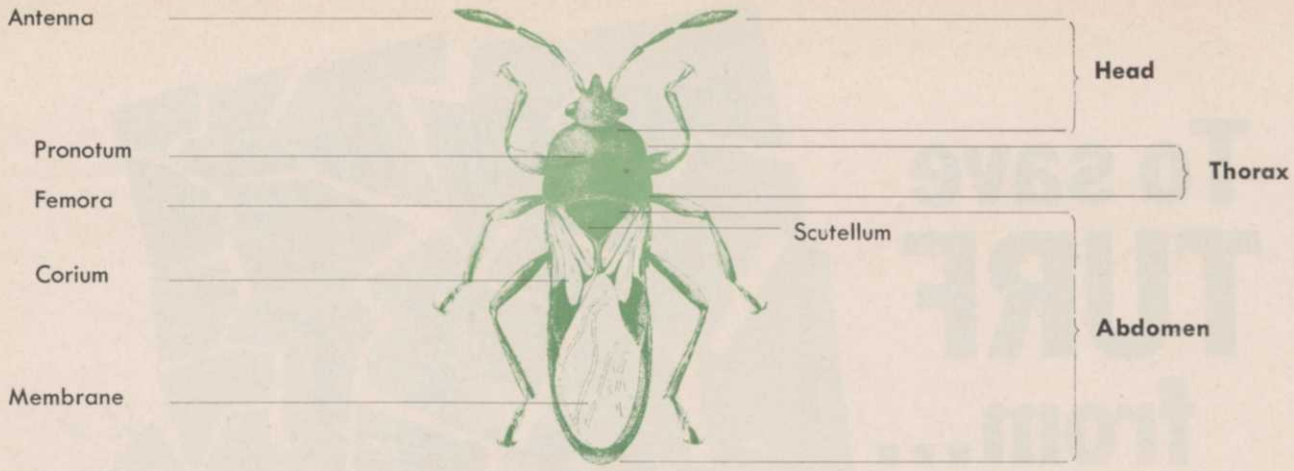

Drawing of typical chinch bug, *Blissus leucopterus* (Say); this is long-winged form.

How to Identify and Control Chinch Bugs

Results of another *Weeds and Turf* field research project

THERE is some confusion in entomological circles which directly affects the turf pest control business. The mention of "chinch bug" by a worker in one part of the country can be interpreted by two other people, in other areas, as different insects. This part of the problem is practical, the other part is academic. It seems that there is confusion whether *hirtus* and *insularis* listed below as subspecies should be subspecies or should be listed directly under *leucopterus* as a separate and distinct species.

To begin a short study of chinch bugs, it is necessary to know something about the order and family to which chinch bugs belong.

Order Hemiptera is that insect group which comprises the true bugs. "Hemiptera" refers to the front wing structure of this order. The basal portion of the wing is thickened and somewhat leathery; it is called the corium. The apical or distal portion is typically membranous as is the second set or hind wings. With only half of the front set membranous, we get the term descriptive of the order, hemiptera or "half wing." At rest insects in this order fold their wings across their backs so that an "X" pattern is suggested.

Hemiptera also have piercing, sucking mouthparts made up of fused maxillae and mandibles (2 each). There are no accessory mouthparts as are found in the mosquito. At rest the stylet is held between the legs almost parallel to the body.

Another character which helps to distinguish Hemiptera is the scutellum. This is a triangular structure directly on the back of the insect which might be described as "right between his shoulder blades." Although Hemiptera share this character with another insect group, when one finds an insect with a scutellum and divided wings, he can be certain it's a Hemipteran.

The family which concerns us here is Lygaeidae (lie-gee'-ih-dee), sometimes called the chinch bug family, not because the chinch bug is typical but because it is the most destructive member of the family. Lygaeids are generally phytophagus or plant sap suckers. They insert their beaks into tender portions of plants, usually of the grass family, and feed on juices from the insides.

Blissus is the genus of this family in which we are interested. The following characters will help identify a member of the genus *Blissus*. The slightly cone-shaped head is bent gradually downward anteriorly. The antennae are as long as the head and the pronotum combined. The pronotum covering the thorax is convex in the middle, tapering downward at the sides. The scutellum previously described does not have a ridge down the middle of it as other members of this family may have. When the adult insect is at rest, all that can be seen is a small part of the sides of the abdomen below the wings; the wings do not completely cover the abdomen but leave a slight margin showing.

Blissus leucopterus (Say) is the chinch bug of agricultural infamy. Thomas Say, a nineteenth century taxonomist, originally described this species in a genus other than *Blissus*; that is why his name appears in parentheses after the species name.

Since *Blissus leucopterus* is the representative type for chinch

Figure 1. Here is the classification of the chinch bug, showing the "subspecies" which have perplexed some researchers.

Class: Insecta

Order: Hemiptera

Family: Lygaeidae

Genus: *Blissus*

Species: *leucopterus*

Subspecies:

-hirtus?

-insularis?

bugs, let us examine the life cycle of this agricultural pest and see how it applies to residential pest control.

Life Cycle

Adults come out of hibernation in the spring when temperatures rise into the 70's. They may have spent the winter in any number of places: in clumps of perennial grasses, under leaves and litter near small woods, under hedges, in shocks of corn, under bark of trees or in cracks of fenceposts, or under boards or shingles of homes or outbuildings. These hibernating places will generally have a southwest exposure to gain benefit from the sparse winter sun. Usually large groups of adult chinch bugs will be found hibernating in one place.

Mating is thought to take place before the bugs take flight from the hibernation spot. After mating, the few adults which have survived the winter fly to the nearest field of wheat or small grain where the adult females lay several hundred eggs over a period of about 20 days.

Eggs hatch, depending on temperature, in 1 to 2 weeks or perhaps longer. The young nymphs, as they are called, are bright red and about half the size of a pinhead. They insert their mouthparts into plants where they were hatched and begin sucking the plant juices. Many feed on the same plant and this is what causes the yellow spots on grass. As the insects move outward from the area which they have killed, a circular pattern of damage is seen.

Metamorphosis is gradual; nymphs pass through 5 instars or growth stages in becoming fully winged adults. They molt 4 times. There is no pupa or resting stage in the life cycle. Nymphs look essentially like the adults except for the bright red coloration and the absence of wings.

With each successive molt, the red color diminishes until the adult color, black, is reached. Adults are ⅕ inch long and black with only slight reddish tinges around their legs. Their bodies are somewhat hairy or fuzzy. Adult wings are white (leuco-pterus means "white wing") with a black triangle on the outer margin of the front wing. This is a good point for recognition of the species.

Total maturation takes about 35 days. Egg-laying processes begin 7 to 10 days after the adult stage is reached. Females will lay second generation eggs usually on young corn plants or other grasses which may be succulent at this time.

In the southern portion of the chinch bug's range, there may be three broods of young each year; in other places only two.

There are two forms of the chinch bug *Blissus leucopterus*, a long-winged form, with wings extending over the abdomen, and a short-winged form with fully developed wings which hardly cover the abdomen. Throughout the central United States where the chinch bug is mainly an agricultural pest, the long-winged form predominates.

Blissus leucopterus has a range almost covering the entire United States. It is mainly an agricultural pest in the Mississippi, Missouri and Ohio River valleys, but it causes trouble from the Appalachians to the Rocky mountains. The

agricultural chinch bug ranges as far north as Quebec and New England and west to British Columbia; south and west to Florida, Texas and Mexico.

Although not generally found in California, Arizona, and Washington, *B. leucopterus* has been collected in those states.

With facts about *Blissus leucopterus* well in hand, we can continue to investigate the other species which are nonagricultural yet economically important and troublesome.

Hairy Chinch Bug

In the northeast sector of the United States, we find another chinch bug. It is called the hairy chinch bug. There is divided opinion whether it is a separate species or only a subspecies of *leucopterus*. Consequently two names are found in the literature describing it: *Blissus hirtus* Montandon and *Blissus leucopterus hirtus* Montd.

Color characters which attempt to distinguish *hirtus* (we shall call it simply *hirtus* because of the doubt as to its status) come from Blatchley's *Heteroptera of North America* (1926): "More robust than typical *leucopterus* with longer and denser and more erect yellowish hairs on the pronotum and sides of the abdomen. The femora are often dark brown (rather than reddish)."

Hirtus is a domestic pest, that is, it attacks lawns and golf courses rather than agricultural crops. Its feeding causes circles of yellowing and death of grasses, mainly bentgrass, in lawns.

Although found predominately in New England, the hairy chinch bug does extend its range west through New York, Pennsylvania, Ohio, and even as far west as Iowa. *Hirtus* has also been taken in Minnesota.

Just as chinch bugs (*leucopterus*) have long- and short-wing forms, long predominating, there are long- and short-wing forms for the hairy chinch bug. Short-wing forms are the most common for *hirtus*.

"At one time," explains Professor J. B. Polivka of the Ohio Agricultural Experiment Station at Wooster, "*hirtus* was considered a distinct species because 50% of the specimens taken were the short-wing forms." This is thought by some to be a criterion for elevating it to species rank.

Short-wing forms are those with smaller, yet mature, wings. These forms do not appear to have large scale migrations from one food plant to another as is commonly observed for the long-wing form.

Lawn Chinch Bug

A third chinch bug exists in the southern parts of the United States. Opinion here is also divided as to whether the lawn chinch bug, as it is commonly called, should be named *Blissus leucopterus insularis* Barber or *Blissus insularis* Barber.

Insularis is described as being shorter and narrower than typical *leucopterus*. The antennae have a relatively shorter terminal segment. The pronotum is a deep velvety black, and has a prominent silvery-gray pubescence (hairiness) on the anterior portion. The overall hairiness (villosity) is shorter and sparser than *leucopterus*.

The wings appear more whitish, and the dark portions of the wings are described as being strongly

piceous (pitchy black with a reddish tinge). The femora are frequently castaneous (chestnutty) in color.

The lawn chinch bug is the most damaging species in Florida and in the Gulf region, according to Dr. S. H. Kerr of the University of Florida at Gainesville.

Again as with *hirtus*, the short wing-form of *insularis* predominates. This perhaps gives strength to the argument that it, too, may be a distinct species.

An unknown author refuting the idea that *insularis* is a species has said, "*Insularis* is but a color form of *leucopterus* found in sandy regions. Specimens of typical form from sandy places in Indiana have the front half of the pronotum more silvery-gray than those from nonsandy areas."

The lawn chinch bug is the only major enemy of St. Augustine grass, upon which *insularis* feeds. Many lawns in Florida and Gulf States where St. Augustine is a favorite grass have been laid to waste by lawn chinch bug damage.

In some areas of very dry land where St. Augustine adapts, its cultivation as a lawn grass has been abandoned because of chinch bug ravages.

It appears as though the subspecies or species *hirtus* and *insularis* are the only nonagricultural chinch bugs. *Blissus leucopterus* is not, from our reports, a domestic pest. It is not reported as a pest of home lawns and golf courses.

Professor Harold Gunderson, of Iowa States University at Ames, told *Weeds and Turf* that it is apparently "the abundance of lush pasture grasses, small grains, and corn (in Iowa) which is responsible for the failure of the chinch bug to attack lawns."

Genetics May Solve Mystery

Apparently superficial coloration studies which originally determined species and subspecies are not sufficient to overcome this identity problem. At present, work is being done at the Connecticut Agricultural Experiment Station by David E. Leonard which may determine through genetic breeding trials whether or not *hirtus* and *insularis* are distinct species, or subspecies of *leucopterus*.

The criterion which Leonard uses is the definition of a species, an animal which will reproduce its own kind. Chinch bugs are being bred to see if they will produce fertile offspring. Sometimes interbreeding will produce offspring, but these offspring of two different species are sterile and will not reproduce themselves.

If, for instance, *hirtus* is only a subspecies of *leucopterus*, a mixed pair will successfully breed and the offspring will be able to reproduce. If *hirtus* is separate and distinct, offspring may be produced, but these will be sterile.

To understand this more clearly, consider the fact that the domestic dog is *Canis domesticus*, regardless of the variety on pedigree papers. Domestic dog varieties will interbreed and the offspring can reproduce.

To demonstrate sterile offspring, we look to the cross between a horse and an ass, two different species. The offspring in this case, a mule, has characters of each parent species, but will not reproduce mules because mules are sterile.

The status of chinch bugs awaits results of these tests at Connecticut.

Damage

Chinch bug damage, whether in the Northeast or South, will be similar except for the species of grasses attacked.

When chinch bugs hatch, the nymphs begin feeding around the bases of the grasses on which eggs were laid. Their feeding causes the grass blades to become yellow because water is being withheld from the leaves above.

The grass dies and turns brown and the nymphs move to adjacent plants away from the central dead area. Their outward movement causes large dead circles in lawns unless measures are taken to stop them. Sometimes infestations are blamed on grass diseases and other disorders, because the nymphs are so small they may not be noticed right away.

An easy test to detect the presence of chinch bugs uses a large tin can which has both ends removed. Push one end about half way into the grass around edge of an area of suspected infestation. Fill the can with water and wait five minutes.

Young chinch bugs, if they are there, will soon float to the top of the water. Positive identification can then be made.

Hemiptera possess odor organs which cause vile smells when the bugs are crushed. An experienced contract applicator can detect infestations by simply walking across lawns and keeping his nose alert for the odor.

Although the hairy chinch bug may be found on many kinds of grass, the most probable, and the one which receives the most damage, is bentgrass.

The lawn chinch bug is found usually on St. Augustine grass, but has been recorded feeding on other grasses such as Bermuda and centipede. St. Augustine can grow on dry sandy areas where chinch bug development is favored and the grass resistance is lowered.

Biological Control

Greatest chinch bug infestations occur during hot dry spells. More humid weather fosters development of a white fungus called *Beauveria globulifera* which decimates populations during damp conditions. This fungus occurs naturally and is not commercially produced as is the milky disease fungus which controls the Japanese beetle.

A small wasp described as a "speck in one's hand" has been credited with parasitizing 30 to 50% of chinch bug eggs in a single area which was tested. This wasp

Confusion among some entomologists and lawn spraymen over the classification of certain chinch bug variants led the *Weeds and Turf* technical staff to prepare this comprehensive article on chinch bug control. Several agricultural experiment stations cooperated in the compilation of this research data.

is called *Eumicrosoma benefica* Gahan.

Other natural enemies of chinch bugs are the red-winged blackbird, bobwhite, catbird, brown thrasher, and meadowlark. Bird predation, however, is not dependable as a means of biological control because birds do not eat enough of the bugs to be classed as a major control factor.

Chemical Control

Chemicals recommended vary from old standbys to the newest weapons needed to combat resistance which shows up in some populations.

DDT, used on *insularis* in tests conducted at Auburn, Alabama, by Eden and Self in 1960, at 10 lbs. active (equals technical) in either spray or granular form, protected the grass for 4 months. DDT has also given control of *hirtus* in Ohio.

Chlordane can be used at 1¼ lbs. active material per 5000 sq. ft. against *hirtus* in some parts of New England.

Unlike chlordane and dieldrin, which are available as emulsifiable concentrates, powders, and dusts, diazinon has been used on lawns as an emulsifiable concentrate and wettable powder.

Recently Geigy developed a granular diazinon called Spectracide 2 G, which is available this year, for use against lawn insects, especially chinch bugs. It will be applied at the same rate as mentioned below for diazinon.

Diazinon at 7½ ounces active per 5000 sq. ft.; dieldrin at ⅓ lb. active per 5000 sq. ft.; and Sevin at 1 lb. active per 5000 sq. ft. are also recommended against *hirtus* in the Northeast. These chemicals are used in the South also.

Florida, having applied chemicals against chinch bugs for a longer period of time and developed more resistance in them, recommends newer insecticides for use against this most serious lawn pest.

V-C 13 is recommended at a maximum of 3 lbs. active per 5000 sq. ft. Trithion is used at 12 ounces active per 5000 sq. ft., and Ethion is advised at 1 lb. active per 5000 sq. ft. These chemicals are also used in states other than Florida.

Newest addition to the Florida recommendations is Aspon, which will be used at about 12 oz. active per 5,000 sq. ft. This is marketed by Stauffer.

Regarding the use of parathion, Dr. S. H. Kerr told *Weeds and Turf*, "At one time it [parathion] was about the only effective material spraymen had in some places, but now there are so many other effective materials available that are far less toxic to warm-blooded animals, we feel there is little justification for continuing its use."

Oddly enough, Zytron, Dow's new pre-emergence herbicide for crabgrass control, appeared useful in experimental trials both in Florida and Alabama. It is not yet registered for use against chinch bugs, however.

It should be mentioned that turf fertilization, specifically application of nitrogen, fosters chinch bug development and increases chances that there will be damage.

Often nitrogen is applied when grasses normally slow their growth. The purpose of the nitrogen is to boost growth. This excess nitrogen may work to the disadvantage of the lawn if chinch bugs develop to infestation levels. Moderate fertilization, if any, is advised; keep the nitrogen at a minimum during chinch bug seasons.

Application Techniques

Tests from Ohio Experiment Station conducted by Professor Polivka showed that a second treatment of insecticide is necessary to combat the second generation which may be in the egg stage when the first treatment is applied.

First treatment may be made when damage becomes very evident. If the first treatment is made to prevent early injury, Professor Polivka advises, the second treatment should be applied in August.

In areas where chinch bug damage was evident the previous year, it is advisable to apply control materials early in the season, preferably late May or early June, to control the developing first generation.

If a spray is to be applied, it is wise to water the lawn thoroughly before treatment so that the water carrier used for treatment will penetrate better. After treatment, do not water for several days.

If prewatering is not done, up to 30 gallons of water per 1000 sq. ft. may be desired for proper penetration. Nozzles which produce coarse sprays are generally preferred to reduce drift and aid penetration.

If dusts or granules are applied, the lawn should be watered thoroughly a day or so before, so that the soil will be sufficiently supplied with water. It should be allowed to dry out on top, because dry chemicals applied to wet grass may cause a discoloration.

After application of dry material with a calibrated spreader or dependable broadcaster, the lawn should be sprinkled lightly to wash the chemical down around the crown of the grasses where the insects feed. Dry applications should be left unwatered also for several days afterward.

Strive for even distribution of the chemical regardless of the form used. Be certain to read all of the label directions and precautions before application.

Resistance of an insect to a chemical insecticide may crop up where that chemical is used sufficiently to cause selection pressure on the population. A few insects may escape elimination and reproduce, passing on to their offspring the ability to tolerate chemical treatment. The offspring too are "weeded" for the ones not fit to survive in an insecticidal environment, and those left build up populations of resistant insects quickly because they have a high rate of reproduction.

Such has been the case in Florida. DDT had been used in the past to control chinch bugs and other lawn insects. Chinch bugs are now, according to Dr. S. H. Kerr, "evidently resistant to DDT in much of Florida."

In Connecticut, David E. Leonard reports, "spraying occurs only when chinch bugs are a problem, but *hirtus* has become resistant in some places. This has occurred because chinch bugs were exposed to chemicals used for control of grubs and other lawn insects long enough to have developed resistance."

Professor Milton G. Savos told *Weeds and Turf* that resistance to dieldrin, DDT and chlordane was

(*Continued on page W-25*)

Chinch Bugs

(*from page W-22*)

found in 1960 in Fairfield County (SW Connecticut), and in 1961 in New Haven County (S. Central Conn.).

Localized resistance in Florida to parathion, a highly toxic material, has been found "about residential neighborhoods right on the ocean front, bays, salt water waterways and canals in the southern third of Florida," according to Dr. Kerr.

Although resistance may thwart efforts of CAs in one area, other places are relatively free of resistance and control may be achieved with DDT as has been shown by tests in Ohio and Alabama.

County agents and extension services should be consulted where there is doubt about the ability of insects in an area to resist a particular chemical treatment.

In view of the confusion surrounding the use of the term "chinch bug" for three different insects, we suggest that the adjectives be added to the common names. Hairy chinch bug is the northeastern form; lawn chinch bug is the southern form; and chinch bug remains the pest of wheat and corn. Regardless of the uncertainty of scientific nomenclature, it is helpful to mention one of the scientific names when relating facts about any of the insects concerned.

Western Weed Conclave Views Turf Maintenance March 20-22

Increased interest in turf management in the western states was demonstrated by all-time high attendance of more than 230 contract applicators and other professionals at the Western Weed Control Conference, held this year in Portland, Ore., March 20-22.

Representatives of academic, extension, regulatory, and commercial fields heard a wide variety of papers, highlighted by a symposium on the deposit and entry of sprayed herbicides into foliage.

Herbert M. Hull, of the Agricultural Research Service, U.S. Department of Agriculture, Tucson, Ariz., was chairman of the research section of this year's program.

L. L. Jansen, from the Crops Research Division, Agricultural Research Service, USDA, Beltsville, Md., traveled to the Portland meeting to analyze surfactant enhancement of herbicide entry, while T. J. Muzik, Washington State University, Pullman, reported on experiments on the effect of light and temperature on response of plants to 2,4-D.

Application techniques for improving deposits and minimizing drift, plant surfaces and herbicide penetration, and physiology of herbicide trasport in plants were covered by C. R. Kaupke, C. L. Foy, and A. S. Crafts all from the University of California, Davis.

At the conclusion of the conference, a number of delegates attended a tour of the Oregon State University campus and turf research facilities.

Officers elected for the 1965 Conference included J. M. Hodgson, president; Millard Swingle, vice president; and Louis Jensen, secretary. Albuquerque, New Mexico, will be site of the 1965 Conference, *W&T* learned.