/min in an International clinical centrifuge. The hematocrit reading was then made from the centrifuge tube, and the samples were centrifuged for an additional 10 minutes before further analyses were made. Plasma potassium and sodium concentrations were determined by the lithium internal standard method with the flame photometer (Perkin-Elmer, model 52C).

The mean data for all animals are plotted for each physiological measure in Fig. 1. The data for each of the six curves were treated independently in an analysis of the significance of linear and nonlinear regression components, by means of the method of orthogonal polynomials (*3*). Quadratic regression—that is, one point of inflexion—is significantly present beyond the 1.5-percent confidence level in five of the curves. However, only linear regression is significant for the hematocrit data obtained after eating.

It is evident from Fig. 1 that a rapid

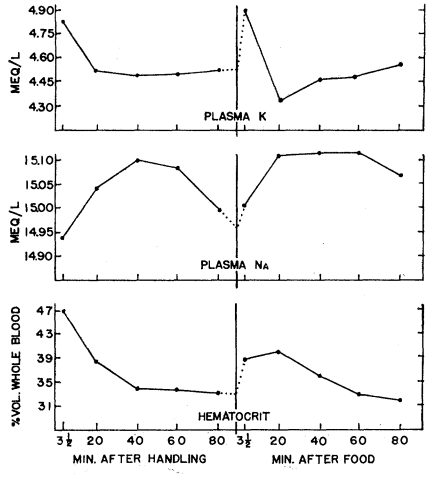

Fig. 1. Mean concentrations of plasma potassium (K) and sodium (Na) and hematocrit values for six animals as a function of time after the onset of handling, and of time after presentation of food. The central ordinate represents the time when food was presented, and the dotted lines represent linear extensions of the curves in the period between the last sample obtained before the presentation of food and the first sample obtained after the presentation of food.