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The spiders of the genus *Latrodectus*, a member of the family Theridiidae, popularly known as the line-weavers or comb-footed spiders, are of world-wide distribution in tropical and sub-tropical latitudes. The genus "comprises those very interesting spiders which, under various local names, have been notorious in all ages and in all regions of the world where they occur on account of the reputed deadly nature of their bite." During several years past in this country they have received widespread attention under the popular name "Black Widow Spider" proposed some years ago by Prof. Comstock. Older popular names sometimes still applied to the form are "Hour-glass Spider," given in reference to the shape of the bright red spot under the abdomen, and "Shoe-button Spider," given in reference to the shining black upper surface of the globular abdomen of the female.

The recent interest in this spider has been due chiefly, it would seem, to numerous newspaper articles and reports which have unduly alarmed great numbers of people and have unfortunately brought all manner of spiders under an undeserved suspicion, for spiders in general are among man's best friends. While an aroused interest has thus played an important role in making people attentive to the presence of creatures which had previously been overlooked, there is some evidence that the weather conditions have played a role. In the first place, the mild winter of 1933-34 allowed a larger than usual number of individuals to survive and mature. In the next place, the serious drought in the West apparently caused the spiders to wander about more than usually in search of suitably moist localities and in so doing more frequently to enter basements, garages, barns, and other buildings. In Russia and elsewhere, similarly, it is reported that spiders of the genus *Latrodectus* are more likely to be abundant, in appearance at least, during dry seasons.

The females of *Latrodectus* are the largest members of the family Theridiidae, and greatly exceed the males in size. Thus, while the male of our common species is ordinarily about 4mm. long, the female may be two and a half times or more as long. The genus is distinguished from all others in our country, excepting *Episinus*, in having the lateral eyes on each side widely separated from each other, and it differs

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from *Episinus* in the form of the abdomen. The abdomen of the female is large, high, and subglobose, while that of the male is narrowly elliptical in outline as seen from above. The legs of the male are relatively much longer than those of the female.

DEVELOPMENT OF COLOR AND COLOR PATTERNS

Nearly all females in *Latrodectus* have the body intensely black, typically marked on the abdomen both above and below with spots of vivid red sometimes encircled with white,—spots which may be obliterated in whole or in part. A few forms are yellow or gray marked with ocellate spots. The males ordinarily differ conspicuously in color and markings from the adult females.

In the American black widow, *Latrodectus mactans* and its varieties, as hereafter described, the individuals pass some way along a definite, apparently orthogenetic, series of color changes, both the male and female of all the varieties passing through some of these changes but only the female of the variety *hesperus* always completing the entire series of changes. This is usually not accomplished until the last instar, though occasionally it is reached with the next to the last one. In some progress is faster than in others, different individuals representing wide ranges of color at the same stage of growth. The normal series of changes in coloration and markings is represented on Plates 4 and 5.

When the spiderling leaves the egg-sac, the abdomen is white with two rows of black spots along the dorsum as shown in Fig 6.

After two or three moults, this pattern becomes changed into one of white and gray (Fig. 8), the gray areas being narrowly bordered with black; the original black spots are still present, but are extending into lines between the gray and white areas.

The gray areas next expand and become darker; the white areas become narrower and tend to change to yellow or orange, especially along the median line, but the borders of these areas still remain white (Fig. 9).

Next the gray areas change toward black and the light areas become narrower and more restricted (Fig. 10).

The lighter areas continue to become more restricted and gradually disappear. The median band changes to bright red and breaks up more or less into spots, which are usually bordered with white along the sides. The lateral stripes and the basal band become reduced and tend to disappear (Figs. 11-12).



In the last stages of complete development, the dorsal color pattern changes to a dense, solid and shining black, a red spot just above the spinnerets, and a small white mark at the basal end being the last of the light areas to disappear.

As previously stated, only females of the variety *hesperus* always complete the entire development above outlined, females of the varieties *mactans* sens. str. and *texanus* never completing this development and those of the latter variety, at least, scarcely exceeding the half-way mark.

The males never progress as far in the series of color changes as the females, and in the most extreme cases do not pass beyond the stage represented by Fig. 7. The males of *mactans* sens. str. are usually much darker than those of either *texanus* or *hesperus*, the average being as shown in Fig. 5, while the average of the latter two varieties is approximately as represented in Fig. 4.

The light or red-colored "hour-glass" shaped area of the venter also passes through a series of changes similar to those of the dorsal pattern. At first, it is a broad ventral area which gradually becomes smaller and usually takes on the characteristic hour-glass shape in the adult female, though it often becomes even more constricted, and in some cases entirely disappears. At the same time the color changes from white to yellow, then to orange, and finally to the characteristic bright red. The males usually do not pass beyond the yellow or orange stage, at which time the mark has not yet taken on the hour-glass shape (See Figs. 21 to 26).

The legs and cephalothorax become darker in correlation with the other color changes. They are pale yellowish at first, with only a few dark markings. The markings on the cephalothorax consist of a narrow median line and narrow lines along the sides of the thoracic division. The markings on the legs consist of dark rings at ends, and an additional dark ring on the tibia at about two-thirds its length from the proximal end. As the spiders mature, these dark areas expand and become darker, until in the adult female the cephalothorax and legs are wholly black. Occasionally the two distal articles of the legs are brown. The male seldom progresses in these changes beyond the stage shown in Fig. 5.

HABITS

The black widow spiders, in general, live a secluded life in dimly lighted corners or out-of-the-way retreats. They are commonly found under stones and pieces of wood, in abandoned rodent burrows, under bridges and eaves of buildings, and in out-buildings and basements,

which they seem especially likely to enter during dry seasons. Their webs are also frequently found stretched over clumps of cactus and low dry shrubs.

The spiders are ordinarily nocturnal and keep concealed during the daytime. The females do not often leave the vicinity of their webs but the males may often be found roving in search of mates. The immature spiders wander in search of new locations. While it is reported that in Russia *Latrodectus* is neither shy nor easily frightened, the members of our American species are as timid and retiring as most other spiders, and make every effort to escape if disturbed. They offer to bite human beings only under extreme provocation.

They spin an irregular web much like that of some members of the common genus *Theridion* but composed of much coarser and unusually strong threads of distinctive appearance and capable of holding the larger and more vigorous insects. The web extends in all directions from the retreat and is usually from six inches to two or three feet across. From the loosely woven upper and outer portion of the web a funnel-shaped tube gradually takes form and leads to the retreat of the spider, the tube being from one to two inches in diameter.

LIFE HISTORY

The principal mating season of the Black Widow about Salt Lake City is the early spring, but they may be found mating anytime during the summer and autumn. In Texas the variety *texanus* was found mating abundantly in August. The female constructs in most cases four or five egg cases in the course of a season, though occasionally there may be as many as nine. These cocoons, which are white, balloon-shaped, and commonly a half inch in width and three-fourths of an inch long, though often smaller, are suspended in the web, most commonly in the funnel or some protected place. Each cocoon contains from 200 to 900 eggs, the number being most commonly from 200 to 300. The egg cases are usually made after midnight in the early morning hours, though oviposition may occasionally take place in the daytime. The adults that have mated ordinarily die in the late summer or early fall. The males seem often to die soon after mating and at times are eaten by the females as is frequent with other spiders.

The young spiders emerge in from ten to fifteen days after the eggs are laid, though in some cases three weeks may elapse. The spiderlings must shift for themselves at once. Many are destroyed by insects and other spiders, and they normally also practice cannibalism. They feed upon each other to such an extent that in the laboratory

where the spiderlings from a cocoon are confined together in a test-tube or bottle, only a dozen or so out of the several hundreds may survive at the end of a few weeks. These are found to be almost exclusively females, the larger size of spiders of this sex giving them an advantage in this struggle.

Typically specimens moult nine times in reaching maturity, although some moult but seven times (See Lawson, '33). The length of time involved in the several stages or instars depends upon food supply and other environmental factors. The usual period between moults for well fed individuals was found to be from nine to eighteen days. Thus two or three months are required ordinarily for full development, but under unfavorable conditions the period may be much longer. Young hatched late in the season may, in fact, winter over in the immature condition, although most overwintering individuals are adults. The life cycle thus ordinarily extends over but one year.

VENOM

The effect of spiders' bites on man and other animals is a very old problem which only in recent years has begun to be placed on a basis of definite certainty. It is true that all spiders secrete venom in a pair of glands situated in the cephalothorax, or in the basal segment of each chelicera, and that they kill their prey by means of this poison, the effect of a nip upon an insect being often instantly fatal. The venom of some of the larger spiders seems to be effective upon birds and lizards, etc. However, it by no means follows that a spider able to kill an insect is also able to injure man. Spiders, in general, are timid and non-aggressive with reference to man and even when attempting to bite most of them are less formidable than a flea. There are a few species, however, feared with some justification. Among these is the Black Widow.

As already indicated, these spiders and related species of *Latrodectus* are feared the world over in nearly all places in which they occur because of their alleged deadly character. This widespread fear is the more interesting because of the fact that these spiders in general are small and inconspicuous. The Indians throughout America share the belief in their dangerous venom and in some cases formerly used their macerated bodies as an arrow poison. In Central and South America they are known by the names *lucacha*, *guina*, and *pallu*. Some Utah Indians, e. g. the Gosiutes, occasionally mixed the mashed bodies of the spiders with liver into which poison of the rattlesnake had been forced and smeared the arrow heads with the mixture. Two species in Madagascar, known to the natives respectively as *mena-vodi* and *van-*

coho, are among them reputed to be the most dangerous animals of the region, much more to be feared than the scorpions. Similarly in New Zealand a species, known among the natives as the *katipo*, is much feared, as is the so-called *karakurte* of southeastern Europe. Pavlovsky (1927) reports numerous cases of fatal results from bites of *Latrodectus tridecemguttatus*, the *malmignatte* of Corsica and south Europe, in horses, camels, and cattle, as well as in man. Sheep and pigs, on the contrary, are said to be immune and "may be used to clear a field of the spiders as an alternative to the method of burning." (Savory, 1928).

The whole matter of arachnidism, as spider-poisoning is called, has in recent years been placed upon a definitely scientific basis in the case of *Latrodectus*. Dr. Emil Bogen in 1926 and 1932 gave accurate evidence based upon sixty patients who had been under his care in the Los Angeles General Hospital and more recently (1935) Drs. J. M. Frawley and H. M. Ginsburg have reported upon fifty-two cases of arachnidism from black-widow bite treated by them in the Fresno County General Hospital. The symptoms and histories given by them and other American observers are essentially in agreement with those recorded earlier by Kobert (1901) who reported on twenty-two cases treated in Russia in 1888.

In a typical case "The patient is an adult male, who had been bitten on the penis or scrotum while sitting in an out-door privy. In some cases, however, there was a history of having been bitten on the foot while putting on a shoe in the morning or on the back or arm after getting into the blankets at night." There are two observations to be made in this connection. In the first place, especially in dry regions and elsewhere during unusually dry seasons, the spiders in seeking a damp place are likely to find and stay in privies. In the second place, the fangs or chelicerae, if applied to a part of the body where the skin is not very thin, may not penetrate deeply enough to enter a blood or lymph vessel and would in such case do little or no harm. The fangs in the black-widow are very small and weak for the size of the spider. Even in a large female the total length of the fang is only about one-half millimeter or one-fiftieth of an inch. It must bite into a tender spot to pierce the skin. Hence, the chance of the average person's being bitten is extremely small, and cases are only sporadic. The poison glands, however, are large for the size of the spider (Cf. Figs. 27 and 28.) Most cases of black widow bite have occurred during the summer and early fall, although the venom seems to be equally active at all seasons.

The symptoms resulting from an effective bite are general rather than local. The victim in an average case complains of pain and swelling at the site of injury, but there is pain throughout the body, pain being felt especially in the extremities which become cramped and spastic. The pain soon spreads over abdomen, back and chest, the pain over the abdomen being very severe, and the abdomen in general very tender. The abdominal muscles become rigid and often board-like. There is nausea and frequent vomiting. Sometimes the patient mentions a burning sensation on the soles of the feet. Commonly he feels some difficulty in breathing, dizziness, a ringing in the ears, headache, and general anxiety. The blood pressure is raised as much as 35 or 40 mm., the face is flushed, the pupils somewhat dilated, and the reflexes are over-active. The hospital patient is ordinarily able to sit up on the second day and to leave in four days.

All the 112 cases treated in the California hospitals at Fresno and Los Angeles and reported upon in the papers above cited, recovered. There are, however, various factors that may affect the results of a bite. In the first place, the supply of poison itself may be exhausted after several bites. The depth of the bite, determining whether the poison enters the circulation, is also of moment. No doubt the individual resistance also varies, some persons being much more susceptible to the poison than others. The size of the individual bitten is an important factor, and an "amount of poison that would be relatively harmless in an adult might conceivably be fatal in an infant or small child. In children the symptoms are more severe and the outlook is grave. In young children there is a rapid development of convulsions which are extremely difficult to control." (Frawley and Ginsburg, '35). Much also depends upon proper treatment as indicated below.

Considerable experimental work has been carried out to determine the effect of the venom under controlled conditions, much of the earlier work having been done upon the effects of the bite without any knowledge of the amount of venom introduced, this seemingly varying with the size and condition of the spider and the depth to which the fangs penetrated. Kobert (1901) was apparently the first to prepare extracts containing the active poison and to inject such extracts in definite quantities directly into the blood of the experimental animals. He showed, by his experiments, not only that the venom secreted by the poison glands of *Latrodectus* is extremely toxic, but also that fluids and tissues of other parts of the body and also the eggs contain active poisons differing from that of the poison glands. That in the eggs is especially concentrated.

Kobert experimented on cats, dogs, guinea pigs, and other animals, proving conclusively that *Latrodectus* possesses a virulent poison, or poisons, which tends to produce paralysis of heart and central nervous system and where the amount of poison coming into contact with the blood is large, to produce haemolysis and thrombosis of the vessels. He experimented on various other European spiders, but in no case found effects comparable in seriousness with the poison from *Latrodectus*. A typical experiment was as follows:

"An extract was prepared from the cephalothorax of eight dried specimens of the Russian *Latrodectus*, and 3 cc. of this, containing 4.29 mg. of organic material, were injected into the jugular vein of a cat weighing 2,450 grams. The previously very active animal was paralyzed and lay in whatever position it was placed. The sensibility of the skin of the extremities and rump was so reduced that there was no reaction from cutting or sticking. There quickly followed dyspnoea, convulsions, and paralysis of the respiratory muscles and the heart. In 28 minutes the cat was dead, after having exhibited exactly the symptoms observed in severe cases of poisoning of man from the bite of this spider."*

Others have tried similar experiments with like results, the most recent being those of Becker and D'Amour (1934, '35) on the American black widow in connection with their work on the preparation of an anti-venom as mentioned later. They found that one-fourth (equalling thirty-two thousandths of a milligram) of the venom in one spider, injected intraperitoneally as a saline extract, would kill five rats out of ten while one-half of the venom would kill nine out of ten. In the case of the eggs, the poison or arachnolysin of one egg would kill four out of ten while two eggs would kill ten out of ten rats. The evidence of the strongly poisonous nature of the venom of species of *Latrodectus* seems conclusive.

Kobert concluded from his work that the poison (arachnolysin) of *Latrodectus* is a proteid, a toxalbumen, something in the nature of a poisonous enzyme, a conclusion confirmed by Becker and D'Amour. Studies by the latter authors indicate that the arachnolysin is approximately twenty times as potent, on a dry weight basis, as rattlesnake venom. It is easily destroyed by mild alkalis and by heat.

TREATMENT FOR BLACK WIDOW BITE

Many different treatments for *Latrodectus* bite have been used in the past. There was early a widespread belief in the helpfulness of heat and sweating. Sweating is used by the natives of Madagascar, and

*Cf. Riley and Johannsen, 1927, p. 27.

this suggests that there may have been some empirical basis for the dancing or tarantism resorted to as a cure in the Middle Ages in Europe in connection with the bite of the European tarantula (*Lycosa tarentula*). In recent years sedatives and hot baths have been a chief dependence. Baerg (1923), who experimented on himself by forcing a black widow to bite him, has described the relief afforded him by such baths. The administration of sedatives, especially morphine, is of unquestionable benefit. The use of strychnine, formerly often administered, is, however, contraindicated.

The suggestion of Bogen that blood serum obtained from patients after recovery from spider bite be used as an antitoxin would seem to be little available in view of the rareness of cases in this country. However, that a protective serum may be developed is a practical certainty. Brazil and Vellard (1925, '26) prepared highly effective sera against various other spider venoms by a series of injections of the poisons into sheep, these sera, however, being strictly specific. That is, the antiserum against one venom was found to be effective only against the particular kind of spider furnishing the venom. Work on a serum against the venom of the black widow, *Latrodectus mactans*, has been done by Troise (1928, 1929) and more recently in this country by Becker and D'Amour (1934, '35). These authors succeeded in thoroughly immunizing rats by injecting them every other day with sub-lethal amounts of venom for two months. Sera from such immunized rats when mixed with the venom destroyed its effectiveness, or if injected into rats before introduction of the poison wholly prevented the appearance of the usual symptoms. Similarly potent anti-serum was prepared against the poison of the eggs. It was shown that this poison is different from that of the venom. These workers have not as yet demonstrated the antiserum on man.

Drs. Frawley and Ginsburg (1935) have given the most recent word in regard to treatment. They caution that, while prognosis is normally favorable, danger may lie in incorrect diagnosis and in improper treatment. In particular they emphasize that the use of alcohol in treatment is contraindicated and that several fatal cases on record seem quite possibly due to this cause. A man bitten while drunk would seem to have a poor chance of recovery. A person bitten by a black widow should not be given an alcoholic beverage.

They conclude that "the most rational form of treatment is one based on the clinical picture, which resembles hypertension in the adult and eclampsia in the child; viz., intravenous administration of mag-

nesium sulphate." commonly known as epsom salts.* This is said to relieve the abdominal cramps and other severe symptoms following an effective bite by the black widow.

The routine treatment they recommend is as follows:

1. The patient is immediately put to bed and iodine is applied to the site of the bite.

2. A soap suds enema is administered and fluids, non-alcoholic, are given freely by mouth.

3. Morphine sulphate is given hypodermically to control the pain and sodium amytal to insure rest.

4. Magnesium sulphate, a 20cc. ampule of 10 per cent solution, is given intravenously, to be repeated as required to overcome the hypertension and the spasticity of the muscles.

They did not find it necessary to give more than one dose of the magnesium sulphate and the patients were commonly free from symptoms within 24 hours.

*The first extensive use of magnesium sulphate in treatment of spider bite was made by De Asis (1934) in 1933 in cases of bites by the "Red Back" *Latrodectus*, or katipo, in the Philippines.

TAXONOMY

In examining large numbers of the black widow spiders collected from many parts of the United States, it was discovered that there are three distinct varieties, contrary to what was heretofore supposed. The true *Latrodectus mactans* (Fabricius) occurs only in the eastern and central states; a second variety occurs in the southwestern states; and a third in all the states west of the Rockies.

The three varieties are identical in their genitalia, the chief differences being in the color markings. The eastern variety has shorter legs than the other two. These three varieties may be briefly characterized as follows:

Latrodectus mactans mactans Fabricius

(Pl. 2, f. 2; Pl. 3, f. 5; Pl. 4, ff. 19-20, 22)

- Aranea mactans* Fabricius, Ent. Syst., 1775, Vol. II, p. 410, No. 11.
Latrodectus formidabilis Walckenaer, Ins. Apt., 1847, Vol. I, p. 647.
Latrodectus perfidus Walck., *ibid.*, p. 647.
Latrodectus variolus Walck., *ibid.*, p. 648.
Latrodectus intersector Walck., *ibid.*, p. 649.
Latrodectus mactans Walck., *ibid.*, p. 648.
Tetragnatha zorilla Walck., *ibid.*, 1842, Vol. II, p. 221, pl. xix, f. 2.
Latrodectus mactans C. Koch, Die Arachniden, 1841, Vol. VIII, p. 115, pl. cclxxxiv, f. 682.
Latrodectus dotatus C. Koch, *ibid.*, p. 115, pl. cclxxxiv, f. 683.
Theridium verecundum Hentz, Journ. Boston Soc. Nat. Hist., 1850, Vol. VI, p. 280, pl. x, f. 1-2. (Reprint: Spiders U. S., 1875, p. 153, pl. xvii, ff. 1-2.)
Theridion lineatum Hentz, *ibid.*, p. 281, pl. x, f. 3. (Reprint: Spiders U. S. 1875, p. 154, pl. xvii, f. 3.)
Latrodectus apicalis Butler, Proc. Zool. Soc. London, 1877, p. 75.
Theridion carolinum Butler, *ibid.*, p. 75.
Theridion lineamentum McCook, Agricultural Ant of Texas, 1879.
Latrodectus mactans Keyserling, Spinnen Amerikas, Theridiidae, Vol. I, p. 145, pl. vii, f. 91.
Latrodectus mactans McCook, American Spiders, 1889, Vol. I, p. 274, ff. 250-252.
Latrodectus mactans Emerton, Common Spider, 1902, p. 123, ff. 288-291.
Latrodectus mactans F. Cambridge, Ann & Mag. Nat. Hist., 7 ser., 1902, Vol. X, p. 38.
Latrodectus mactans F. Cambridge, Biol. Cent. Americana, 1902, Vol. II, p. 378, pl. 35, ff. 19-20. (In part.)
Latrodectus mactans F. Cambridge, Proc. Zool. Soc. London, 1902, p. 253, pl. xxvii, f. 2.
Latrodectus mactans Petrunkevich, Ann. N. Y. Acad. Sci., 1910, Vol. XIX, p. 208.
Latrodectus mactans Comstock, Spider Book, 1912, p. 357, ff. 360-362.

This variety is the one originally named *Latrodectus mactans* by Fabricius. The adult females are slightly smaller than in the two following varieties, and the legs are somewhat smaller and weaker on the average.

The cephalothorax and legs of the female are essentially black, as is characteristic of the species; the abdomen is shiny black with a red spot above the spinnerets, or the red spot may extend along the middle of the dorsum for much of the length as broad median band, or this band may be broken up into a number of spots. On the venter is a red mark, which sometimes resembles the shape of an hour-glass, though not as typically so as in the other varieties. The red mark above the spinnerets is ordinarily the only mark on the dosum, and is usually large and more or less round in shape, instead of narrow or small as is typical in the following variety.

The male is much smaller than the female as is characteristic for the species, and is more brightly colored. (See Fig. 5).

The palpus and epigynum are identical for all varieties.

Measurements:

	FEMALE	MALE
Length	9.6 mm.	4.0 mm.
Cephalothorax:		
Length	3.60	1.8
Width	3.04	1.5
Tibia-patella:		
I	6.3	5.0
IV	5.6	3.4

Distribution.—Eastern North America from New Hampshire to Florida, and westward into Texas and Oklahoma; probably extending down the Gulf coast into Mexico.

Type locality.—Massachusetts.

Latrodectus mactans texanus Chamberlin & Ivie, n. var.

(Pl. 2, f. 3; Pl. 4, ff. 15-18)

This variety appears never to have been given a name of its own, unless perchance, it is the same as one of the forms from the tropics or West Indies which have been described under new names.

This variety differs from the true *mactans* in being larger on the average, in the case of the adult female. The dorsum of the abdomen is most often black with a red streak just above the spinnerets, usually accompanied by a small white mark on the anterior end. (This latter mark is often found in the variety *mactans* also).

The male is much lighter than in the previous variety,—the black areas on the abdomen of the eastern form being gray or even whitish in this form.

Measurements (average):

	FEMALE	MALE
Length	10.6 mm.	4.0 mm.
Cephalothorax:		
Length	3.7	1.6
Width	3.2	1.2
Tibia-patella:		
I	7.1	4.1
IV	6.1	3.0

Distribution.—Throughout most of Texas, and extending less abundantly across the southwestern states into California, and northward into southern Utah. The range undoubtedly extends southward into Mexico. This is the most common form in Texas, but is rather rare westward from there.

Type locality.—Alvarado, Texas. Female type, male allotype.

Latrodectus mactans hesperus Chamberlin & Ivie, n. var.

(Pl. 1, f. 1; Pl. 3, f. 4; Pl. 4, ff. 6-14, 21, 23; Pl. 5, ff. 24-33)

This variety has heretofore been given no special name of its own, having been confused with the other varieties under the species name *Latrodectus mactans*.

The adult female of this variety differs from the two preceding varieties in that it never has any colored mark on the upper side of the abdomen whatsoever, the whole dorsum being a shiny black. The red mark on the venter is typically the shape of an hour-glass, though this is subject to considerable variation, often being reduced to two or three small spots, and sometimes absent altogether.

The male shows considerable variation in size and color, ranging from the dark color typical of the eastern variety to nearly a white; the extreme variation in size is shown by the following measurements.

Measurements:

	FEMALE	MALE
<i>Average:</i>		
Length	10.7 mm.	4.0 mm.
Cephalothorax:		
Length	4.6	1.6
Width	3.5	1.2
Tibia-patella:		
I	7.0	4.3
IV	6.1	3.3
<i>Extremes:</i>		
Length	9.0-11.7	3.0-6.0
Cephalothorax:		
Length	3.5- 5.0	1.2-2.6
Width	2.7- 3.9	1.0-2.0
Tibia-patella:		
I	5.3- 7.7	2.6-6.0
IV	5.0- 6.8	2.0-5.0

Distribution.—Abundant in all states west of the Rocky Mountains, extending into Canada on the north and into Lower California and Mexico on the south. In the southern states, it extends eastward into western Texas.

Type locality.—Salt Lake City, Utah.
Female holotype, male allotype.

Bibliography

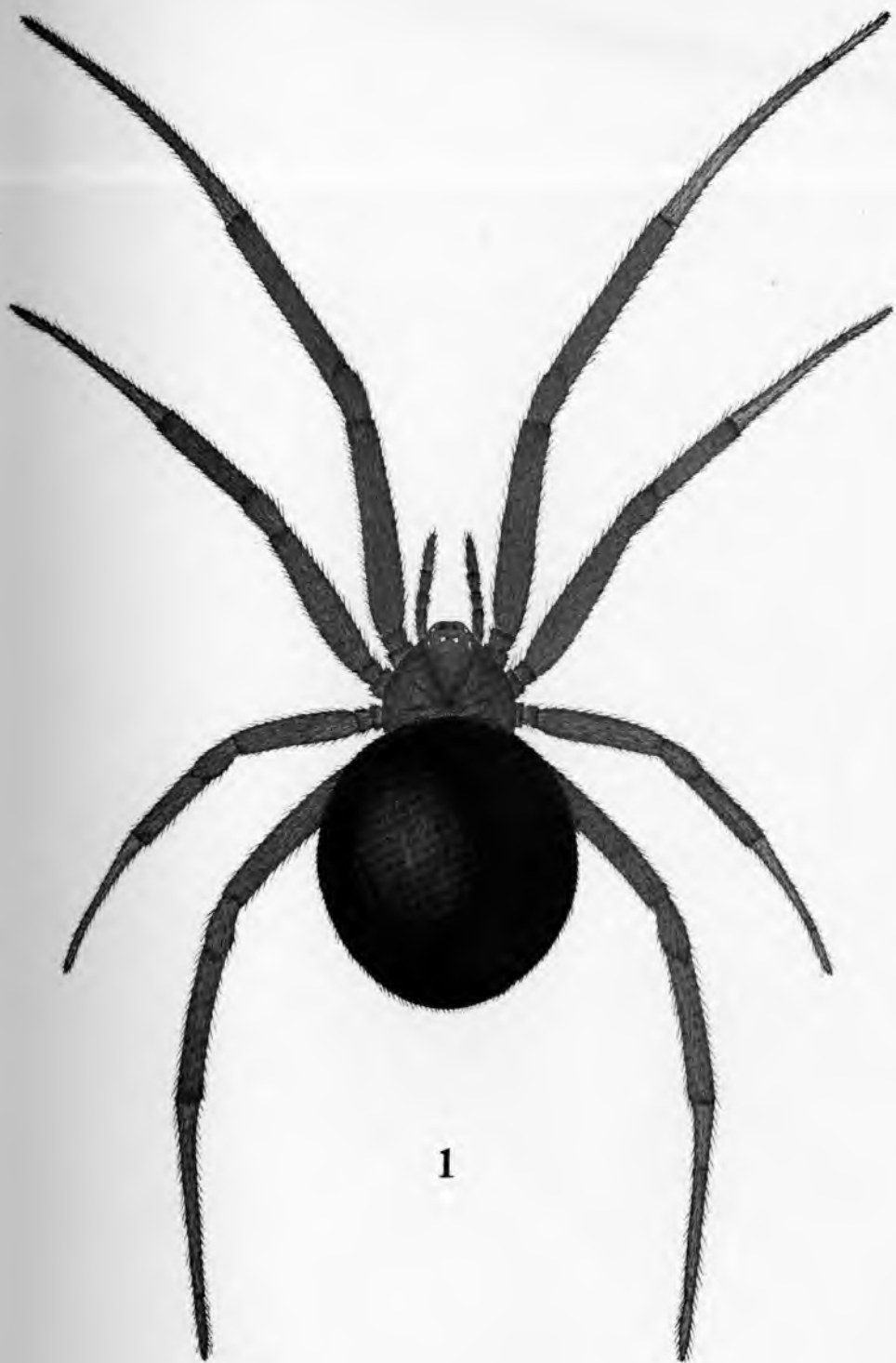
- Ancona, L., 1931. Anatomia e Histologia del ap. venoso de *Latrodectus mactans* o *Arana capulina*. Ann. Inst. Biol. Chapultepec, Vol. 2 (1), pp. 77-84.
- Baerg, W. J., 1923. Effects of bite of *Latrodectus mactans*. Journal of Parasitology, Vol. 9, pp. 161-169.
1923. The Black Widow: Its life history and the effects of the poison. Scientific Monthly, Vol. 17, pp. 535-547.
- Becker, F. E. and D'Amour, F. E., 1934. Anti-serum against black widow spider venom. Proc. Soc. Exp. Biol. and Med., Vol. 32, pp.166-167.
- Bogen, Emil, 1926. Arachnidism. A study in spider poisoning. Journal Am. Med. Association, Vol. 86, pp. 1094-1096. Also in Arch. Int. Med., Vol. 38, pp. 623-632.
1932. Poisonous spider bites. Ann. Int. Med., Vol. 6, pp. 375-388.
- Brazil, V. and Villard, J., 1925 Contrib. ao estudo do veneno Aranhas. Mem. Inst. Butantan, Vol. 2 (1), pp. 5-77.
1926. Contrib. ao estudo do veneno das aranhas. Segunda mem., Mem. Inst. Butantan, Vol. 3, pp. 243-294.
- Browne, A. C., 1930. The Black Widow (*L. mactans*), Month. Bull. Dept. Agr., Cal., pp. 596-597.
- Butler, A. G., 1877. Account of the Zoological Collection made during the visit of H.M.S. "Petrel" to the Galpagos Islands. Arachnida. Proc. Zool. Soc. London, pp. 75-77.
- Cambridge, F. P., 1902. On the genus *Latrodectus* Walck. Ann. and Mag. Nat. Hist., Vol. 10, pp. 38-40.
1905. Arachnida, Araneidea and Opiliones. Biologia Centrali Americana, Vol. 2 (1897-1905).
1902. On the spiders of the genus *Latrodectus* Walck. Proc. Zool. Soc. London, pp. 247-261.
- Comstock, J. H., 1912. The Spider Book.
- Cornwell, A. M., 1931. Arachnidism. South. Med. and Surg., Vol. 93, p. 885.
- De Asis, C., 1934. "Red back" spider bite and magnesium sulphate treatment: Clinical study of four cases. Am. J. Trop. Med., Vol. 14, p. 33.
- Dzenski, P., 1915. Le Venin des araign. et leur action sur l'organisme animal. Tr. Soc. Bulg. Sci. Nat. Sophia., No. 7, pp. 152-159.
- Emerton, J. H., 1902. Common spiders of the United States.
- Ewing, H. E., 1928. Injury caused by bites or stings of some common North American arthropods. Am. J. Trop. Med., Vol. 8, pp. 39-62.
- Fabricius, J. C., 1775. Systema entomologiae, etc.
- Hentz, N. M., 1850. Descriptions and figures of the araneids of the United States. Jour. Boston Soc. Nat. Hist., Vol. 6, pp. 271-295.
1875. Reprint of the preceding: The Spiders of the United States.
- Illingworth, J. F., 1931. The Black Widow Spider. Proc. Hawaiian Ent. Soc. Vol. 7, pp. 410-414.
- Keyserling, G. E., 1884. Die Spinnen Amerikas. Theridiidae, Vol. 2.
- Kobert, R., 1901. Beitrage zur Kenntniss der Giftspinnen. 191 pp.
- Knowlton, G. F., 1935. The Black Widow Spider. 4 pp.
- Koch, C., 1841. Die Arachniden. Vol. 8.
- McCook, H. C., 1879. Agricultural Ant of Texas.
1889. American Spiders, Vol. 1.

- Millot, J.**, 1931. Les glandes venimeuses des arancides. Ann. Sci. nat. Paris, Vol. 14, pp. 113-147.
- Nicoli**, 1849. Arachnidas: in Gray's Historia phisica y politica de Chili, Vol. 3, pp. 322-541.
- Pavlovsky, E.**, 1927. Giftthiere und ihre Giftigkeit. 516 pp.
- Petrunkewitch, A.**, 1910. Some new or little known American spiders. Ann N. Y. Acad. Sci., Vol. 19, pp. 205-224.
1911. Catalog of American spiders. Bull. Am. Mus. Nat. Hist., Vol 29, pp. 1-791.
- Reese, A. M.**, 1921. Venomous spiders. Science, pp. 382-385.
- Riley, W. A. and Johannsen, O. A.**, 1932. Medical Entomology. 476 pp.
- Troise, E.**, 1928. Action pharmacodynamique du venin de *Latrodectus mactans*. C.R. Soc. Biol. Paris, Vol. 99, No. 31, pp. 1431-1433.
1928. Serum actif contre le venin de l'Araigne *Latrodectus mactans*. C. R. Soc. Biol. Paris, Vol. 99, pp. 1433-1434.
1929. Action du venin de l'Araigne *Latrodectus mactans*. C. R. Soc. Biol. Paris, Vol. 102, pp. 1097-1098.
1929. Specificite du serum anti-*Latrodectus mactans*. C. R. Soc. Biol. Paris, Vol. 102, pp. 1098-1099.
- Vaughan, J. T.**, 1931. Arachnidism: Report of two cases. Virginia M. Monthly, Vol. 57, p. 806.
- Walckenaer, C. A.**, 1837-1847. Histoire nat. des Insectes Apteres.

Explanation of Figures

PLATE 1

Fig. 1. *Latrodectus mactans hesperus* Chamb. & I., var. nov., Female.



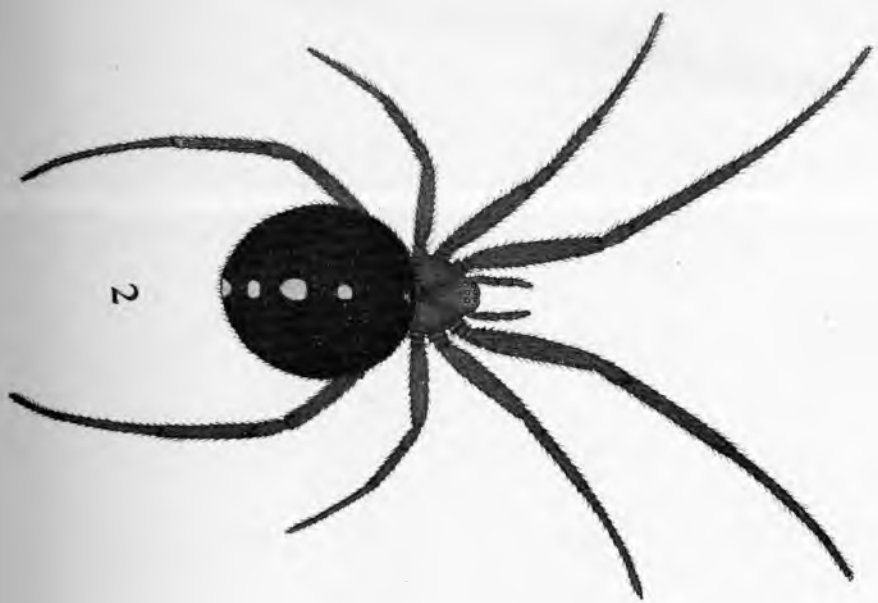
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PLATE 2

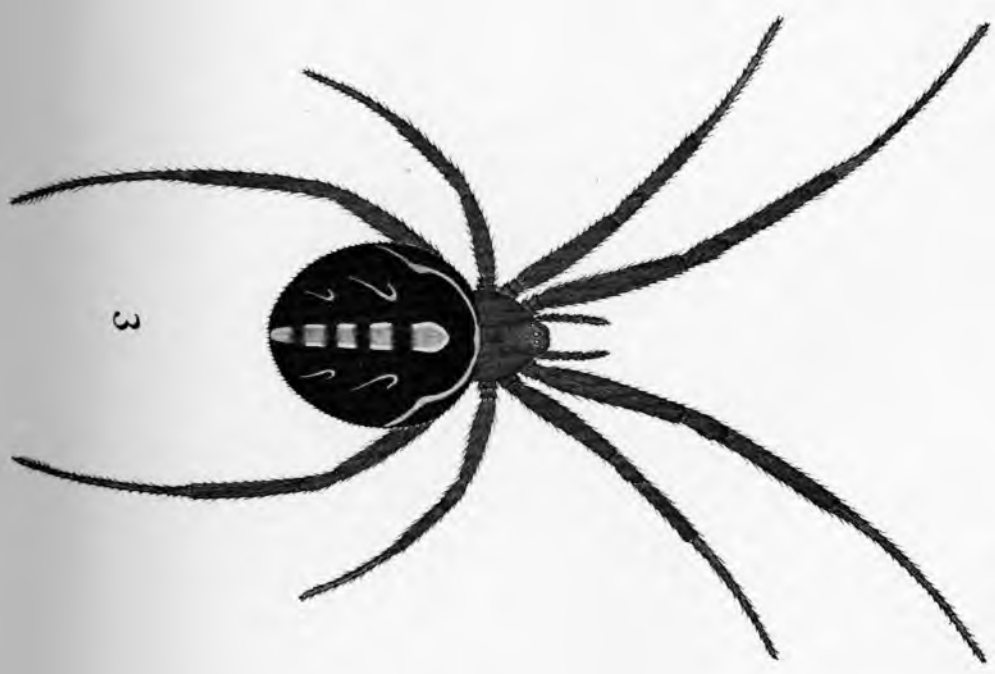
Fig. 2. *Latrodectus mactans mactans* (Fabricius). Female.

Fig. 3. *Latrodectus mactans texanus* Chamb. & Ivie, var. nov., Female.

(Both specimens figured on this plate are more highly colored than is typical for their varieties.)



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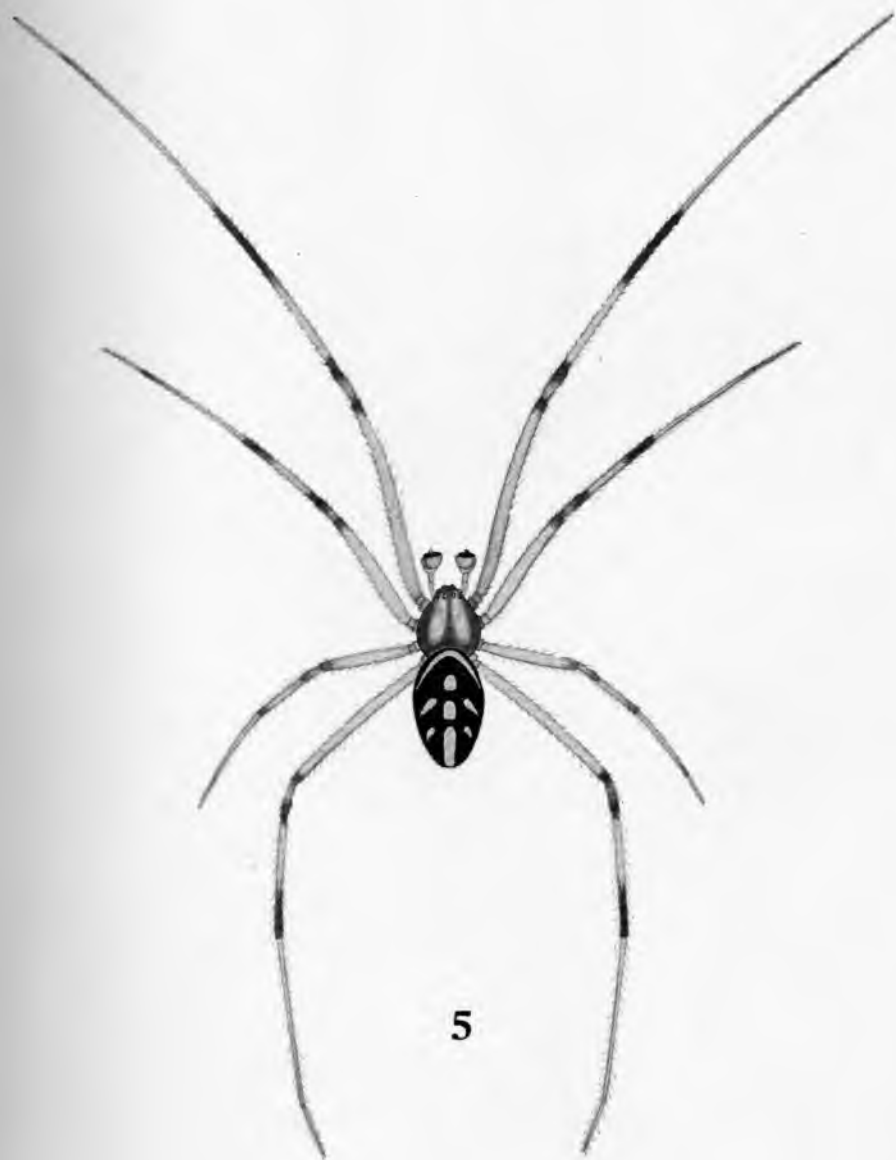
PLATE 3

Fig. 4 *Latrodectus mactans hesperus* Chamb. & Ivie, var. nov., Male.

Fig. 5. *Latrodectus mactans mactans* (Fabricius). Male.



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PLATE 4

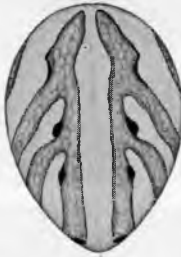
- Figs. 6-14. Dorsal views of the abdomen to show the typical change of the color pattern on the abdomen, from the time of hatching to the full development as exhibited by the adult female of *L. m. hesperus* Chamb. & Ivie, var. nov.
- Figs. 15-18. Dorsal views of the abdomens of adult females of *L. m. texanus* Ch. & I., var. nov., showing variations in the color pattern.
- Figs. 19-20. Dorsal view of the abdomen of adult females of *L. m. mactans* (Fabr.), showing variations in the color markings.
- Fig. 21. A section of the venter showing the typical hour-glass mark characteristic of *L. m. hesperus* and *texanus* var. nov.
- Fig. 22. A section of the venter showing the mark characteristic of *L. m. mactans* (Fabr.).
- Fig. 23. A variation in the shape of the ventral mark.



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PLATE 5

- Figs. 24-25. Other variations in the shape of the ventral mark on the abdomen.
- Fig. 26. *Latrodectus mactans hesperus* Chamb. & Ivie, var. nov. Female, ventral view.
- Fig. 27. Chelicerae of female with poison glands attached, front view.
- Fig. 28. Same as above, lateral view. The outline of the carapace is also shown to give the position and relative size of the glands.
- Fig. 29. Spinnerets of female.
- Fig. 30. Carapace of female.
- Fig. 31. Epigynum.
- Fig. 32. Variations in the shape of the opening of the epigynum.
- Fig. 33. Male palpus, ectal view.



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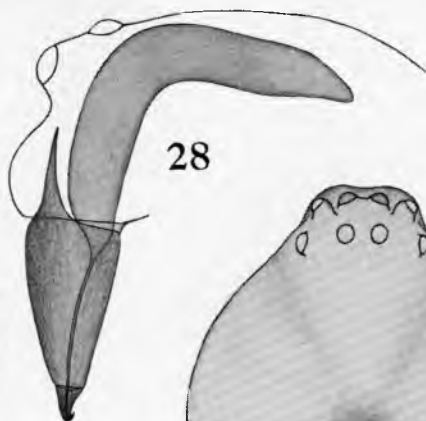
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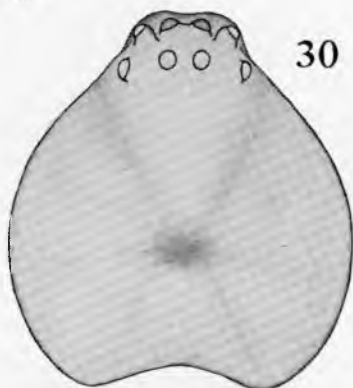
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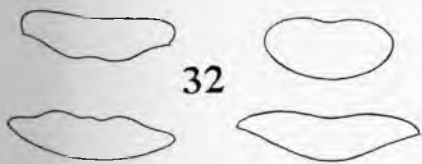
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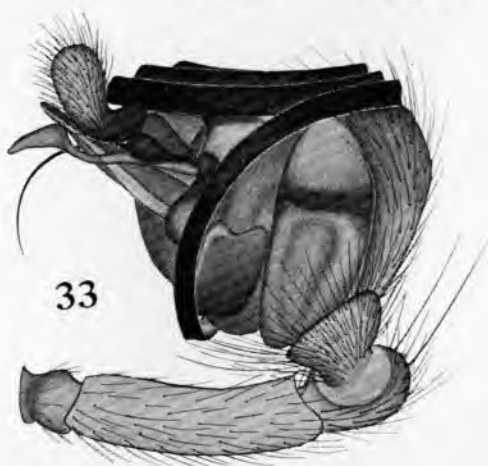
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