A Revision of the Genus Listronotus

(Curculionidae: Coleoptera)

by

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INTRODUCTION

Some time ago, while looking over the Curculionidae with the intent of choosing a group of them for study, I noticed that very little had been done on the genus Listronotus since 1876, when LeConte's paper on the Rhynchophora was published. There was apparently a great deal of confusion in the genus, and it seemed to me that a revision of the group would be a worth while endeavor. The present problem was begun, and I was soon confronted by keys that would not work and original descriptions that were often inadequate or even inaccurate. There was general confusion in the literature and in collections, due to frequent misdeterminations caused by the close relationship of some of the species and the amount of variation within a single species.

A large number of specimens have been studied during the preparation of this paper. Collections have been borrowed from various museums. Every species described in the genus has been studied. Some sort of type material, either type, cotype, or paratype, has been examined for every name proposed in the genus, except L. sordidus (Gyllenhal), L. distinguendus (Gyllenhal), and the species described by Say. An attempt has been made to study as much material as possible in order to secure all the available data on the distribution of the various species. All the available information on biology and host records has also

been assembled.

By examining long series from varied localities, and by studying the variation exhibited by these specimens, a rather definite concept has been formed of what constitutes a species within this group. Most of the species of Listronotus display a great deal of variation, and therein lies the difficulty of a detailed study of the group. The statement may sound paradoxical, but I have seen two specimens belonging to different species which actually appeared to be more alike in ~~a good~~ many respects than two specimens representing extremes found within the same species. This is a rather drastic statement and demands an immediate explanation. As an example, we may find a male of L. tuberosus LeConte and a male of L. sordidus (Gyllenhal) which are so nearly alike that they defy separation by an inexperienced eye. After we have studied the two species for some time and have examined a large number of individuals in both of them, we begin to notice a rather characteristic appearance of each species, and then the two individuals can be readily separated. But the difference that one sees in these specimens may be very difficult to demonstrate to someone else and even more difficult to set down in print or incorporate into a key--it is a difference of degree rather than one of kind. Where we have come to recognize certain external differences, our conclusion is borne out by finding a difference in the genitalia of the two specimens.

Now let us take the same specimen of L. sordidus (Gyllenhal) which was, let us say, from New Jersey, and compare it with a specimen of the same species from Louisiana. We may fine a marked difference in size and color and, to a lesser degree, in certain external morphological characters. This type of variation is the one upon which LeConte described L. obliquus. The genitalia show very little difference, if any, except in size. Now let us examine a large number of individuals from Louisiana, from New Jersey, and from several other localities. We soon find a multitude of intermediate forms which tie the two extremes together, and if we were to continue to regard L. obliquus LeConte as a valid species we would have to find names for a large number of other variations. What we really have is one species exhibiting a wide range of variation.

This rather detailed discussion has been given purposely to illustrate some of the ~~factors~~ problems involved in this study and to assist in interpreting some of the conclusions set forth. Similar situations exist in other species, and several types of this same sort of problem have arisen during the course of this study.

There may be some who will consider that I have been too lax in drawing specific lines, but it should be remembered that we are endeavoring to build up a natural system of classification, and that species are artificial concepts which probably do not exist in nature in as precise a form

as they do in the minds of some taxonomists. A species, especially one with a wide distribution, is confronted in nature with a great variety of environmental conditions, many of which exert a powerful influence on the growth and development of the individual. An attempt has been made to take this fact into consideration when making decisions and arriving at conclusions. The species have been treated in the manner which seemed most logical in the light of present information. Some of the problems will only be solved definitely by means of supplementary biological studies. With additional information from that source, and with more material available, some of the conclusions submitted in this paper may have to be altered. There is much to be learned about biological races and the effect of food plants and environment upon the species. When information is available concerning some of these factors it may be possible to explain some of the variation found within certain species of Listronotus. It may even be possible to associate certain types of variation with certain ecological or environmental factors, or with certain biological races.

Since Listronotus has never been treated before in monographic form, the purpose of this paper is to bring together the literature and redescribe species which have very brief original descriptions. Inadequate descriptions have been supplemented, and inaccurate statements have been corrected. An attempt has been made to present as much biological information as is available. Illustrations and

keys are given which should assist in the identification of the species. All the material which could be secured has been examined in order to acquire as ~~much~~ many data on distribution as possible. The lists of citations to the literature of the species do not purport to be entirely complete, but they do include all the more important references and a great many more which were found by a rather detailed search of the literature. There may be references in a few obscure places which have been overlooked. All the citations known to me concerning the economic literature of this group have been included. In a few cases where names have been published in error I have had access to the material in question and have been able to rectify the mistake. In other cases where names have been obviously cited in error, but the material has not been available for study, a note has been added calling attention to the error.

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MORPHOLOGY AND TERMINOLOGY

A study was made of the location of the spiracles in order to determine what segments of the abdomen were actually represented by the visible sternal sclerites.

Two pairs of large spiracles are found in the thorax. The first of these pairs is in the membrane between the prothorax and the mesothorax. The second pair is in the membrane between the mesothorax and the metathorax and is situated directly behind the mesothoracic epimeron.

There are eight pairs of abdominal spiracles. The third pair is associated with the first visible abdominal sternum, showing that it is in reality the third sternum. The two pairs of abdominal spiracles anterior to this region indicate that the first two sterna have either fused with the third or have dropped out. An examination of the anterior part of the abdomen reveals what is undoubtedly a remnant of the second sternum lying behind and above the posterior coxae, and separated from the third sternum by a small inter-segmental fold. The first sternum has probably dropped out. The third and fourth sterna are rather firmly united, there being but little evidence of the antecosta, or inter-segmental infolding, found between the other sterna. There are five visible abdominal sterna, the last being the seventh. There are often peculiar modifications of the seventh sternum, especially in the female. These may be in the form of elevated ridges, depressions, or pits.

The eighth sternum is internal. In the male there are two sclerotized sternites. In the female the greater portion of the sternum is sclerotized. The degree of sclerotization and the shape of the sclerotized areas is constant within a species but differs in different species, so that we have here a character of great taxonomic value.

Because of the characters of taxonomic value located on the abdominal sterna it is often necessary to refer to them individually. In the past there have been several terms applied to them which are undesirable for certain reasons. A common practice is to refer to them as "segments" of the abdomen. This term should not be used, because in its proper application it does not include the lower surface alone but the upper part, or tergum, as well. Perhaps the term in most common usage is "sternite". This term is a diminutive form of the word sternum and as such would be used by morphologists to designate one of two or more sclerotized divisions of the sternum, if it consisted of more than one sclerite. Since the sclerotized plates of the sterna represent essentially all of the sternal portion of the segment, they will be referred to as sterna.

The five visible abdominal sterna are generally referred to as the first to the fifth, inclusive. The next sternum, the one which is internal, is most often referred to as the eighth, its proper morphological number. This incongruity is confusing, and it would seem more desirable to follow some uniform system of referring to the number of

the individual sterna, therefore they will be referred to their proper morphological positions, the five visible sterna being the third to the seventh, inclusive.

In the female the seventh tergum is the last one which is external. The eighth is internal, and its spiracles are very small and apparently closed and non-functional, although the tracheae still attach to them. In the male the eighth tergum is external and is sometimes referred to as the pygidium.

In discussing the antennae the terms in common usage have been utilized. The long basal segment is called the scape; the series of shorter segments, seven in this genus, is called the funicle; and the enlarged terminal part is called the club. The individual divisions of the antennae are sometimes referred to as joints, but this term is not used because it generally implies the concept of an articulation rather than a segment. It would perhaps be more accurate to refer to some of the individual division of the antennae as sub-segments, since we are told by the morphologists that the antenna is composed of three fundamental segments, and that any additional divisions are due to secondary segmentation and are therefore sub-segments. Since we do not know which of the divisions of the antennae of the Curculionidae are primary divisions and which are secondary divisions, the term segment will be used instead of sub-segment.

The dorsal part of the prothorax is referred to in

this paper as the disk of the prothorax rather than as the pronotum. The term pronotum usually refers to the dorsal sclerite of the prothorax. Since the entire prothorax of the Curculionidae is more or less fused into one somewhat tubular unit, there is no actual line of division between the pronotal region and the rest of the prothorax, and the pronotum does not exist as an actual unit. Therefore the term pronotum cannot be applied in its proper sense to the dorsal part of the prothorax of the Curculionidae. There is no other morphological term available to apply to this region of the body, and since it was not deemed advisable to coin a new term, the somewhat flattened dorsal portion of the segment is referred to simply as the disk of the prothorax.

In making measurements of the prothorax and other parts of the body an eyepiece micrometer has been used in a binocular. Relative proportions of the length and width of the prothorax are by actual measurement. These measurements do not always agree with what appears to be the condition by a casual observation of the specimen. The prothorax of a species may appear to be longer than wide, and indeed the original description may even describe it as such, but actual measurement may show the width to be equal to the length, or it may even by slightly wider than long. The prothoraces of the types of several species which were described as having the prothorax longer than wide have been measured and have been found to be wider than long. The

measurement of the prothorax is made from a dorsal view. The longitudinal measurement is made through a median line from the base to the apex and does not include the ocular lobes. The transverse measurement is made at the point of the greatest width.

The measurement of the length of the beak is made from a side view. It is the length of a line drawn from the lower corner of the apex to the top of the head at the point marked by the center of the frontal fovea. The mandibles are not included in this measurement since they are sometimes opened and, in these cases, extend for a considerable distance beyond the apex of the beak and would not give accurate or uniform measurements.

Another point which demands an explanation is that of the numbering of the intervals of the elytra. There are ten striae, dividing the elytra into eleven so-called intervals. In a very few cases some workers have referred to only a part of the elytron located between two striae as an interval. The strip between the first stria and the inner margin of the elytron is sometimes called the suture, and the strip between the first and second striae is sometimes called the first interval. In this paper the term suture indicates the actual line of division between the elytra along the median line of the body. The strip between the suture and the first stria is called the first interval, the strip between the first and second striae is called the second interval, and so on, accounting for eleven intervals.

In measuring the total length of the body the length of the beak is not included. The measurement is started at the front margin of the head if the beak is turned down, or if it protrudes anteriorly the measurement is begun from the anterior margin of the eyes. If there are caudal processes on the tips of the elytra they are included in the total length of the body.

Blatchley and Leng (1916, p. 155) state that the scattered black dots mentioned by LeConte on Listronotus tuberosus LeConte and on other species are only open punctures from which the scales have been lost. This is not the case. If the "black dots" are examined closely it will be seen that they are open punctures, but that they are larger than the other punctures, which can be uncovered by picking off the scales. It will also be seen that instead of the usual scales each of these larger punctures bears a stout semi-erect seta which is often black and for this reason is not plainly visible against the black exoskeleton of the insect and the shadow within the puncture.

GENITALIA

The male genitalia of Listronotus have been found to possess excellent taxonomic characters of specific value. The main differences lie in the shape of the median lobe and in the various hooks and spines within the internal sac. The structures of the internal sac can be studied through the transparent membranes, without the sac being inverted, if the preparation is examined in a liquid medium such as glycerine or alcohol. When the membranes become dry they are white and opaque, and the inner structure cannot be seen. There is a small amount of variation in the genitalia but never enough to cause any confusion, even with closely related species.

The female genitalia are very similar throughout the genus. There are noticeable differences between some species, but in most cases they are of no value in separating species. The internal characters of the greatest value in the female are found in the eighth sternum, which has a characteristic shape in each species.

A number of different methods of preserving the genitalia have been tried, and the one found to be most satisfactory is to store the parts in a small amount of glycerine in the bottom of a tiny vial which is corked up and pinned through the cork to the same pin upon which the specimen is mounted.

Prior to the dissection of the genitalia the labels

are removed from the pin, and the specimen is relaxed for a few minutes in a warm solution of 5% alcohol until sufficiently softened to be manipulated easily. In the case of the larger species a hooked minutey nadely may be inserted through the posterior opening of the body, and by carefully severing the membranous connections between the sclerites of the eighth segment and those of the seventh, the genitalia and accessory parts may be removed. With smaller species it is sometimes more convenient to remove the entire abdomen, pull away the tergal portion, and then dissect out the desired parts. After the genitalia are removed from the body they should be put into a 10% solution of caustic potash to soften and partially dissolve the muscle tissue which is attached. This process is hastened if the caustic is hot, and it may even be boiled. After the genitalia have been removed from the caustic the muscle and excess membranous tissue may be easily dissected away.

GEOGRAPHICAL DISTRIBUTION

The genus Listronotus occurrs only in North America. Only one species is known from Mexico. There have been no previous records from Cuba, but two of the species herein described as new are from that island. Only a few of the species have a range which extends over the entire United States and southern portion of Canada. A number of the species have a more limited range which may include the southern states, or the central and eastern states. Some of the species are very local in their occurrence, having been recorded from only one or two states.

BIOLOGY

Very little is known of the biology of most of the species of Listronotus. The habits of many of the species are entirely unknown. Some have been taken on sandy or muddy ground along the margins of lakes and ponds. Others have been taken by sifting moss and debris in swamps, or they may be found under logs, pieces of wood, or under other cover, either in swamps or on dry ground. A specimen of L. palustris Blatchley in the T. W. Harris Collection was found by Doubleday under the bark of rotten oak in eastern Florida. A number of the species are commonly taken at light.

Listronotus tuberosus LeConte has been reared from Sagittaria by Satterthwait. It was determined by him as L. sordidus (Gyllenhal), and the data are recorded under his Webster Groves No. 26558. Criddle has bred the species from Sagittaria at Treesbank, Manitoba.

Criddle has also bred L. appendiculatus (Boheman) from Sagittaria at Treesbank. It is quite often taken on Sagittaria and has also been taken on Chelone glabra and on Nelumbo.

Listronotus squamiger (Say) has been reared from Scirpus validus at Milford, Iowa, by Satterthwait.

Listronotus oregonensis (LeConte) does not seem to feed on semi-aquatic plants as do the other members of the genus whose host plant is known. There have been sev-

eral published records of this species occurring on Sagittaria, but these records are probably based on Hyperodes solutus (Boheman). Chittenden (1924) first expressed doubt as to whether L. oregonensis (LeConte) was the species which had been reared from Sagittaria, and Buchanan (1932) indicates that the species reared from Sagittaria was Hyperodes solutus (Boheman). For a detailed discussion of the biological data known for L. oregonensis (LeConte), see the section on the biology of that species.

LISTRONOTUS AS FOOD OF CERTAIN ANIMALS

Through the coöperation of A. L. Nelson, Division of Wildlife Research, Bureau of Biological Survey, United States Department of Agriculture, I have been supplied with the data pertaining to numbers assigned to specimens found in the United States National Museum and Biological Survey material which had been recovered in stomach content studies. By the use of these data, some information can be given concerning the utilization of Listronotus as food by other animals.

One specimen has been found in the stomach of the water snake Natrix sipedon. A number of individuals belonging to eleven different species of Listronotus have been taken from the stomachs of various species of Bufo. Judging from these data it would seem that Listronotus is an important item in the diet of the toads. The following information is arranged according to the species of predator involved:

Bufo americanus.

L. tuberosus LeConte.

No. 2075. Douglas Lake, Cheboygan Co., Mich., June 26,1915, W. A. Wood.

L. squamiger (Say).

No. 1946. Palo Alto Co., Iowa, 7-16-07, A. G. Ruthven. One male.

No. 1962. Palo Alto Co., Iowa, 7-5-07, A. G. Ruthven. One female.

No. 1984. Harbert, Berrien Co., Mich., July 13, 1917, A. G. Ruthven. Two females.

No. 2412. Stevens Pt., Mellen, Wisc., July 19, 1918, A. I. Ortenburger. One female.

L. caudatus (Say).

No. 2052. Lost Island Lake, Clay Co., Iowa, July 26,1918, A. G. Ruthven. One male.

No. 2353. Holcomb, Wis., July 28,1918, A. I. Ortenburger. Two males.

L. frontalis LeConte.

No. 1997. Lakeside Lab., Milford, Iowa, F. M. Blanchard.

No. 2052. Lost Island Lake, Clay Co., Iowa, July 26,1918, A. G. Ruthven. One male.

L. oregonensis (LeConte).

No. 1984. Harbert, Berrien Co., Mich., July 13, 1917, A. G. Ruthven. One male.

No. 1997. Lakeside Lab., Milford, Iowa, F. M. Blanchard. One female.

No. 2052. Lost Island Lake, Clay Co., Iowa, July 26,1918, A. G. Ruthven. Three females.

L. appendiculatus (Boheman).

No. 2002. Lakeside Lab., Milford, Iowa, July 3, 1920, F. N. Blanchard. One female.

No. 2052. Lost Island Lake, Clay Co., Iowa, July 26, 1918, A. G. Ruthven. One female.

Bufo hemiophrys.

L. tuberosus LeConte.

No. 1810. Larimore, Grand Forks Co., North Dakota (Turtle River), June 22-30, 1915, R. Kellogg.

Bufo terrestris.

L. frontalis LeConte.

No. 1428. Lake Kissimmee, Fla., E. A. Mearns. One female.

L. palustris Blatchley.

No. 1387. Lake Kissimmee, Fla., E. A. Mearns. One male.

L. blandus Henderson.

No. 1303. Lake Kissimmee, Fla., E. A. Mearns. One male.

No. 1376. Lake Kissimmee, Fla., E. A. Mearns. One female.

No. 1377. Lake Kissimmee, Fla., E. A. Mearns. One male; one female.

No. 1387. Lake Kissimmee, Fla., E. A. Mearns. One male; one female.

No. 1388. Lake Kissimmee, Fla., E. A. Mearns. One male.

No. 1389. Lake Kissimmee, Fla., E. A. Mearns. One male.

No. 1392. Lake Kissimmee, Fla., E. A. Mearns. One female.

No. 1417. Lake Kissimmee, Fla., E. A. Mearns. One female.

No. 1439. Lake Kissimmee, Fla., E. A. Mearns. Two females.

No. 1443. Lake Kissimmee, Fla., E. A. Mearns, 1891. One male.

L. oregonensis (LeConte).

No. 1387. Lake Kissimmee, Fla., E. A. Mearns. One male.

No. 1434. Lake Kissimmee, Fla., E. A. Mearns. One male; one female.

No. 2301. Oklanaha River, Fla., Jan.4,1914, H. S. Cole. One female.

L. insignis Henderson.

No. 1260. Lake Kissimmee, Fla., E. A. Mearns. One male.

No. 1300. Lake Kissimmee, Fla., E. A. Mearns. One female.

No. 1303. Lake Kissimmee, Fla., E. A. Mearns. One male; one female.

No. 1326. Kissimmee River (?), Fla., E. A. Mearns. One male.

No. 1377. Lake Kissimmee, Fla., E. A. Mearns. One female.

No. 1389. Lake Kissimmee, Fla., E. A. Mearns. Two females.

No. 1432. Lake Kissimmee, Fla., E. A. Mearns. One male.

No. 1439. Lake Kissimmee, Fla., E. A. Mearns. One female.

L. appendiculatus (Boheman).

No. 1384. Lake Kissimmee, Fla., E. A. Mearns. One female.

No. 1392. Lake Kissimmee, Fla., E. A. Mearns. One female.

Bufo valliceps.

L. sordidus (Gyllenhal).

No. 1504. New Orleans, La., May 15 (?), So. Biol. Supply.

L. blandus Henderson.

No. 1465. Belair, La., June 10,1910, Andrew Allison. One male.

Bufo woodhousii.

L. nebulosus LeConte.

No. 2080. Waco, Texas, May 2,1911, J. K. Strecker. One female.

Natrix sipedon.

L. squamiger (Say).

No. 109. Bennings Marsh, D. C., April 22,1917, E. G. Holt.

HISTORICAL SKETCH

The first species of Listronotus was described by Thomas Say in 1824 as Rhynchaenus caudatus. In 1826 Schönherr described the genus Listroderes with the South American Listroderes costirostris Gyllenhal as the type species. In 1831 Say referred his species caudatus to the genus Listroderes and described Listroderes squamiger Say. In 1834 Gyllenhal described Listroderes distinguendus and Listroderes sordidus. In 1842 Boheman described Listroderes inaequalipennis and Listroderes appendiculatus. In 1860 LeConte described Listroderes teretirostris and Listroderes oregonensis.

In 1864 Jekel wrote his "Recherches sur la Classification Naturelle des Curculionides", in which he described the genus Listronotus. He does not definitely designate a type species but mentions the names caudatus, squamiger, and inaequalipennis at the beginning of the paragraph of discussion in which Listronotus is named.

In 1876 LeConte brought together the North American species which had been placed in the genus Listroderes and treated them as Listronotus, describing fourteen new species, obliquus, tuberosus, callosus, americanus, rotundicollis, sulcirostris, nebulosus, frontalis, cribricollis, impressifrons, setosus, punctiger, gracilis, and nevadicus. He included the genus Listronotus, along with Macrops, in a division which he called Listroderi, under the tribe

Phytonomini in the subfamily Curculionidae.

LeConte and Horn in their "Classification of the Coleoptera of North America", published in 1883, again include Listronotus and Macrops in the Listroderi group of the tribe Phytonomini within the subfamily Curculioninae.

Casey described two species of Listronotus in 1895, L. scapularis and L. tessellatus.

In 1902 Champion placed Listronotus and Hyperodes together in his Listroderina Group. In regard to the relationship of Listronotus to the rest of the Curculionidae he states: "The affinites of this group, as shown by the Australian genus Desiantha, Pasc., seem to me to be with the Erirrhina (Hydronomides), and not with the Hyperina, amongst which it is placed by all North-American writers." In regard to the species included within Listronotus he says: "The North-American species referred to Listroderes by Gyllenhal were separated by Jekel from that genus under the name Listronotus, and this course has been followed by LeConte, the chief difference being the posteriorly evanescent scrobes in the South-American forms." At this time Champion described Listronotus bagoiformis.

Blatchley and Leng include Listronotus in the tribe Hyperini of the subfamily Curculioninae, in their arrangement of the genera in "The Rhynchophora of North Eastern America", which appeared in 1916. Blatchley described four species of Listronotus in this work, palustris, rudipennis, floridensis, and debilis.

In the "Catalogue of the Coleoptera of America, North of Mexico" Leng, in 1920, places Listronotus in a group Listroderi of the tribe Hyperini, following LeConte in this regard.

Chittenden in 1926 described a species of Listronotus which he called leucozonatus. Van Dyke described L. impressus and L. elegans in 1929.

In 1931 Pars 114 of the Junk "Coleopterorum Catalogus" appeared, covering part of the Curculionidae. Schenkling and Marshall, the authors of this section, include Listronotus along with Hyperodes, Listroderes, and related genera, in the subfamily Cylindrorrhininae.

ORIGINAL DESCRIPTION OF LISTRONOTUS JEKEL

"Les unes, la plupart de grande taille (Caudatus, Squamigêr, Inaequalipennis) ont, ainsi que l'observe M. Lacordaire (loc. cit., p. 344 note 2), quelques rapports avec les Plinthus pr. d. (Lacord.), et me paraissent pouvoir en être rapprochées, ainsi que le genre Eudocimus, auquel elles ressemblent davantage qu'à tout autre groupe, et qui ne devra pas rester près des Heilipus. Elles se distinguent de quelques autres espèces de l'Amérique du nord, relativement très petites (ex.: Humilis Sch.), par leurs élytres plus planes en dessus, conjointement émarginées à leur base, à côté de cette base, remontant assez anguleusement en dehors et au delà des côtés de la base du thorax, avec les épaules assez obliquement et brusquement abaissées, puis les côtés parallèles jusque près des trois quarts de la longueur; elles sont ensuite étranglées dans leur partie postérieure rétrécie; et leur sommet est prolongé aiguëment, formant parfois une sorte de queue quelque peu recourbée inférieurement chez certains ♂. L'antenne a son scape atteignant seulement l'oeil, sans empiéter sur lui, et le deuxième article du funicule est beaucoup plus long que le premier. Le rostre, long, contigu à la tête qui est très courte et enfoncée presque jusqu'aux yeux, affecte conjointement avec elle une forme subconique, est pour ainsi dire aussi large qu'elle à sa base, et se rétrécit insensiblement jusque vers l'extrémité

qui est un peu elargie; de plus, les yeux étant latéraux, le front se trouve avoir une bien plus grande largeur que chez les vrais Listroderes, et sert de base au cône supposé que forment la tête et le rostre pris ensemble. Le thorax est à peine élargi antérieurement, convexiuscule, et ne justifie déjà plus le nom imposé au genre. Je nomme cette coupe Listronotus, car il n'y a en effet que le dos de l'élytre qui soit aplani."

GENOTYPE

No type species was designated by Jekel in his original description of the genus Listronotus, although at the beginning of the paragraph he mentions the names caudatus, squamiger, and inaequalipennis. Since caudatus was the first of the three names mentioned by Jekel in the original description of Listronotus and was also the first species described which is now assigned to this genus, I hereby designate Listronotus caudatus (Say) as the type species of the genus Listronotus.

STATUS OF THE GENUS

The genus Listronotus is very superficially separated from Hyperodes by characters which are not of generic value. If the generic distinctions were strictly adhered to, certain species of one genus would have to be transferred to the other genus, and then there would be found some intermediate species which could not be definitely placed because of the possession of some of the characteristics of both genera.

This paper has been limited to the species now considered to belong to the genus Listronotus. The species described by LeConte as Listronotus neuadicus has not been included, because it has been found to belong to Dietz's Ulkei Group, or Blatchley and Leng's Group II, of the genus Hyperodes. Work is in progress on a treatment of the species now listed as Hyperodes. After these species have been studied in detail and the intermediate forms have been carefully considered, the entire series of species will be rearranged, generic concepts will be clarified, and generic limits will be defined. Due to the early stage of the work on this next group of species it would be premature at the present time to attempt to define the genus Listronotus.

According to present concepts the following characters can be utilized to recognize a member of the genus Listronotus: abdominal sterna very unequal, the fifth and sixth

together not, or scarcely longer than the fourth or seventh; mandibles two-toothed at tip; antennae with second segment of funicle about twice as long as first; tibiae bent at tip and strongly mucronate at apex.

POSITION OF THE GENUS

Listronotus has been included by American authors in the tribe Hyperini of the subfamily Curculioninae. Champion (1902, p. 120) was of the opinion that it should be associated with the Erirrhinae. The latest work in regard to the placing of the genus was done in 1931 by Schenkling and Marshall in the Junk "Coleopterorum Catalogus". They consider it to be allied to Listroderes and other closely related genera, mostly South American and Australian, all of which are included in the subfamily Cylindrorrhininae.

KEY TO THE SPECIES

1. Head with slender scales or setae - - - - - - - - - - - 2
   Head with broad rounded scales ~~or setae~~ - - - - - - - 21

2. Antennae with third segment of funicle distinctly longer than fourth - - - - - - - - - - - - - - - 3
   Antennae with third segment of funicle not distinctly longer than fourth - - - - - - - - - - - 13

3. Fourth segment of funicle elongate - - - - - - - - - 4
   Fourth segment of funicle rounded - - - - - - - - - - 7

4. Alternate intervals of elytra more convex - - - - - - 5
   Alternate intervals of elytra equally convex - - - - 6

5. Declivous portion of elytra laterally compressed and nearly vertical - - - - - - - - - - - americanus
   Declivous portion of elytra normal - - - - - - callosus

6. Scales on median half of disk of prothorax slender - - - - - - - - - - - - - - - - - - ingens
   Scales on median half of disk of prothorax broad - candatus

7. Posterior callus of elytra prominent - - - - - - - - 8
   Posterior callus of elytra not prominent - - - - - - 10

8. Posterior callus of elytra conical - - - - - - tuberosus
   Posterior callus of elytra not conical - - - - 9

9. Humeri oblique - sordidus
Humeri rounded - - - - - - - - - - - - - - - - - - squamiger

10. Ocular lobes very large, produced ventrally
to form prominent ridges - - - - - - - - manifestus
Ocular lobes normal - - - - - - - - - - - - - - - 11

11. Elytra with an angular lateral protuberance
just behind the humeri - - - - - - - - scapularis
Elytra without such protuberance - - - - - - - 12

12. Beak thick, distinctly tricarinate - - - - distinctus
Beak with only the median carina
distinct - - - - - - - - - - - - - - - rotundicollis

13. Fourth segment of funicle very slightly
elongate - 14
Fourth segment of funicle rounded - - - - - - - - 17

14. Alternate intervals of elytra convex - - - - - - 15
All intervals of elytra equally convex - - - - - 16

15. Beak distinctly tricarinate- - - - - - - - blatchleyi
Beak with only median carina distinct - - - palustris

16. Beak distinctly tricarinate - - - - - - - - - blandus
Beak with only median carina distinct - - - - frontalis

17. Scales of prothorax distinctly larger than
those of elytra - - - - - - - - - - appendiculatus
Scales of prothorax not larger than
those of elytra - - - - - - - - - - - - - - - - - 18

18. Beak shorter than prothorax - - - - - - - - - nebulosus

Beak not shorter than prothorax - - - - - - - 19

19. Beak without median carina - - - - - - - - - - elegans

Beak with median carina - - - - - - - - - - - - 20

20. Body rufo-piceous, scales mostly brown or cupreous - - - - - - - - - - - - - - - - - oregonensis

Body black, scales black and cinereous - tessellatus

21. Beak distinctly tricarinate - - - - - - - - - setosus

Lateral carinae of beak obsolete - - - - - - - - debilis

Listronotus caudatus (Say) 1824

Plate II, Fig. 6.
Plate VI, Fig. 6.

1824. Rhynchaenus caudatus Say, Jr. Acad. Nat Sci. Phil., Vol. III, p. 311.

1831. Listroderes caudatus (Say). Say, Desc. n. sp. Am. Curc., p. 11.

1834. Listroderes caudatus (Say). Gyllenhal, in Schönherr, Gen. et Spec. Curc., II, 1, p. 278.

1842. Listroderes caudatus (Say). Boheman, in Schönherr, Gen. et Spec. Curc., VI, 2, p. 189.

1853. Listroderes caudatus (Say). Melsheimer, Catalogue of the described Coleoptera of the United States, p. 95.

1859. Rhynchaenus caudatus Say, Complete Writings of Thomas Say, ed. LeConte, Vol. I, p. 27.

1859. Listroderes caudatus (Say). Say, Complete Writings of Thomas Say, ed. LeConte, Vol. II, p. 174.

1871. Listroderes caudatus (Say). Gemminger and Harold, Catalogus Coleopterorum, VIII, p. 2360.

1873. Listroderes caudatus (Say). Crotch, Check List of the Coleoptera of America, North of Mexico, p. 118.

1876. Listronotus caudatus (Say). LeConte, Proc. Am. Phil. Soc., Vol. XV, p. 131.

1878. Listronotus caudatus (Say). Popenoe, Trans. Kans. Acad. Sci., Vol. VI, p. 85.

1890. Listronotus caudatus (Say). Beutenmuller, Can. Ent., Vol. XXII, p. 200.

1893. Listronotus caudatus (Say). Beutenmuller, Jr. N. Y. Ent. Soc., Vol. I, p. 40.

1895. Listronotus caudatus (Say). Hamilton, Trans. Am. Ent. Soc., XXII, pp 344.

1903. Listronotus caudatus (Say). Ulke, Proc. U. S. N. M., XXV, p. 33.

1910. Listronotus caudatus (Say). Smith, Insects of New Jersey, p. 382.

1916. Listronotus caudatus (Say). Blatchley and Leng, Rhynchophora of North Eastern America, p. 156.

1920. Listronotus caudatus (Say). Leng, Catalogue of the Coleoptera of America, North of Mexico, p. 316.

1922. Listronotus caudatus (Say). Hayes, Tr. Ks. Ac. Sci., XXX, 2, p. 207.

1928. Listronotus caudatus (Say). Leng, Cornell Univ. Agri. Exp. Sta., Memoir 101, p. 495.

1931. Listronotus caudatus (Say). Schenkling and Marshall, in June, Coleopterorum Catalogus, Subfam. Cylindrorrhininae, Pars 114, p. 11.

1937. Listronotus caudatus (Say). Bleasdell, Iowa St. Coll. Jr. Sci., Vol. XI, No. 4, p. 416.

Original description. "Imbricate, dusky-cinereous, tinged with golden; elytra caudate.

"Inhabits Missouri.

"Body dusky-cinereous, covered with minute scales, and obsoletely tinged with golden, a paler lateral vitta: head obscurely golden: eyes deep black: rostrum with a slightly elevated line: beneath deep black: antennae blackish-brown; thorax obscurely golden, with minute, elevated, black dots: scutel golden: elytra with regular series of punctures; golden color more obscure than that of the thorax; tip of each, elongated into an obtuse caudiform projection: beneath obscurely golden, varied with black: feet fuscous, with short hair; thighs dilated before the tip; a cinereous fascia on the two posterior pairs.

"Length, from the anterior part of the head to the tip of the elytral processes, rather more than two-fifths of an inch.

"Found near Engineer Cantonment on the Missouri River. The caudal processes are peculiar to one sex."

Additional description. Length 8 to 12.5 mm. Elongate-oblong, rather robust. Body black, thickly covered with dark brown scales. In some individuals the scales may be light brown or even yellowish-brown, while in other cases they may have a distinctly cupreous tinge. Head, anterior margin of prothorax, a small median basal spot on the prothorax, base of elytra, and scutellum covered with slender, elongate scales which are usually bright, shining cupreous, but are sometimes shining golden, or may be dull brown. There is a rather narrow vitta of paler scales at each side

of the disk of the prothorax and sometimes a very narrow pale median vitta in which the scales may be slightly narrower. Beak scarcely as long as prothorax; median carina narrow, smooth, polished, slightly elevated; lateral carinae and lateral sulci usually obsolete; punctures of beak moderately coarse, dense, sometimes slightly rugose, mostly covered by cupreous scales which are somewhat broader than those of head; a few scattered broader scales, especially on the basal portion of the beak. Antennae dark reddish-brown; second segment of funicle about twice as long as first; third segment noticeably longer than the fourth. Head very convex, densely punctate; frontal fovea rather deep, elongate. Disk of prothorax one-fifth wider than long; ocular lobes moderately developed; sides of prothorax of male nearly straight from base to apical third and then curving in, female with sides more evenly rounded along entire length, with greatest width about at middle; disk slightly convex, densely punctate, the punctures being covered by scales; a few scattered larger punctures on disk open and bearing setae. Scutellum slightly elongate. Elytra deeply emarginate at base, humeri oblique; striae fine, with very small remote punctures, each bearing a tiny seta; intervals very slightly convex, with a tendency for the third and fifth to be more convex; each interval with a row of short, sub-erect, sparsely placed setae, the third, fifth, and sometimes the seventh intervals with two or three confused rows of setae; the elytra with scattered

transverse wrinkles which may traverse one or two, or occasionally parts of three intervals. Ventral surface with sides of the third and fourth abdominal sterna thickly clothed with broad, cupreous or dark brown scales, with a few intermixed black ones; elsewhere with less densely placed elongate scales. Male with elytra conjointly rounded at tip. Female with elytra separately prolonged at tip into rather long, cylindrical processes which are usually parallel but may be convergent and are sometimes tapering instead of cylindrical. The seventh abdominal sternum of the female is slightly wider than long, with a shallow, elongate concavity toward each lateral margin and an indistinct triangular concavity on the median caudal portion, with the apex of the triangle cephalad. The triangular concavity is sparsely and finely punctate, with the punctures bearing slender semi-erect setae. The lateral concavities are densely punctate, with the setae prostrate and somewhat thicker. There are a few scattered punctures which are larger and bear rather long, erect, stiff hairs. The median anterior portion of the seventh sternum is impunctate, shining, and alutaceous; the tip is slightly rounded, with a faint emargination toward each side. The conditions described above are typical, but there are slight variations found in some specimens. The modification, however, is never very great.

Notes on types. The types of this species have been lost or destroyed and neotypes are being erected. A map of the itinerary and camp sites of the expedition of which Say was a member at the time he took this species has been checked, and "Engineer Cantonment" on the Missouri River, the type locality given in the original description, was found to be very near the present location of Council Bluffs, Iowa. Neotypes have been chosen, therefore, from Kansas, Missouri, and Iowa, all in the general region from which the species was described. Neoholotype and neoallotype deposited in the Francis Huntington Snow Entomological Collections at the University of Kansas. Neoparatypes in the Snow Collections and in the United States National Museum.

Neoholotype male, "Douglas Co., Ks., 6-22-34, L. S. Henderson". Neoallotype female, "Douglas Co., Ks., 6-22-33, L. S. Henderson." Seventeen neoparatypes as follows: 1 male, "Douglas Co., Ks., 6-22-33, L. S. Henderson"; 1 female, "Lawrence, Kansas, 6-26-33, L. S. Henderson, At Light"; 1 female, "Lawrence, Kas., 7-13-35, L. S. Henderson, Collected at Light"; 1 female, "Lawrence, Kas., 6-17-36, L. S. Henderson, Collected At Light"; 1 male, "Leavenworth Co., Kans., 6-22-33, L. S. Henderson, Collected At Light"; 1 female, "Topeka, Ks., Popenoe"; 1 female, "Topeka, Kan., Jul. 19, Popenoe"; 1 male, "Mo."; 1 male, "St. Peters, Mo., Oct. 23, H. E. Roberts Collector"; 1 male, 1 female, "Sioux City, Ia."; 2 males, 1 female, "Sioux City, Ia., 29/4";

2 females, "Sioux City, Ia., 8/7"; and 1 female, "Iowa City, Iowa, IV.16, Wickham."

Remarks and comparative notes. Sometimes the females of this species have been determined as L. inaequalipennis (Boh.). They may be distinguished from L. inaequalipennis (Boh.), a synonym of L. squamiger (Say), by the lack of the peculiar development of the elevated flaps of the seventh abdominal sternum of that species. Other specimens have been determined as L. callosus LeConte, from which they may be separated by the less deeply emarginate base of the elytra and the less prominent posterior calli. The elytral intervals are also less convex, and there are usually prominent transverse wrinkles of the elytra which are not present in L. callosus LeConte. These species may be easily separated by an examination of the internal genitalia.

The tips of the elytra of the male are usually conjointly rounded. Two male specimens have been found, one from Albert Lea, Minn., and the other from Iowa City, Iowa, in which there is a short tubercle at the apex of each elytron, suggesting a slight development of the long cylindrical process which is characteristic of the female of this species.

The range of this species is now known to include California, Oregon, and British Columbia. There are variations in some of the specimens from the new local-

ities, and these will be discussed in some detail to avoid possible confusion. In a series of specimens from Oregon, most of them from Dalles, the most noticeable differences have been found. The most apparent variation is that of the shorter processes found on the tips of the elytra of some of the females. In one of the specimens the elytra are but slightly more than acuminate at the apex. In other specimens the processes are longer, but not quite as long as is typical of the species. Still others are entirely normal. In some of the specimens the beak is a little thicker and is more strongly curved on the upper surface. In these individuals the beak is usually distinctly tricarinate, the median carina being narrow, sharp, and smooth, the lateral carinae broader and rather densely punctate. The anterior half of the disk of the prothorax often has a fine median carina. There is sometimes a slight granulation of the surface of the prothorax, giving it a rough appearance, the rougher sculpture being more apparent on the sides than on the disk. An examination of the sclerotized portion of the eighth stermun of the female shows that the basal piece is sometimes shorter than usual, but that the shape of the terminal arms is typical. The extent of the modification of some of these individuals might suggest the possible existence of a variety or even a geographic race. After careful consideration, the conclusion has been reached that it would not be wise to give such rank to these specimens, at least in the light of

present information, and with the small number of specimens available. During the course of the examination of a large number of individuals of this species from the eastern states, tendencies toward all of these modifications have been noticed. There are often faint traces of a median prothoracic carina, and in some cases the carina is rather strongly developed. The sides of the prothorax are often rough or granulate and the punctation of the disk is variable. In some cases the beak has only a median carina, but many times the lateral carinae are well developed. An indication of the variation of the elytral processes has already been given in the description of the species. Specimens from other localities which are in the outer limits of the range of the species may show various degrees of development of one or more of the variable characters mentioned, so that we have some intermediate forms between the typical condition found in the north-eastern states and conditions found in some of the specimens from Oregon. There is a female from Creston, British Columbia, less than five miles above the Idaho line, in which the caudal processes of the elytra are very short; the beak is not thickened, and the lateral carinae are present but not strongly developed; the basal piece of the eighth sternum is moderately long. A male from Nevada has been seen which is typical in all respects. Two females from Dry Lake, Utah, have the lateral carinae of the beak very prominent and the prothorax somewhat

granulate on the disk and rough on the sides; the caudal processes of the elytra of these specimens are typical, and the basal piece of the eighth sternum is long. A male seen from Salt Lake, Utah, is normal in all respects. Females from Colorado and Texas have been examined which were typical in all respects. A male from Texas has the transverse wrinkles of the elytra very prominent; the disk of the prothorax has more large open punctures than usual, and there is a slight constriction of the sides at about the middle. There are sometimes lesser indications of this constriction in other specimens. It seems plausible to assume that the atypical Oregon specimens are merely individuals at the extreme limits of the range of the species, in which there is an unusual amount of variation, when we consider that there are tendencies toward these same variations in some individuals in the eastern states, that there are some intermediate forms in the intervening territory, and that not all the specimens from Oregon exhibit variation to the same extent, some of them being entirely normal.

Biological notes. This species has been recorded as having been taken on several different plants, and a number of new records are given here. A great variety of plants are included on the list, and it is doubtful that all of them are actual food plants. The beetles may have only been resting on some of the listed plants at the time

they were taken.

Beutenmuller (1890 and 1893) states that F. M. Chittenden found the species with L. tuberosus LeConte and L. appendiculatus (Boheman) while sweeping a small patch of aquatic plants composed entirely of Sagittaria and Carex. It was recorded by Popenoe (1878) from Topeka, Kansas, as occurring with L. nebulosus LeConte on Sagittaria. The record of L. nebulosus LeConte in this case is probably based upon a male specimen of L. caudatus (Say). Popenoe states that his specimens were determined by LeConte, and I have seen a male of L. caudatus (Say) from Topeka, Kansas, which not only bears the label of nebulosus in LeConte's own handwriting, but is one of the rare labels which states that the determination was made by LeConte. Blatchley and Leng (1916) state that the species has been recorded from the mild smartweed, Polygonum hydropiperoides Michx., and on arrow-head. Bleasdell (1937) states that two specimens of L. caudatus (Say) were taken by Mr. Sooter on a species of Scirpus at Lost Island, Ruthven, Iowa.

The following are the new records: on oak sprouts, May 13, at Oregon, Illinois; taken on joint-grass by G. Stace Smith at Creston, British Columbia, on July 12; taken on corn at Meredosia, Illinois, by H. E. Roberts; taken on dock at night by F. A. Fenton, at Lafayette, Indiana, May 22; taken on hickory at the same locality by Satterthwait, on June 21.

The species is often taken at light. It was found

under a log on July 8, at Amora, Illinois. McElfresh found a number of specimens at Urbana, Illinois, around stumps in overflowed land in April.

Data on distribution. Blatchley and Leng (1916), give the following information as to the distribution of this species: "Frequent throughout Indiana, May 25-October 12; mating June 20. Dorchester and West Roxbury, Mass., April 18-Aug.17. Ranges from Canada, New England and District of Columbia, west to Iowa and Missouri." The range of this species is now known to extend to Oregon and California, including the intervening territory. I have examined specimens from the following localities:

UNITED STATES

Massachusetts: 39

Mas.; Mass.; Chicopee, Mass.; Chicopee, Mass., Apr.18,'99, June 9,'96, and July 22,'96; Chicopee, M., June 20,'95; Chicopee, Mass., VII.11; Cambr., 20.2.74; Boston, Mass., IV.9.02 and IV.12.02, H. M. Parshley; Springfield, Mass., Geo. Dimmock; Low., Mass.; Brookline, Mass.; Needham, Mass.; Arlington, Mass., II-20-25; Wayland, Mass., III-13-25 and IV-27-24; Dorchester, Mass., 9-VII-'03, Jul.25. 1903, Aug.17.1903, and 10-VII-'03; W. Roxbury, Mass., Apr. 18.1909, Bolster.

Rhode Island: 1

Watch Hill, R. I., July 31,1909, W. Robinson.

New York: 14

N. Y.; Rosedale, L. I., N. Y., IV.22.1923, Collector A. Nicolay; New York, N. Y., Chittenden Collector; N. Y. City & vcty.; Buffalo, N. Y.; Ithaca, N. Y.; Ithaca, N. Y., Chittenden Collector; Ithaca, N. Y., 23 Sept.,'89.

New Jersey: 35

N. J.; Arlington Mdws., N. J., IV.10.1926, A. Nicolay; No. Arlington, N. J., III-26, IV-10, and XI-7; Arlington, N. J.; Blmfield, N. J.; Milburn, N. J.; Slt. Mdows., N. J., III-17; Slt. Mdows., N. J.

Maryland: 2

Pr. Geo. Co., Md., 5/12/14, G. W. Barber Coll.; Cupid Bower Isl., nr. Grt. Fl., Md., 6 Aug.,1927, H. S. Barber.

District of Columbia: 10

Washington, D. C., VI-22-23, J. R. Greeley Coll., at light; Washington, D. C., 6.3, Chittenden Collector, light; Washington, D. C., June 19,'95, Chittenden Collector; Eastern Branch, Washington, D. C., H. S. Barber; Rock Creek, D. C., 19.5.1911, F. A. McDermott.

Virginia: 3

Alex. Co., Va., June 14,1910, Wm. T. Davis; Arlington Marsh, opp. Wash., D. C., June(?),1928, J. C. Bridwell.

Pennsylvania: 8

Pen.; Philadelphia, Pa., VII.27.16; Pa.; Phila. Neck, Pa., 6-14 and 6.24, H. W. Wenzel Collector.

Ohio: 11

Ohio; Toledo, O.; Summit Co., Ohio, 6-13-1934, Louis J. Lipovsky; Cincinnati, Ohio, VII-22; Columbus, O.,

7-15-14, 8-15-14, 8-19-14, and 8-29-14, V. R. Haber Collector; Columbus O., VII-20-35, J. N. Knull Coll.; Erie Co., O., VII-10-03.

Indiana: 26

Ind.; Terre Haute, Indiana; Lafayette, Ind., V.22.'16, F. A. Fenton collector, On Dock at night; Lafayette, Ind., VI.21.'15, Satterthwait Collector, Hickory leaf; Miller, Ind., VII-3-15; Millers, Inds., VII-3-15, Selingen; Hessville, Ind., VII:1:11, Col. by W. J. Gerhard, At Light; Millers, Ind., VII-9, Liljeblad Collector.

Michigan: 37

Mich.; Washtenaw Co., Mich., Ann Arbor, VI-19-1919, M. H. Hatch; Port Huron, Mich., June; Monroe, Mich.; S. Haven, Mich., 15.9; Washtenaw Co., Mich., VI-17-1921, M. H. Hatch; Detroit, Mich.; Oakland Co., Mich., IX-3-1921, M. H. Hatch; Cheboygan Co., Mich., 7-14-1936; Douglas Lake, Mich., July 24,1923, H. B. Hungerford; Cheboygan Co., Mich., 7-29-1936, David M. Gates, Shore of Douglas Lake; Ludington, Mich., VII:13:32, Col. & pres. by E. Brundage, Jr.

Wisconsin: 18

Wis.; Bayfld, Wis., Wickham; Cranmoor, Wis., VI.18.10, C. W. Hooker Collector; Holcombe, Wis., Bufo am. 2353 (July 28,1918, A. I. Ortenburger); Victory, Wis., July 29,1927, F. M. Uhler.

Minnesota: 73

Min.; Minn.; Albert Lea, Minn., July 12,1923, D. R.

Hylan Collector; Albert Lea, Minn., July 12,1923, C. C. Sperry Collector; Duluth, Minn.; St. Anth. Park, Minn., 7/4, 14/4, and 4/7; St. Anthony Park, Minn., 5/20; St. Anthony Pk., Minn., 5.VII.1923 and 10-VII,1921, H. H. Knight, collected at light; Albert Lea, Minn., July 10, 1923, P. L. Keene, at light; Wabasha Co., Minn.; Ramsay Co., Minn.; Ramsey Co., Minn., June 15,1923, Wm. E. Hoffman, U. Farm lights; Ramsey Co., Minn., June 15,1923, Wm. E. Hoffman, U. Farm lights; Ramsay Co., Minn., VIII-1-1924, H. H. Knight; Ramsay Co., Minn., 7-6,1923, R. W. Dawson; Ramsey Co., Minn. Powder Plant woods, August 24, 1922, Clayton Johnson; Ramsey Co. Minn., Oak forest, July 5,1929, 5 P.M., R. E. Wall; St. Paul, Minn., University Farm, June 24,1932, light trap, A. A. Granovsky; St. Paul, Minn., June 26,1936, July 2,1935, July 20,1935, and Aug.5,1935, U. Farm light trap, A. A. Granovsky; Ottertail Co., Minn., 7-15-12; Houston Co., Minn., May 25,1936, Robert Cottrell Collector.

Illinois: 72

N. Ill.; N. Ill., July; Pekin, Ill., Aug.,1882; Peoria, Ill., Aug.11,'95; Cook Co., Ill., Aug., Blackwelder; Cook Co., Ill., Col. & pres. by E. B. Chope; Chicago, Ill., VII:1, Col. by W. J. Gerhard, Light; Chicago, Ill., IX: 12:06, Col. by E. B. Chope; Chicago, Ill., 3/9; Chicago, Ill., Chittenden Collector; Roby, Ill., IX:7:06, Col. by E. B. Chope; Meredosia, Ill., VIII.8.23, H. E. Roberts Collector, Corn; Havana, Ill., VIII.19.07; Lake Forest,

Ill., 6-VIII-1906, J. G. N.; Urbana, Ill., Apr.7,1892 and Apr.11,1892, McElfresh, around stump in overflowed land; Urbana, Ill., Jan.1,1889 and Apr.5,1885; Urbana, Ill., Jul.1,'07, at light; Beach, Ill., lake shore, Aug.24,'06; Aurora, Ill., July 17,1927, at light, Coll. T. H. F. and R. D. G.; Aurora, Ill., Jul.8,'08, under log; Oregon, Ill., May 13,'15, on oak sprouts; E. St. Louis, Ill., June 26,1931, Frison, Betten & Ross.

Iowa: 76

Iowa; Sioux City, Ia.; Sioux City, Ia., 26.III.89; Sioux City, Ia., 29/4 and 8/7; Iowa City, Iowa, IV.16, Wickham; Iowa City, Ia., 4-23-'16, L. Buchanan; Iowa City, Wickham; Iowa City, Ia., VI.7.1895; Iowa City, Wickham, III-25-98; Iowa City, Wickham, III.28; Iowa City, Ia., V-16-'13, Stoner; Ioawa City, Ia., IV.23.1895; Des Moines, Iowa, VII-15'14, D. Stoner; Keokuk, Iowa, June, Shaffer; Muscatine, Ia., 4-21-19, F. M. Wadley Collector; Lake Okoboji, Ia., July 24,1917, L. L. Buchanan; Cedar Rapids, Ia., Shimek; Solon, Iowa, 4-23-'15, Buchanan; Ames, Iowa, VII-7-'13, D. Stoner; Oskaloosa, Iowa; Iowa, Bufo 2052 (Lost Island Lake, Clay County, July 26, 1918, A. G. Ruthven).

Nebraska: 2

Nebraska City, Nebraska; Neb.

Missouri: 45

Mo.; St. L., Mo.; St. Peters, Mo., Oct. 23, H. E. Roberts Collector.

Kansas: 30

Ks.; Kan.; Topeka, Ks., Popenoe; Topeka, Kan., Jul.19, Popenoe; Riley Co., Ks., Jun.23, Popenoe; Mc Pherson, Kansas, July; Lawrence, Ks., 8-8-1933, Wm. D. Field; Lawrence, Kan., 6-22-33, Jack Penfold; Lawrence, Kan., May, 1933, D. Lewis; Lawrence, Ks., 22.VI.1922, C. H. Curran; Doug. Co., Ks., 7-2-35, Chas. Amyx; Lawrence, Kas., 7-13-35, L. S. Henderson, at light; Douglas Co., Ks., 6-22-33 and 6-22-34, L. S. Henderson; Lawrence, Kansas, 6-21-33, L. S. Henderson, at light; Lawrence, Kas., 6-17-36, L. S. Henderson, collected at light; Leavenworth Co., Kans., 6-22-33, L. S. Henderson, trap light; Kan., T. B. A.

Arkansas: 1

Ark.

Texas: 3

Texas; Dallas, Tex., 26.6, H. S. Barber Collector.

Colorado: 1

Col.

Utah: 3

Dry Lake, Ut., 7/31/1926, G. F. Knowlton Collector; Salt Lake, Utah, C. N. Ainslie Collector.

Nevada: 1

Nev.

Oregon: 20

Or.; The Dalles, Oreg.; Dalles, Or.; Dalles Ore. Chittenden Collector.

California: 1

Sta. Rosa, Cal., 6.13.

CANADA

Quebec: 6

Montebello, Que., VIII-3-37; Berthier, Que., 5/30/21.

Ontario: 8

E. Ont.; Toronto, Ont., R. J. Crew; Ottawa, Can., Rockcliffe Park, 2.X.1907, C. H. Young; Pt. Pelee, Ont., 5.VI.1929, L. J. Milne; Co. Prince Edw'd., Ont., Can., 1.7.96, Evans; Ottawa, 25.5.96.

British Columbia: 1

Creston, B. C., 12-VII-1926, G. Stace Smith, Joint-grass.

Listronotus ingens new species

Plate I, Fig. 2, 2a.

Length 11 to 13.5 mm. Large, oblong, stout. Body piceous. Head, beak, median half of disk of prothorax, middle of thoracic sterna and all of abdominal sterna rather thinly clothed with very narrow scales or setae which are brownish-cinereous, sometimes with a slight cupreous tinge; sides of prothorax and elytra clothed with small, rounded, dull brown scales. Sixth and seventh intervals of elytra sometimes with mottlings of cinereous scales, or rarely almost entirely light-colored from humeri to apical third of elytra; occasional small scattered patches of lighter scales on basal half of sides of elytra. Beak slightly longer than prothorax, moderately stout, very slightly curved in male, more strongly curved in female; usually rather strongly tricarinate; median carina always prominent and sharp; lateral caninae more rounded, always present but occasionally less pronounced; lateral sulci present but rather broad and shallow; finely and densely punctate. Head strongly convex, densely punctate; frontal fovea deep, elongate, sometimes continuing upward for a short distance onto the head as a sharp, narrow sulcus. When viewed from the side there is usually a rather pronounced impression at the point of the frontal fovea, between the convex head and the curved upper surface of

the beak. Antennae with second segment of funicle not quite twice as long as first; third segment elongate, longer than fourth, and about the same length as the first; seventh segment more closely united with the club than in the other species of this group. Prothorax one-fifth wider than long; ocular lobes not very strongly developed; sides broadly rounded, widest slightly beyond the middle; apex truncate, base slightly curved, basal angles rounded; disk convex, densely but very shallowly punctate; median half of disk clothed only with very slender scales. Scutellum elongate, very densely covered with minute buff-colored scales. Base of elytra rather deeply emarginate; humeri oblique, with a rather prominent angulation just behind the humeri; sides nearly parallel to apical third, then narrowed to the conjointly rounded apices; striae fine, not strongly impressed, punctures moderate; intervals slightly convex, sometimes slightly roughened by transverse wrinkles; setae very short and slender, confused on third, fifth, and seventh intervals, in a single row on the others; posterior calli scarcely evident. Ventral surface clothed mostly with slender scales; finely and densely punctate. Male with a broad, feeble, median impression across all of third abdominal sternum and basal half of fourth; seventh sternum unmodified. Female with a somewhat triangular area at base of seventh sternum devoid of punctures and scales, shining, but minutely reticulate.

Notes on types. Holotype male and allotype female from "Okla." Nine paratypes as follows: 2 males, 1 female, "Okla."; 1 male, "Stillwater, Okla., 6-16-'30"; 1 male, "Arcadia, Tx., 5-10-35", 1 female, "La."; 1 male, 1 female, "Kansas, Ashton Collection"; 1 female, "Laporte Co., Ind., 6-10-01, W. S. B." Holotype in the American Museum of Natural History. Allotype in the United States National Museum. Paratypes in the American Museum of Natural History, Museum of Comparative Zoology at Harvard College, Francis Huntington Snow Entomological Collections at the University of Kansas, and in the entomological collections of Purdue University, and H. J. Reinhard, College Station, Texas.

Remarks and comparative notes. This species is very closely related to L. caudatus (Say). The shape of the eighth sterna of the females is very much the same but they may be easily separated by the absence of the caudal processes of the elytra of L. ingens n. sp. The male genitalia of the two species are very distinct. L. ingens n. sp. may be recognized by the setae on the median half of the prothorax, by the tricarinate beak, and the deep frontal fovea. L. caudatus (Say) has slender scales on the disk of the prothorax, but they are not hair-like and there is no definite break between slender and rounded scales at the side of the prothorax as there is in L. ingens n. sp. The following external characters will be

found of value in separating L. ingens n. sp. from L. caudatus (Say): beak more strongly curved and lateral carinae more distinct; frontal fovea deeper; scales on median half of disk of prothorax more hair-like and the larger punctures bearing dark, stout, semi-erect setae absent; sides of prothorax more rounded; humeri a little more oblique, elytra smoother, sometimes with mottlings of cinereous scales; ventral durface with scarcely any rounded scales.

Data on distribution. Although this species is represented by only a few known individuals and is apparently very rare, it has a rather wide range. Specimens have been examined from Indiana, Kansas, Oklahoma, Texas, and Louisiana.

Listronotus americanus LeConte 1876

Plate I, Fig. 1.

1876. Listronotus americanus LeConte, Proc. Am. Phil. Soc., Vol. XV, p. 131.

1916. Listronotus americanus LeConte. Blatchley and Leng, Rhynchophora of North Eastern America, p. 157.

1920. Listronotus americanus LeConte. Leng, Catalogue of the Coleoptera of America, North of Mexico, p. 316.

1931. Listronotus americanus LeConte. Schenkling and Marshall, in Junk, Coleopterorum Catalogus, Subfam. Cylindrorrhininae, Pars 114, p. 11.

Original description. "Blackish, covered with round dirty-brown scales, becoming larger on the prothorax, less dense and hair-like upon the head and beak. Beak as long as the prothorax, strongly carinate and sulcate. Prothorax scarcely as long as wide, rounded on the sides, narrowed before the middle, constricted towards the tip; marked with two sinuous lateral vittae, and a scarcely distinct dorsal line of pale scales. The punctures are less concealed by scales than in the species above described [L. caudatus (Say)], and are very coarse and dense. Scutellum pale. Elytra strongly emarginate at base, humeri oblique, sides then parallel, rounded behind; the posterior callus is distinct, not very prominent; the elytra are compressed at the suture towards the tip, and vertically declivous;

the striae are strongly punctured, the interspaces somewhat uneven; there is an indistinct broad stripe commencing at the humeri and running backwards on the sixth, seventh, and eighth interspaces, and there are besides some irregular mottlings of pale scales. Beneath punctured, irregularly spotted with large pale scales; thighs with a pale band. Length 14 mm.; .55 inch.

"Female. Last ventral deeply concave, the excavation smooth at the bottom, and transversely impressed with a short line, becoming narrow at the tip, which is deeply emarginate; the upper marginal line is continued around the tip, separate from the lower one, and the space between them is curiously and deeply marked with two excavations on each side near the extreme emargination; pygidium strongly emarginate; tips of the elytra separately rounded. Male wanting.

"Georgia, three specimens. I have seen nothing similar to the curious sculpture of the last ventral segment, though in its homology it is only a modification and complication of the forms mentioned under other species. It is the Eudocimus americanus Dej. Cat. 299, but bears no resemblance to Eu. mannerheimii."

Additional description. Length 10.5 to 14 mm. Beak slightly longer than the prothorax, tricarinate; median carina sharp and smooth, lateral carinae broader, more

rounded, and punctate; there is a very distinct deep lateral sulcus on the basal half of the beak; upper surface rather coarsely punctate, slightly rugose on sides and on the head between the eyes; frontal fovea rather deep. Antennae slender; second segment of funicle about twice as long as first; third segment distinctly longer than fourth, about the same length as the first; seventh segment enlarged and rather closely joined to the club. Disk of prothorax slightly wider than long; ocular lobes moderately developed. The base of the elytra is more deeply emarginate in this species than in any other, causing the humeral angle to be rather oblique; anterior margin along first five elytral intervals somewhat reflexed; the basal region of the tenth and eleventh intervals directly beneath the humerus is impressed, giving a sharp and rather prominent appearance to the humeri when viewed from the front; alternate intervals slightly more convex; transverse wrinkles give a rough appearance to the elytra. Legs rather long; tibiae with a rather stout mucro and a fringe of long, yellow hair on the extreme apical portion along the inner or lower margin. Male with tips of elytra conjointly rounded and seventh sternum broadly convex in the anterior half.

Notes on types. LeConte described this large and interesting species from three females which he stated were from Georgia. These specimens have been examined. Two are in the LeConte Collection in the Museum of Comparative

Zoology at Harvard College and the other is from the Horn Collection and is in the collection of the American Entomological Society in the Philadelphia Academy of Natural Sciences. All three of these specimens bear the orange disk of colored paper which LeConte used to indicate the "southern states."

Biological notes. Nothing is known of the biology of this species. Doctor H. P. Löding of Mobile, Alabama (in litt., Jan.24,1936) says, "I have taken L. americanus here, but it seems extremely rare or at least hard to find. I have not so far been able to associate the species with its food plant."

Data on distribution. Only seven specimens of this species have been seen. There is a female in the United States National Museum form the collection of Bovie, bearing the label "Patrie?". There is a large male from Florida in the collection of Mr. H. C. Fall. Doctor H. P. Löding has a pair from Alabama. The available records follow:

Georgia: 3

Georgia.

Florida: 1

St. Augstne., Fla.

Alabama: 2

Dog River, Ala., IV.14.32; Springhill, Ala., XII.18.27.

Listronotus callosus LeConte 1876

Plate IV, Fig. 17.
Plate VI, Fig. 17.

1876. Listronotus callosus LeConte, Proc. Am. Phil. Soc., Vol. XV, p. 130.

1885. Listronotus callosus LeConte. Townsend, Can. Ent., Vol. XVII, p. 72.

1903. Listronotus callosus LeConte. Ulke, Proc. U. S. N. M., XXV, p. 33. (Name cited in error.)

1906. Listronotus callosus LeConte. Evans, Can. Ent., Vol. XXXVIII, p. 100. (Name cited in error.)

1910. Listronotus callosus LeConte. Smith, The Insects of New Jersey, p. 382. (Name cited in error.)

1911. Listronotus callosus LeConte. Mitchell and Pierce, Proc. Ent. Soc. Wash., Vol. XIII, p. 50.

1916. Listronotus callosus LeConte. Blatchley and Leng, Rhynchophora of North Eastern America, p. 155.

1920. Listronotus callosus LeConte. Leng, Catalogue of the Coleoptera of America, North of Mexico, p. 316.

1928. Listronotus callosus LeConte. Leng, Cornell Univ. Agri. Exp. Sta., Memoir 101, p. 495. (Name cited in error.)

1931. Listronotus callosus LeConte. Schenkling and Marshall, in Junk, Coleopterorum Catalogus, Subfam. Cylindrorrhininae, Pars 114, p. 11.

1937. Listronotus callosus LeConte. Bleasdell, Iowa St. Coll. Jr. Sci., Vol. XI, No. 4, p. 445.

Original description. "Blackish, densely clothed, as in the other species, with small rounded scales, becoming larger on the prothorax, and hair-like upon the head, they are dirt colored on the general surface of the body, but pale at the sides of the prothorax and elytra, and on a narrow dorsal vitta of the former. Beak as long as the prothorax, distinctly carinate and sulcate, prothorax scarcely as wide as long, broadly rounded on the sides, gradually narrowed in front of the middle, marked as usual with scattered black dots. Scutellum pale. Elytra strongly emarginate at base, humeri oblique, striae strongly punctured, interspaces wide, somewhat convex; posterior callus rather prominent, oblong, fading in front into the fifth and adjoining interspaces. Beneath dirty brown speckled with black punctures. Length 9-10.5 mm; .35-.42 inch.

"Male. Last ventral segment not impressed, anal segment very slightly visible behind the last ventral.

"Female. First and second ventral with a broad shallow impression, last ventral with a deep round excavation extending from the base to the tip; pygidium semi-circularly emarginate at tip; elytra separately subacuminate at tip.

"New York to Georgia. The posterior callus of the elytra is about as prominent as in L. squamiger, but not so narrow.

Additional description. Length 8-11 mm. Median carina of beak sharp, distinct; lateral carinae more rounded

and less prominent. There is a rather deep sulcus beginning at the base of the beak between the lateral carina and the scrobe of the antenna. This sulcus becomes less deep as it extends forward and becomes obsolete slightly beyond the middle. Disk of prothorax one-fifth wider than long; ocular lobes moderately developed. The scattered black dots of the prothorax mentioned in the original description are the scattered larger punctures which are open and bear setae instead of scales. The depression of the seventh abdominal sternum of the female is transverse rather than roumded. Although the depression is usually deep there are occasional specimens with a rather shallow impression.

Notes on types. The types of this species have been examined. They are located in the LeConte Collection in the Museum of Comparative Zoology at Harvard College. There are two specimens at the head of the series which bear type labels. The first is a male and the second is a female. They both bear the pink disk which LeConte used to indicate the "middle states." These two specimens agree with LeConte's description of the species. There are three additional specimens in the series, all L. squamiger (Say). The first of these specimens is from "Can.," and since Canada is not mentioned in the original description, this specimen, and the other two labelled "N. Ill." were undoubtedly added to the series at some later time.

LeConte gives New York to Georgia as the range of L. callosus LeConte. The New York record is undoubtedly based upon a misidentification. I do not know where the types were collected but they probably came from some locality north of Georgia, since Georgia was considered by LeConte as a southern state and the types are said to come form the "middle states." I have seen representatives of this species from only as far north as South Carolina.

Remarks and comparative notes. One male specimen was found which bears the label "Listroderes squamiger Say, Lec./74." This label was written two years before the present species had been described. Male specimens of L. caudatus Say are frequently found which have been determined as L. callosus LeConte. The latter species may be distinguished from L. caudatus (Say) by the more deeply emarginate base of the elytra and the more prominent posterior calli. The elytral intervals are more convex and are without the transverse wrinkles which are present in L. caudatus (Say). Some of the large representatives of L. sordidus (Gyllenhal) are very similar to L. callosus LeConte; however, in the latter the base of the elytra is a little more emarginate and the humeri are more acute, the posterior calli of the elytra are less pronounced, the beak is heavier and thicker, and the median carina is stronger. In the females the two species may be easily separated by the caudate elytra of L. sordidus (Gyllenhal).

Biological notes. Nothing is known of the life history or food plant of this species. It has been recorded by Townsend (1885) as having been taken in some numbers with L. tuberosus LeConte, L. nebulosus LeConte, and L. frontalis LeConte under old railroad ties and pieces of wood in dry places during the first part of April.

Data on distribution. The distribution of this species as given by LeConte in the original description has already been discussed in the paragraph concerning types. Blatchley and Lend (1916) add Ontario, District of Columbia, New Jersey, Michigan, Illinois, and Louisiana. All these records except the one for Louisiana are erronerous, since the species does not extend into any of the northern states. The northern records for this species are based on misdeterminations, the confusion probably being with L. caudatus (Say) and L. squamiger (Say), representatives of both haveing been found determined as L. callosus LeConte. Mitchell and Pierce (1911) record the species as having been collected by Walker in Victoria County, Texas, June 18, 1904.

The center of population of this species seems to be in Louisiana, the great majority of the specimens examined having come from there. A few specimens have been seen from other states. Material has been examined from the following localities:

South Carolina: 1

So. Carolina.

Georgia: 1

Geo.

Alabama: 1

Ala.

Louisiana: 100

Louisiana; La., Horn, 7/10/73; N. Orleans, La., 28/2/93 and 26.X.91; N. Orleans, La., 11/3, 26/3, 6/6, and 10/6; N. Orleans, 11/3.

Texas: 3

Tex.; Willis, Tex., '03.

Listronotus squamiger (Say) 1831

Plate V, Fig. 20.
Plate VI, Fig. 20.

1831. Listroderes squamiger Say, Desc. n. sp. Am. Curculionites, p. 11.

1834. Listroderes squamiger Say. Gyllenhall, in Schönherr, Genera et Species Curculionidum, II, 1, p. 279.

1835. Curculio (Listroderes, Sch.) reticulatus Harris. Harris, Catalogues of the Animals and Plants of Massachusetts, p. 49. (Nomen nudum.)

1842. Listroderes squamiger Say. Boheman, in Schönherr, Genera et Species Curculionidum, VI, 2, p. 189.

1842. Listroderes inaequalipennis Boheman, in Schönherr, Genera et Species Curculionidum, VI, 2, p. 189.

1853. Listroderes squamiger Say. Melsheimer, F. E., Catalogue of the described Coleoptera of the United States, p. 95.

1859. Listroderes squamiger Say, Complete Writings of Thomas Say, ed. LeConte, Vol. I, p. 271.

1871. Listroderes squamiger Say. Gemminger and Harold, Catalogus Coleopterorum, VIII, p. 2361.

1871. Listroderes inaequalipennis Boheman. Gemminger and Harold, Catalogus Coleopterorum, VIII, p. 2360.

1873. Listroderes squamiger Say. Crotch, Check List of the Coleoptera of America, North of Mexico, p. 118.

1873. Listroderes inaequalipennis Boheman. Crotch, Check List of the Coleoptera of America, North of Mexico, p. 118.

1876. Listronotus squamiger (Say). LeConte, Proc. Am. Phil. Soc., XV, p. 130.

1876. Listronotus inaequalipennis (Boheman). LeConte, Proc. Am. Phil. Soc., XV, p. 131.

1878. Listronotus squamiger (Say). Popenoe, Trans. Kans. Acad. Sci., VI, p. 85.

1889. Listronotus squamiger (Say). Townsend, Psyche, V. p. 234.

1893. Listronotus squamiger (Say). Beutenmuller, Jr. N. Y. Ent. Soc., I, p. 40.

1895. Listronotus squamiger (Say). Hamilton, Trans. Am. Ent. Soc., XXII, p. 344.

1895. Listronotus inaequalipennis (Boheman). Hamilton, Trans. Am. Ent. Soc., XXII, p. 344.

1903. Listronotus inaequalipennis (Boheman). Evans, Can. Ent. XXXV, p. 319.

1903. Listronotus inaequalipennis (Boheman). Ulke, Proc. U. S. N. M., XXV, p. 33.

1910. Listronotus squamiger (Say). Smith, Insects of New Jersey, p. 382.

1910. Listronotus inaequalipennis (Boheman). Smith, Insects of New Jersey, p. 382.

1916. Listronotus squamiger (Say). Blatchley and Leng, Rhynchophora of North Eastern America, p. 155.

1916. Listronotus inaequalipennis (Boheman). Blatchley and Leng, Rhynchophora of North Eastern America, p. 156.

1920. Listronotus inaequalipennis (Boheman). Britton, Conn. Geol. and Nat. Hist. Surv., Bull. 31, p. 283.

1920. Listronotus squamiger (Say). Leng, Catalogue of the Coleoptera of America, North of Mexico, p. 316.

1920. Listronotus inaequalipennis (Boheman). Leng, Catalogue of the Coleoptera of America, North of Mexico, p. 316.

1925. Listronotus inaequalipennis (Boheman). Hatch, Papers, Mich. Ac. Sci., IV, 1, p. 584.

1928. Listronotus squamiger (Say). Leng, C. W., Cornell University Agricultural Experiment Station, Memoir 101, p. 495.

1928. Listronotus inaequalipennis (Boheman). Leng, C. W., Cornell University Agricultural Experiment Station, Memoir 101, p. 495.

1931. Listronotus squamiger (Say). Schenkling and Marshall, in Junk, Coleopterorum Catalogus, Subfam. Cylindrorrhininae, Pars 114, p. 12.

1931. Listronotus inaequalis (Boheman). Schenkling and Marshall, in Junk, Coleopterorum Catalogus, Subfam. Cylindrorrhininae, Pars 114, p. 11.

1937. Listronotus squamiger (Say). Bleasdell, Iowa State College Journal of Science, XI, No. 4, p. 415.

1937. Listronotus inaequalipennis (Boheman). Bleasdell, Iowa State College Journal of Science, XI, No. 4, p. 416.

Original description. "Body covered with minute brownish cinereous scales; rostrum with a carinate line; thorax with scattered punctures; not flattened; scutel yellowish or whitish, elytra with punctured striae towards the tip concealed by the scales; the united tip obtusely rounded; humeri obtuse.

"Length from two-fifths to half an inch.

"Inhabits Arkansaw.

"Much like caudatus but in that species the humeral line is carinate and acute."

Additional description. Length 7.5 to 10 mm. Elongate-oblong, black. Densely covered with dark brown or fuscous scales, sometimes with a slight cupreous tinge, especially on the head and sides of the elytra; thorax with an oblique stripe of pale scales on each side, continuing posteriorly onto the elytra as a very small humeral spot; median thoracic vitta sometimes entire, usually interrupted at middle, and sometimes only very faintly indicated. Beak moderately stout, shorter than prothorax, slightly thicker and with upper surface more strongly curved in female than in male; median carina distinct and sharp, but fine; lateral carinae absent and lateral sulci faint; surface finely and densely punctate, rather thickly clothed with small, slender scales. Second segment of funicle of antenna about twice as long as first, third segment longer than fourth. Head finely and very thickly punctate, covered with small, elongate scales; frontal fovea moderately

impressed. Disk of prothorax slightly wider than long; ocular lobes well developed; sides of prothorax nearly straight, slightly constricted at apex, basal angles rounded; base slightly arcuate; disk densely punctate, each puncture covered by a rounded, striate scale; a few scattered punctures larger, open, bearing coarse brown semi-erect setae. Scutellum elongate, thickly covered with light slender scales. Elytra emarginate at base; humeri rounded; sides parallel to apical third, then converging to apex; odd intervals elevated and usually connected by transverse wrinkles which vary greatly with different individuals in the number and degree of convexity; elytra thickly clothed with small fuscous scales; third, fifth, and seventh intervals with several confused rows of coarse brown semi-erect setae, other intervals with a single row; striae fine, remotely punctate, each puncture bearing a very short slender seta; posterior calli of elytra not very prominent. Ventral surface with sides of mesosternum and the mesothoracic pleurites very sparsely clothed with a few rounded scales and some slender setae; sides of metasternum densely covered with scales, the median area with rather short slender setae. Legs densely squamose and setose, femora with a pre-apical spot of lighter scales on outer side. Male with abdominal sterna densely punctate, third sternum more sparsely punctate than the others; intervals between the punctures shining and very minutely reticulate; large and small punctures intermixed, especially on the last

three visible sterna, the small punctures bearing short, slender, decumbent setae, the larger punctures bearing long, coarse, semi-erect setae; squamose areas only on the sides of the third and fourth abdominal sterna; a rather broad, deep, median impression on the third abdominal sternum and the basal half of the fourth. Terminal spur on hind tibia broad, flattened, somewhat spoon-shaped. Apex of elytra conjointly rounded. Female with abdominal sterna more finely and densely punctate than in the male, but also having the surface shining and minutely reticulate; third abdominal sternum with short setae at base and in a small depressed median area toward the apex, the rest of the sclerite squamose; fourth abdominal sternum squamose over its entire surface; fifth and sixth abdominal sterna with small lateral squamose areas; seventh abdominal sternum with two strongly elevated folds toward the tip, each inclined posteriorly, beginning at the posterior corners of the sclerite and extending cephalo-mesad to about the middle of the sclerite but not meeting; the median part of the sclerite, anterior to the area inclosed by the lateral folds is shining and impunctate, but minutely reticulate. The seventh tergum is somewhat prolonged into a sub-acuminate tip which projects ventrally between the tips of the elytra and the last visible sternum, reaching a little beyond the level of that sclerite and a very short distance into the space between the lateral folds. The

apical spur of the hind tibia is rather broad and stout, and somewhat flattened. There is a blunt tooth near the base of the spur and nearly at right angles to it. The tooth is quite variable in its extent of development, sometimes becoming approximately the same size as the main spur and in these cases the effect is to produce a spur with a bifid tip. The tips of the female elytra are usually separately subacuminate. In some individuals the tips of the elytra are prolonged into caudate processes such as are found in L. caudatus (Say). All degrees of development are found between these two extremes. Specimens examined which have exhibited the caudate condition of the elytra have usually been from New Jersey and the District of Columbia.

Notes on synonymy. Listronotus inaequalipennis (Boheman) has been found to be a synonym of L. squamiger (Say), the latter name having priority by eleven years. The type of L. inaequalipennis (Boheman) has been examined and does not differ from L. squamiger (Say). The type specimen is a male. The differences upon which Boheman based the identity of the species are only individual variations. Throughout his entire description he compares the species to L. squamiger (Say), stating that L. inaequalipennis (Boheman) is "distinguished from it only by the distant transverse wrinkles of the elytra, and

the more elevated alternate intervals." During the course of the examination of several hundred specimens of this species these characters have been found to be quite variable. Although Boheman's type is somewhat roughly sculptured, having rather distinct alternate intervals and transverse wrinkles on the elytra, this appearance is emphasized by the fact that the specimen has been rubbed, removing the scales from the convexities and exposing the black shining elytra in these places.

Harris (1835), in the catalogue of the insects of Massachusetts, lists the name reticulatus under the genus Curculio (Listroderes, Sch.). I have seen the specimens on which this record is based, located in the Harris Collection in the New England Museum of Natural History in Boston. They are L. squamiger (Say), and L. reticulatus (Harris) is a nomen nudum, since a description of the species was never published. Although Harris did not attribute the name to Say in the catalogue, Harris' own books indicate that reticulatus was a Say manuscript name in Listroderes, but this name was never published by Say.

Notes on types. The types of this species have been lost, as have most of the other Say types. Neotypes are being designated. The species was described from "Arkansaw," and a few specimens from that state have been seen, but the greater part of the range of the species is more northern,

and for this reason the types were selected from Iowa. Another reason is that the Arkansas specimens were very few and were in poor condition, while longer series of perfect and typical specimens could be secured from Iowa.

Neoholotype male and neoallotype female, "Iowa City, Iowa, IV.16, Wickham." Seven neoparatypes as follows: 1 male, "Lake Okoboji, Ia., June 23,1917, L. L. Buchanan"; 2 males, 2 females, "Lake Forest, Ill., U. S. A., 6-VIII-1906, J. G. N."; 2 males, "Ind." Neoholotype and neoallotype in the United States National Museum. Neoparatypes in the United States National Museum and in the Francis Huntington Snow Entomological Collections at the University of Kansas.

Remarks and comparative notes. Reference has already been made to the caudate condition of the elytra of some females of this species. There is a limited region along the Atlantic coast between Massachusetts and North Carolina where females have been found with caudate elytra. No other difference can be detected between these females and others of the spedies without the prolongation of the tips of the elytra. The peculiar development of the seventh sternum is the same and the eighth sternum is the same. No difference at all can be found between males from this region and those from other localities. Specimens have been taken over a long period of years, so this is not some variation which oocurred during one season and then ceased to exist.

Dates of collection have ranged from March to August, excluding the possibility of seasonal effect upon development. No explanation can be offered as to the causes of this condition. Some workers might be inclined to assign a name to these caudate individuals but until more is known of the biology of the species and the nature of the cause of this development such action would be unwise.

Most of the females seen with caudate elytra have been from Massachusetts, New Jersey, and Washington, D. C. The point farthest south is Raleigh, North Carolina. Females with both caudate and rounded elytra have been seen from Virginia. All females examined from the District of Columbia have had caudate elytra. Several specimens from Delaware and Philadelphia, Pennsylvania, were caudate. Some caudate females were found from Long Island, New York, and others were labelled only New York, but were probably from the eastern part of the state. A long series of females from New Jersey has been examined and in this locality are found all stages of gradation from a condition in which there are long processes on the elytra to one in which the elytra are conjointly rounded.

A series of fifteen specimens has been arranged to show the gradation between the two extremes. These specimens are being designated as plesiotypes and are numbered consecutively. They will be deposited in the United States National Museum, and the series is to be kept intact.

Two caudate females have been found which were not from the Atlantic coastal region. One of these was from Ohio, and the other from Aweme, Manitoba. The latter specimen is included as number four in the series of plesiotypes mentioned in the previous paragraph. The processes are not as strongly developed as in some cases, but they are very evident.

LeConte (1876) recognized only one female of L. squamiger (Say) from Georgia. The males of this species were treated as L. inaequalipennis (Boheman). LeConte applied the name L. inaequalipennis (Boheman) to the females with caudate elytra. Blatchley and Leng (1916) followed LeConte in the application of the name L. inaequalipennis (Boheman) to the females with caudate elytra. Males were treated both as L. squamiger (Say) and L. inaequalipennis (Boheman).

L. squamiger (Say) is sometimes confused with L. caudatus (Say) but may be separated from it by the more rounded elytral humeri and the peculiar structure of the spurs of the hind tibiae. The female may also be readily distinguished by the structure of the last visible abdominal sternum. This species is also sometimes confused with L. callosus LeConte and here again it may be separated by the rounded humeri, the spurs, and the structure of the seventh abdominal sternum of the female.

A female was found from Millers, Indiana, with quite a deep median longitudinal sulcus on the disk of the prothorax. The sulcus is deepest at the base of the prothorax and with-

in it there is a rather sharp median carina, interrupted at the base and the apex.

Biological notes. This species is often attracted to light. It occurs along the margins of lakes and ponds and has been found under cover in swamps, or by sifting moss and debris in swamps. It has been reared from Scirpus validus Vahl., by Satterthwait. Blatchley and Leng (1916) state that the larvae live in the stems of the broad-leaved arrow-head, Sagittaria latifolia Willd. Beutenmuller (1893) says that according to Hamilton the larvae live in the stems of Sagittaria variabilis.

Specimens have been examined which had been taken from the stomach of Bufo americanus. The records are: Palo Alto Co., Ia., 7-5-07 and 7-16-07, A. G. Ruthven; Stevens Pt., Mellen, Wisconsin, July 19, 1918, A. I. Ortenburger; and Harbert, Berrien County, Michigan, July 13, 1917, A. G. Ruthven. Another specimen has been examined which had been taken from the stomach of a female water snake, Natrix sipedon, taken at Bennings Marsh, D. C., April 22, 1917, by E. G. Holt.

Data on distribution. Described by Say from "Arkansaw." Recorded by LeConte (1876) from Georgia. Blatchley and Leng (1916) give the range as "from Quebec and New Jersey to Illinois, south to Georgia, Arkansas and Louisiana." I have seen no specimens from as far south as Louisiana.

Representatives of this species have been seen from Canada, extending from Ontario to British Columbia, and from United States from the northern, eastern, and central states, extending as far south as North Carolina, and west to Kansas, Nebraska, North Dakota and Montana. I have also seen one specimen labelled "San Francisco, California", but until additional specimens are seen, either from there, or from regions between there and the area now known to be inhabited by the species, there will be some doubt as to the authenticity of this label. Specimens have been examined from the following localities:

UNITED STATES

Massachusetts: 53

Mas.; Mass.; Chicopee, Mass.; Camb., 4.14; Fram'ham., Mass., V-28-26, C. A. Frost; Framingham, Mass., IV-4-26, C. A. Frost, Sifting; Sherborn, Mass., V-6-34, C. A. Frost, Sifting swamp; Sherborn, Mass., X-13-23, C. A. Frost, Sifting moss; Boston, Mass., IV.10.02 and III.30.02, H. M. Parshley; Springfield, Mass.; Cambridge, Mass., April 21, 1866, F. P. Atkinson; Mass., P. S. Sprague (Listroderes reticulatus Say Ms.); Cambridge, J. C. Morrill, Jr., June 5 (Listroderes reticulatus Say Ms.); Dorchester, Mass., 9-VII and 10-VII-'03; Dorchester, Mass., Aug.8.'09, Bolster; W. Roxbury, Mass., Apr.18.1909, Bolster; Lowell, Mass.; Brookline, Mass.; Cambridge, Mass., V.5.1925, Darlington; Arlington, Mass., III.28.24, P. J. Darlington; Dorchester, Mass., Jun.3,1903, July 7,1903, July 6,1903 and Jul.25,1903.

New York: 27

N. Y.; N. Y. City & vcty.; Buffalo, N. Y.; Rochester, N. Y., July 23,1933, R. L. Post; Orangeburg, N. Y., V.3. 1925, A Nicolay; Ithaca, N. Y., July 13, '16, H. Dietrich Collector; Rockaway B., L. I., June 2[illegible],1913, Wm. T. Davis.

New Jersey: 53

N. J.; Slt. Mdows., N. J.; Elmfield., N. J.; Bloomsburg, N. J., IX-3; Roselle Park, N. J., IV.4.1926, XI.29.1925, and XII-9-1923, A. Nicolay; Cedar Grove, N. J., V.30.1923; Cedar Grove, N. J., IV-5-1925, A. Nicolay; No. Arlington, N. J., III-17, III-26, and XI-7; Arlington, N. J., III-17; Avalon, N. J., 7-5; Orange, N. J., 6/20, Elec. light; Orange, N. J., 6/20, Chittenden Collector; Hopatcong, N. J.; "Upper" Montclair, N. J., VIII.22.1925, A. Nicolay; Camden, N. J., III-3; Cramer Hill, N. J., 5.30.96; Woodbury, N. J. Aug.7,'96; Westville, N. J., H. W. Wenzel Collector; Mt. Pleasant, N. J., Gerhard Coll.; Hillsdale, N. J., 8.V.26.

Pennsylvania: 9

Frankford, Pa., VI.21, A. Schmidt Collector; Phila., Pa., 6.22.96; Pennsylvania, Schuppel: Phila. Neck, Pa., VII-21, H. A. and H. W. Wenzel Collectors; Pa.

Delaware: 2

Del.

District of Columbia: 22

D. C.; Wash., D. C.; Washgtn., D. C.; D. C., June 11.86; Washington, D. C., Chittenden Collector; Washington, D. C., III.3.1928, A. Nicolay; Washington, D. C., May,1922, and

May 14,1921, D. H. Blake Coll; Washington, D. C., July 1-08, W. L. McAtee Collector; Washington, D. C., 27-IV-13 and July 10,1913, W. L. McAtee Collector, at light; Wash., D. C. Apr.22, No. 109. Natrix (Natrix sipedon, Bennings Marsh, D. C., April 22,1917, F. C. Holt).

Virginia: 8

Va.; Va., Nov.6.81; Vienna, Va.; Alex. Co., VI-14-10 and IX-2-1910; Alex. Co., Va., June 14,1910, Wm. T. Davis; Falls Church, Va., 19 Oct.

North Carolina: 3

N. C.; Raleigh, N. C., April,03, F. Sherman Collector.

Ohio: 3

Ohio; Columbus, O., 6-21-14 and 7-30-14, V. R. Haber Collector.

Indiana: 29

Ind.; Indiana; Millers, Ind., Jul.13,'07, VII-19-13, and VIII-2-15; Mineral Spg., Ind., IX.2; Lafayette, Ind., IV.3.'16, Satterthwait collector, Under board in swamp; Millers, Ind., VII-9, Liljeblad Collector; Lake Co., Ind., 6-15-03 and 7-28-97, W. S. B.; Kosciusko Co., Ind., 6-9-02, W. S. B.; Steub. Co., Ind., 7-6-04, W. S. B.; Marion Co., Ind., 5-23-97, W. S. B.

Michigan: 36

Mich.; Detroit, Mich.; Det., Sept.; Detroit, May 21; S. Haven, Mich.; Port Huron, Mich., June; Ottawa Co., Mich., Aug.26, E. A. P.; Marquette, Mich., 29.7; Leelanau Co., Mich., 7-25-1936, Robert W. Forbes; Harbert, Mich., Bufo am. 1984 (Berrien Co., July 13,1917, A. G. Ruthven).

Wisconsin: 23

Wis.; Madison, Dane Co., Wis., V-4-07, C. B. Hardenberg; Beaver Dam, Wis., IV-9-1911, W. E. Snyder; Bayfld., Wis., Wickham; Cranmoor, Wisc., 5-2-8; Cranmoor, Wis., IV.15.10, VI.18.10 and X.14.1909, C. W. Hooker Collector; Cranmoor, Wood Co., Wix., VI-23-07, C. B. Hardenberg; Wis., Bufo 2412 (Stevens Pt., Mellen, Wisconsin, July 19,1918, A. I. Ortenburger).

Minnesota: 101

Minn.; Duluth, Minn.; St. Anth. Park, Minn., 7/4, 14/4, 5/20, and 4/7; St. Anthony Pk., Minn., VIII. 26.10; St. Anthony Park, Minn., VI-25-1921, W. E. Hoffman, coll. at light; Hennepin Co., Minn., 6/1; Hennepin Co., Minn., May 2,1936, C. E. Mickel; Hennepin Co., Minn., May 3,1937, M. T. Jen; Olmsted Co., Minn., C. N. Ainslie; Anoka Co., Minn., May 8 and 9,1937, M. T. Jen, Kohls, Edward Thomas, K. S. Liu, and H. C. Ma Collectors; Ramsay Co., Minn., May 5; Ramsey Co., Minn., May 15,1937, K. S. Liu Collector; Ramsay Co., Minn., Battle Creek, April 15,1922, Wm. E. Hoffmann; Rochester, Minn., 6.23.94, C. N. Ainslie; U. Farm, 14 Apr.,'14; St. Paul, Minn., July 5, 1932, Donald Denning; St. Paul, Minn., July 13,1934, at light, A. A. Granovsky; St. Paul, Minn., July 26,1927, Carl T. Schmidt; St. Paul, Minn., University Farm, August 23, 1926, C. T. Schmidt; St. Paul, Minn., University Farm, July 1, 2, and 5,1937, at light, A. A. Granovsky; St. Paul, Minn., Aug.24,1934, A. A. Granovsky, U. Farm; St. Paul, Minn., July 14,20,23, and 26, Aug.5 and 11, and Sept.15,1935, U. Farm light trap,

A. A. Granovsky; St. Paul, Minn., U. Farm lights, July 23, 1934, Sam Kepperley; St. Paul, Minn., U. Farm lights, July 25,1921, Wm. E. Hoffmann; St. Paul, Minnesota, July 1,1937, Golf course light trap, A. A. Granovsky; St. Paul, Minnesota, July 11,1936, U. Golf course light trap, A. A. Granovsky; Albert Lea, Minn., July 10,1923, at light, P. L. Keene; Frontenac, Minn., May 29,1930, Wm. C. Stahr; Redwing, Minn., July 15,1935, A. B. Gurney; Red Wing, Minn., May 16,1936, O. Elster; Browns Valley, Minn., Aug.3,1935, R. H. Daggy; Crookston, Minn., July 9 and Aug.2,1935, Light trap, D. G. Denning; Taylors Falls, Minn., Apr.19,1935, R. W. Salt; Goodhue Co., Minn., Oct.10,1934, Horace O. Lund; Walker, Minn., May 30,1934, D. Denning; Cass Co., Minn., O. W. Oestlund; 9-mile Creek, Minn., May 2,1936, A. B. Gurney; Waldo, Minn., Aug.,1906, Witmer Stone.

Illinois: 30

Ill.; N. Ill.; Moline, Illinois; Chicago, Ill., Chittenden Collector; Cook Co., Ill., Aug., Blackwelder; Havana, Ill., VIII.14.07; Lake Forest, Ill., U. S. A., 6-VIII-1906, J. G. N.; Waukegan, Ill., Aug.26,'17; Beach, Ill., lake shore, Aug.24,'06; Normal, Ill., Apr.3,1883; Mt. Pulaski, Ill., June 6,1885; Urbana, Ill., May 30,1885; Chicago, Ill., IV:9:05 and VI:1, Col. by W. J. Gerhard.

Iowa: 52

Ia.; Iowa, Wickham; Iowa City, III#20-98, III-25-98, IV-17-98, and IV-28-98, Wickham; Iowa Cy., Iowa, IV-20-1914, Wickham; Iowa City, Ia., IV.9.1895 and IV.23.1895; Iowa City, Iowa, IV.14 and IV.16, Wickham; Iowa City, Iowa,

V-16-'13, Stoner; Iowa City, Ia., Sept.3-'17, L. L. B.; Sioux City, Ia., 29/4 and 8/7; Ames, Iowa, VIII,1912, Stoner; Ames Iowa, July 18,1916, Collector L. S. Wells; Lake Okoboji, Ia., June 20,1917, June 23,1917, June 26, 1917, June 29,1917, July 10,1917, and VII-1-'16, L. L. Buchanan; Muscatine, Ia., 4-21-19, F. M. Wadley Collector; Spirit L., Ia., J. H. B.; Guttnbrg., Ia., 18/9/93; Mason-ville, Ia., F. C. W.; Milford, Ia., VII.14.26, Satterthwait Collector, reared from Scirpus validus; Dickinson Co., Iowa, VII,9-13,1920; Palo Alto Co., Ia., Bufo 1946 (7-16-07, A. G. Ruthven); Palo Alto Co., Ia., Bufo 1962 (7-5-07, A. G. Ruthven).

Nebraska: 1

Kenosha, Nebraska.

Kansas: 4

Kan.; Topeka, Kan., Jul.17, Popenoe; Riley Co., Ks., Jun.28, Popenoe; Douglas Co., Kan., 900 ft., L. L. Dyche.

Dakota: 2

Dak.

North Dakota: 2

Devil's Lake, N. Dak., June 6-7, Wickham.

Montana: 3

Poplar, Mont., July 13,1922, C. C. Sperry Collector, Electric light; Kalispell, Mont., M. P. S.

California: 1

S. Francisco, Cal.

CANADA

Ontario: 8

Toronto, Can.; Hamilton, Canada; Port Credit, Ont., XI.9; E. Ont.; Pt. Pelee, Ont., 5.VI.1929, L. J. Milne.

Manitoba: 18

Aweme, Man., IV.20's, 28.V.08, VII.23, and 12.V.06, Criddle; Aweme, Man., Can., VI.20.10, N. Criddle Collector; Aweme, Manitoba, 1.VI.08, 10.VI.08, 6.VII.1920, and VII.27.11, E. Criddle; Aweme, Man., 13.V.1916, 28.VI.1921, VII.10. 1914, and 30.VIII.1917, N. Criddle; Onah, Man., 30.IV. 1928, R. M. White; Stoney Mountain, Man., 8.VI.12, J. B. Wallis.

Saskatchewan: 9

Redvers, Sask., VII-28-08; Regina, 20.VI.07; Carnduff, N. W. T. Can., VI.16-05; Turnsden, (Sask.?) 28 May 06; Abernethy, N. W. T. Can., VI.28.05; Saskatoon, Sask., 12. VII.1925, Kenneth M. King.

British Columbia: 19

Terrace, B. C., Mrs. M. E. Hippisley; Westbank, B. C., IV-23-1925 and VI-7-26, R. Hopping.

Listronotus tuberosus LeConte 1876

Plate I, Fig. 4.
Plate VI, Fig. 4.

1876. Listronotus tuberosus LeConte, Proc. Am. Phil. Soc., Vol. XV, p. 130.

1885. Listronotus tuberosus LeConte. Townsend, Can. Ent., Vol. XVII, p. 72.

1890. Listronotus tuberosus LeConte. Beutenmuller, Can. Ent., Vol. XXII, p. 200.

1893. Listronotus tuberosus LeConte. Beutenmuller, Jr. N. Y. Ent. Soc., Vol I, p. 40.

1903. Listronotus tuberosus LeConte. Ulke, Proc. U. S. N. M., XXV, p. 33.

1910. Listronotus tuberosus LeConte. Smith, Insects of New Jersey, p. 382.

1916. Listronotus tuberosus LeConte. Blatchley and Leng, Rhynchophora of North Eastern America, p. 154.

1920. Listronotus tuberosus LeConte. Britton, Conn. Geol. and Nat. Hist. Surv., Bull. 31, p. 283.

1920. Listronotus tuberosus LeConte. Leng, Catalogue of the Coleoptera of America, North of Mexico, p. 316.

1928. Listronotus tuberosus LeConte. Leng, Cornell Univ. Agri. Exp. Sta., Memoir 101, p. 495.

1931. Listronotus tuberosus LeConte. Schenkling and Marshall, in Junk, Coleopterorum Catalogus, Subfam. Cylindrorrhininae, Pars 114, p. 13.

1937. Listronotus tuberosus LeConte. Bleasdell, Iowa St. Coll. Jr. Sci., Vol. XI, No. 4, p. 415.

Original description. "Black, densely clothed with yellowish-brown rounded scales, which become larger on the prothorax, and hair-like upon the head. Beak as long as the prothorax, stout, cylindrical, carina and grooves obsolete, frontal fovea feeble. Prothorax as wide as long, sides nearly parallel, suddenly rounded and narrowed near the tip, indistinctly trivittate with pale and sprinkled with large distinct black dots. Scutellum pale. Elytra at base broadly emarginate, humeri oblique, so that they become one-third wider than the prothorax, sides gradually narrowed behind the widest part; posterior callus large, conical, prominent; striae punctured, interspaces wide nearly flat; scales uniform in color, very dense, setae very short. Beneath of the same color as above, hind thighs with a pale band. Length 7 mm.; .28 inch.

"Male. First ventral segment flattened at base, anal segment protuberant beyond the fifth ventral and visible from beneath; elytra rounded at tip.

"Female. Last ventral segment feebly impressed near the tip, each elytron prolonged at tip into a long straight process.

"Michigan to Georgia. Easily known by the absence of the carina and grooves of the beak, which are so obvious in the two preceding species [obliquus and sordidus]."

Additional description. Length 5.5 to 9 mm. The scales are often of a bright coppery tinge. There is a narrow median vitta of brighter scales on the prothorax, and there is a wider sinuate vitta of similar scales on each side of the disk. Beak longer than the prothorax, rather strongly curved; upper surface usually rounded and with no indication of median carina except at extreme tip; occasional specimens with faint median carina and shallow lateral grooves. Frontal fovea usually quite deep instead of feeble as indicated in the original description. Prothorax wider than long. The large black dots mentioned by LeConte are larger punctures which bear elongate, prominent setae instead of the flattened scales which cover the other punctures of the prothorax. Striae of elytra very slightly impressed, punctures rather deep, very narrow and elongate, each bearing a tiny seta; intervals nearly flat, but elytra usually rather rough and uneven due to the presence of low, irregular, transverse wrinkles; each interval with a row of short, rather distant setae. Male with tips of elytra conjointly rounded; third and fourth abdominal sterna with a median longitudinal concavity; seventh abdominal sternum with three very slight concavities, one median and longitudinal, the other two lateral, confined to the posterior half of the sclerite. Female with tips of elytra prolonged into long cylindrical processes which may be either parallel or convergent; third abdominal sternum feebly concave at middle; seventh abdominal sternum with a

median convexity.

Notes on types. The type of this species has been examined in the LeConte Collection in the Museum of Comparative Zoology at Harvard College. The first specimen in the series, and the only one bearing a type label, bears the orange disk indicating "southern states" and is probably from Georgia. It is a male and is covered with an incrustation of dirt. The second and third specimens in the series are a female and a male, both good clean specimens, but bearing no other label than one indicating their sex. The fourth specimen is a female of L. sordidus (Gyllenhal) and bears only the number 1390.

Remarks and comparative notes. Very closely related to L. sordidus (Gyllenhal). For a detailed discussion of the differences see the section of this same heading under that species.

Biological notes. The food plant of this species is Sagittaria. It was bred from Sagittaria by Criddle at Treesbank, Manitoba. It was reared from Sagittaria at Woodbury, New Jersey, by Satterthwait and was determined by him as L. sordidus (Gyllenhal) and recorded as such under his Webster Groves No. 26558. A specimen taken at Stoughton, Massachusetts by Mrs. D. H. Blake bears the following notation: "Found near Sagittaria latifolia

whose root stocks were heavily infested by some insect." Beutenmuller (1890 and 1893) says that F. M. Chittenden found L. tuberosus LeConte, along with L. caudatus (Say) and L. appendiculatus (Boheman) while sweeping vegetation composed of Sagittaria and Carex. Mr. C. A. Frost has taken the species at Northboro, Massachusetts, by sweeping vegetation along a river. Townsend (1885) records quite a number as having been taken along with L. callosus LeConte, L. frontalis LeConte, and L. nebulosus LeConte under old railroad ties lying on the ground and under pieces of wood in dry places during the early part of April. Blatchley and Leng (1916) say that it has been taken from the margins of ponds and along the beach of Lake Michigan, and that it usually occurs on sandy and muddy ground near water; also that it is often taken by sweeping aquatic plants such as Sagittaria and Carex. The species is sometimes taken at light.

Data on distribution. The original description gives the distribution as Michigan to Georgia. Blatchley and Leng (1916) add the territory northward into Quebec. We now know that it occurs as far west as Manitoba and North Dakota, and southward through Iowa, Missouri, and Oklahoma, into Texas. Specimens have been examined from the following localities:

UNITED STATES

Maine: 1

Monmouth, Me., VII-15-16, C. A. Frost.

New Hampshire: 2

Plymouth, N. H., VI-29-1926 and VII-20-1930, Darlington.

Massachusetts: 64

Mass.; Low., Mass.; Chicopee, Mass., June 11.93, June 14. 93, May 31.95, and June 9.96; Camb., 4.74; Stoughton, Mass., IX-28-30, Mrs. D. H. Blake; Agawam, Mass.; Framingham, Mass., V-2-11, C. A. Frost; Northboro, Mass., IX-7-35, C. A. Frost, Sweeping by river; Holyoke, Mass., G. Dimmock; Lowell, Mass., F. Blanchard; Dorchester, Mass., Apr.30 and June 30,1905; Tyngsboro, Ms., 6/16/21; Brookline, Mass.; Tyngs., Mass.; Arlington, Mass., III.6.24.

Connecticut: 1

Cornwall, Conn., VII-22-1924, C. A. Frost.

New York: 13

N. Y.; New York City and vicinity; Buffalo, N. Y.; Ithaca, N. Y., 7/9, 8/4, 7/6, and July 6/84, Chittenden Collector; Ithaca, N. Y., June 14,95 and July 19,94; Van C. Pk., N. Y., N. Y.; Ithaca, N. Y., July 11,16, H. Dietrich, Collector.

New Jersey: 37

N. J.; Arlington, N. J., III.17 and IV-10; No. Arlington, N. J., III-26 and XI-7; Woodbury, N. J., 30.7; Woodbury, N. J., VI.19.26, Sagittaria, Webster Grvs. No. 26558, Satterthwait Collector; Milburn, N. J.; Orange, N. J.; Slt. Mdows., N. J.; Riverdale, N. J., 27-V-1923, Quirsfeld.

Pennsylvania: 6

Frankford, Pa., VI.21, A. Schmidt Collector; Phila. Neck, Pa., VI.24, H. A. Wenzel Collector; Greentown, Pa., 21-VII-1926, Quirsfeld.

District of Columbia: 3

Washgtn., D. C., IV; Washngtn., D. C., My.III, Coll. Chittenden; Washington, D. C., VI-22.'23, J. R. Greeley Coll., at light.

Virginia: 1

Glencarlyn, Va., 11-VI-14, F. Knab.

Indiana: 1

Laporte Co., Ind., 6-9-'02, W. S. B.

Illinois: 6

Chicago, Ill.; Urgans, Ill., VII:19:07, at light, Hart S. Hood; Rock Island, Ill., June 24,1931, Coll. Mohr; Normal, Ill., 7-14-82; Springfield, Ill., June 24,1885, Coll. Hart, Electric Lights.

Michigan: 7

Mich.; Marquette, Mich.; Port Huron, Mich., June; Cheboygan Co., Mich., Douglas Lake, VII.23.1917, M. H. Hatch; Washtenaw Co., Mich., VI-17-1921, M. H. Hatch; Cheboygan, Mich., Bufo 2075 (Douglas Lake, June 26,1915, W. A. Wood.)

Wisconsin: 4

Wis.; Cranmoor, Wis., III.16.10, C. W. Hooker Collector.

Minnesota: 4

Plummer, Minn., June 6,1933, D. Denning; St. Anth. Park, Minn., 5.9.90; Olmsted Co., Minn., C. N. Ainslie; Crookston, Minn., July 9,1935, Light trap, D. G. Denning.

Iowa: 8

Sioux City, Ia., 29/4; Ames, Iowa, VI-'13, D. Stoner.

North Dakota: 2

Larimore, N. D., Bufo 1810 (June 22-30,1915, R. Kellogg); Rugby, N. D., 1918, C. N. Ainslie Collector.

Missouri: 1

Ferguson, Mo., IV.18.23, H. E. Roberts Collector.

Oklahoma: 1

Page, Okla., June 23,1937, Standish-Kaiser.

Texas: 1

Tex.

CANADA

Quebec: 3

Kazubazua, Que., 18-VIII-'31, W. J. Brown; Berthierville, P. Q., V-30-21 and VI-10-21.

Ontario: 4

Toronto, Ont.; Toronto, Can., VII-10, R. J. Crew.

Manitoba: 18

Treesbank, Man., 16.IX.1925, N. Criddle, Bred from Sagittaria; Aweme, Man., 13.VIII.1922, E. Criddle.

Listronotus sordidus (Gyllenhal) 1834

Plate III, Fig. 13.
Plate XI, Fig. 13.

1834. Listroderes sordidus Gyllenhal, in Schönherr, Genera et Species Curculionidum, II, 1, p. 280.

1834. Listroderes distinguendus Gyllenhal, in Schönherr, Genera et Species Curculionidum, II, 1. p. 281.

1842. Listroderes sordidus Dejean. Boheman, in Schönherr, Genera et Species Curculionidum, VI, 2, p. 192.

1842. Listroderes distinguendus Dejean. Boheman, in Schönherr, Genera et Species Curculionidum, VI, 2, p. 192.

1853. Listroderes sordidus Schönherr. Melsheimer, Catalogue of the described Coleoptera of the United States, p. 95.

1853. Listroderes distinguendus Schönherr. Melsheimer, Catalogue of the described Coleoptera of the United States, p. 95.

1871. Listroderes sordidus Gyllenhal. Gemminger and Harold, Catalogus Coleopterorum, VIII, p. 2360.

1871. Listroderes distinguendus Gyllenhal. Gemminger and Harold, Catalogus Coleopterorum, VIII, p. 2360.

1873. Listroderes sordidus Gyllenhal. Crotch, Check List of the Coleoptera of America, North of Mexico, p. 118.

1873. Listroderes distinguendus Gyllenhal. Crotch, Check List of the Coleoptera of America, North of Mexico, p. 118.

1876. Listronotus sordidus (Gyllenhal). LeConte, Proc. Am. Phil. Soc., XV, p. 129.

1876. Listronotus distinguendus (Gyllenhal). LeConte, Proc. Am. Phil. Soc., XV, p. 129. (Discussed as synonym of L. sordidus Gyllenhal.)

1876. Listronotus obliquus LeConte, Proc. Am. Phil. Soc., XV, p. 129.

1889. Listronotus sordidus (Gyllenhal). Kilman, Can. Ent., XXI, p. 136.

1903. Listronotus sordidus (Gyllenhal). Knaus, Trans. Kans. Acad. Sci., XVIII, p. 189.

1910. Listronotus sordidus (Gyllenhal). Smith, Insects of New Jersey, p. 382.

1911. Listronotus obliquus LeConte. Mitchell and Pierce, Proc. Ent. Soc. Wash., XIII, p. 50.

1916. Listronotus sordidus (Gyllenhal). Blatchley and Leng, Rhynchophora of North Eastern America, p. 155.

1920. Listronotus sordidus (Gyllenhal). Leng, Catalogue of the Coleoptera of America, North of Mexico, p. 316.

1920. Listronotus distinguendus (Gyllenhal). Leng, Catalogue of the Coleoptera of America, North of Mexico, p. 316. (Listed as a possible synonym of L. sordidus.)

1920. Listronotus obliquus LeConte. Leng, Catalogue of the Coleoptera of America, North of Mexico, p. 316.

1928. Listronotus sordidus (Gyllenhal). Leng, A List of the Insects of New York, Cornell Univ. Agric. Exp. Sta., Memoir 101, p. 495.

1928. Listronotus obliquus LeConte. Leng, A List of the Insects of New York, Cornell Univ. Agric. Exp. Sta., Memoir 101, p. 495.

1928. Listronotus inaequalipennis Blatchley, nec Boheman. Blatchley, Jr. N. Y. Ent. Soc., XXXVI, p. 241.

1931. Listronotus sordidus (Gyllenhal). Schenkling and Marshall, in Junk, Coleopterorum Catalogus, Subfam. Cylindrorrhininae, Pars 114, p. 12.

1931. Listronotus distinguendus Gyllenhal. Schenkling and Marshall, in Junk, Coleopterorum Catalogus, Subfam. Cylindrorrhininae, Pars 114, p. 12. (Listed as synonym of L. sordidus Gyllenhall.)

1931. Listronotus obliquus LeConte. Schenkling and Marshall, in Junk, Coleopterorum Catalogus, Subfam. Cylindrorrhininae, Pars 114, p. 12.

1937. Listronotus sordidus (Gyllenhal). Bleasdell, Ia. St. Coll. Jr. Sci., Vol. XI, No. 4, p. 415.

Original description. "Niger, opacus, dense cinereo-squamosus et fusco-sub-setosus, antennis tarsisque piceis, rostro crassiusculo, carinato, elytris sub-remote punctato-striatis, punctis aequalibus, interstitiis convexis.

"Hypera sordida. Dom.Com. Dejean in Litteris.

"Habitat in America boreali. Dom.Com.Dejean.Mus.Schh.

"Statura Erith. bimaculati, sed duplo minor. Caput convexum, confertim punctatum, nigrum, squamulis minutis cinereis adspersum; oculi laterales, oblongi, brunnei,

parum prominuli; rostrum longitudine fere capitis cum thorace, validum, parum arcuatum, confertim punctatum, in medio carinatum, nigrum, cinereo-squamulosum. Antennae longiusculae, ferrugineo-piceae, pilosae, clava acuminata. Thorax latitudine brevior, antice late et profunde emarginatus, lobis ocularibus productis, rotundatis; longe intra apicem constrictus, lateribus rotundato-ampliatus, basi bi-sinuatus, supra convexus, pulvinatus, confertim punctatus; niger, squamis majusculis, rotundatis, depressis, cinereo-albidis tectus, setisque minutis concoloribus adspersus. Scutellum rotundatum, nigrum, squamosum. Elytra antice sub-truncata, thoracis basi multo latiora, pone basin oblique ampliata, humeris elevatis; dein posterius attenuata, apice conjunctim rotundata, thorace quadruplo longiora, supra convexa, sat profunde striata, striis remote punctatis, punctis aequalibus; interstitiis convexis; nigra, squamulis denis cinereis tecta setulisque fuscis adspersa, praesertim posterius; squamulis detritis interstitia laevia, nitida; intra apicem singuli elytri callus elevatus observatur. Pygidium obtusum, dense cinereo-squamosum. Corpus subtus nigrum, magis nitidum, profunde punctatum, cinereo-squamosum. Pedes longiusculi, valida, nigri, femoribus clavatis, punctatis, cinereo-squamosis, tibiis arcuatis, scabris, tarsis dilatatis piceis, subtus albido-spongiosis. --Ghl."

Additional description. Length 6.5 to 10.5 mm. Elong-

ate-oblong. Body black, elytra often partly or entirely piceous. Rather thickly clothed with scales which vary a great deal in color, ranging from light brown to dark brown, sometimes cupreous. Prothorax with narrow median and wider lateral vittae of paler scales. Humerus often with small spot of light scales continued from prothoracic vitta. There is an oblique dark mark centering on the fourth elytral interval at the anterior third, sometimes present only on that interval, other times longer and extending in some cases to include the second and sixth intervals. When this dark line is fully developed it extends posteriorly and toward the suture, reaching a little past the middle of the elytron; it extends anteriorly toward the humerus. The oblique line is often more strongly developed on the lighter specimens, and on some very dark individuals may not be at all evident. There is a tendency for the scales inside the oblique lines to be of a slightly darker color. Beak moderately stout, slightly longer than the prothorax. Upper surface with a distinct sharp median carina, lateral carinae usually moderately developed, not sharp. Antennae slender, second segment of funicle twice as long as first, third distinctly longer than fourth. Head slightly convex, densely, moderately punctate, the punctures bearing short, slender scales; frontal fovea usually deep and elongate. Prothorax wider than long, ocular lobes moderately developed; sides nearly parallel for three-fourths their length, then strongly rounded to apex; base slightly arcuate; disk

quite densely punctate with moderately large, but very shallow punctures. Scutellum elongate, covered with slender scales. Elytra emarginate at base; humeri oblique; sides slightly narrowed to apical fourth, then strongly rounded to apex; striae fine, slightly impressed, the punctures very small, elongate, each bearing a tiny seta; intervals sometimes almost flat, usually slightly convex, especially the odd ones; intervals each with a row of distant punctures bearing setae which are more evident on the declivity; third and fifth intervals with punctures confused instead of in a single row; posterior calli prominent. Ventral surface with sides of all the sterna, except seventh abdominal, rather thickly clothed with large round scales; middle of third and fourth abdominal sterna clothed with round scales; middle of fifth and sixth abdominal sterna and all of the seventh clothed only with elongate scales or setae. Male with tips of elytra conjointly rounded or very slightly sub-acuminate; third abdominal sternum concave at middle. Female with tip of each elytron prolonged into a short conical process; third abdominal sternum convex; seventh abdominal sternum with a slight depression in each posterior corner and with a short, rather deep median groove at the posterior part of the sclerite.

Notes on synonymy. LeConte (1876) discusses L. distinguendus (Gyllenhal) as a synonym of L. sordidus (Gyll-

enhal), stating that it "seems to differ from the type only by smaller size and slightly irregular elytral puncturing; similar variations occur in other species."

L. obliquus LeConte has also been found to be a synonym of L. sordidus (Gyllenhal). In his description of the species LeConte gives no distinguishing features by which it may be separated from L. sordidus (Gyllenhal). Specimens from Texas, Louisiana, Alabama, and Florida have been found which agree with the types of L. obliquus LeConte which are from Texas. Occasional larger specimens from the northern states also compare with the types of L. obliquus LeConte. These specimens are somewhat larger than most of the northern individuals. The larger northern specimens and most of those from the south usually tend to be a little lighter in color. They may have the beak a little more distinctly carinate and sulcate and the frontal fovea a little deeper and more elongate. There is also a tendency for the alternate intervals of the elytra to be more strongly convex in the larger southern specimens. None of these characters is constant, however, and a careful examination of rather long series has indicated that the northern and southern specimens belong to the same species. Individuals can be picked out which are very different in size and seem to differ considerably even in regard to morphological characters. By studying additional material the variation within the species soon fills in a

multitude of intermediate forms between the two extremes which had been segregated. L. distinguendus (Gyllenhal) and L. obliquus LeConte, the two synonyms of L. sordidus (Gyllenhal), have been erected on individuals representing the extremes of variation found within the species.

Notes on types. L. sordidus (Gyllenhal) and L. distinguendus (Gyllenhal) are the only names proposed in this genus for which type material of some sort has not been studied, with the exception of the two species described by Say, the types of which have been lost or destroyed. Horn and Kahle (1935) state that the Gyllenhal Collection is deposited in the museum at Uppsala, Sweden. The types of L. obliquus LeConte are in the LeConte Collection in the Museum of Comparative Zoology at Harvard College. There are two specimens, both females, which bear the locality label, "Tex."

Remarks and comparative notes. L. sordidus (Gyllenhal) is very closely related to L. tuberosus LeConte and sometimes, especially in the case of males, the two species are very difficult to separate on external characters. The males can be readily separated by the different shape of the apex of the median lobe of the genitalia, and the females can be separated by the shape of the eighth abdominal sternum. The females of L. sordidus (Gyllenhal) may be distinguished by the shorter and usually stouter appendages

of the elytra and by the less convex seventh abdominal sternum. The beak of L. sordidus (Gyllenhal) is usually more strongly carinate and sulcate, while in L. tuberosus LeConte the beak is usually smooth, with the median carina faint or absent, and the lateral grooves obsolete. In L. sordidus (Gyllenhal) the elytra are smooth, or have the alternate intervals more convex. In L. tuberosus LeConte the intervals are of about equal convexity but the elytra are roughened by transverse wrinkles. The anterior margin of the elytra of L. tuberosus LeConte is somewhat reflexed, while in L. sordidus (Gyllenhal) it is more rounded.

Biological notes. Nothing is known of the life history or food plant of this species. It is reported to have been taken in a cotton field at Cameron, Louisiana, on September 10, 1904, by Wm. Laurents. Since no other records are known of its occurrence on cotton it probably has no connection with this plant, but was merely captured as it happened to be a chance visitor in the field. A specimen was taken on Sagittaria by H. P. Loding, at Mobile, Alabama, on June 29, 1920. It has been taken at light in Louisiana. It was found in the stomach of Bufo valliceps at New Orleans, Louisiana.

Data on distribution. L. sordidus (Gyllenhal) and L. distinguendus (Gyllenhal) were both described from boreal

America. LeConte (1876) gives the range as Massachusetts to Georgia. Blatchley and Leng (1916) list "Ontario and New England to Lake Superior, south to Georgia and Texas." Quebec is added to the Canadian localities. In the United States it has been found to extend south into Florida and as far west as Colorado. The records of distribution of the specimens examined are as follows:

UNITED STATES

Massachusetts: 10

Mass.; Chicopee, Mass.; Chicopee, M., June 20,'95; Chicopee, M., Apr.12.95; Dorchester, Mass., July 12-15,'09; Tyngsboro, Ms., 1.21.08; Tyngs., 4/17-87; Wayland, Mass., 7-VI-1931, Quirsfeld.

New York: 1

N. Y.

New Jersey: 17

N. J.; Slt. Mdows., N. J., III.20 and IV.9; Arlington, N. J.; No. Arlington, N. J., III-26; Milburn, N. J.; Blmfield., N. J.

Pennsylvania: 1

Frankford, Pa., VI.21, A. Schmidt Collector.

North Carolina: 1

N. C.

Florida: 7

Kissimmee Fla.; Tamiami Trail, Fla.; Sanford, Fla., 6.8. '29; Homestead, Fla., June,1929, Darlington.

Alabama: 12

Mobile Co., Ala., H. P. Loding; Mobile, Ala., VI-29-20, H. P. Loding, Sagittaria; Mobile, Ala., VI.11.27, Darlington; Mobile, Ala., VII-1-21, H. P. Loding; Magazine Pt., Ala., VIII.16-25, H. P. Loding; Whistler Ala., H. P. Loding.

Louisiana: 138

La.; Gueydan, La., May 24, May 28, May 29, May 30, June 4, June 13, June 15, June 16, June 20, June 25, June 26, June 28, July 5, July 11, July 21, July 28, Aug.3, Aug.5, Aug.7, Aug.16 and Sept.14,1925, E. Kalmbach, At Light; Gueydan, La., VI,15-16,'25, E. Kalmbach, At Light; Lafayette, La., Sept.'04; N. Orleans, La., 26.91 and 6.7.95; N. Orleans, La., 26/3; Abbeville, La., 16.V.25, J. O. LeBlanc; Cameron, La., Set.10,1904, Wm. Laurents.

Kentucky: 1

Kentucky, Sanborn.

Indiana: 9

Ind.; Laporte Co., Ind., 9-15-93 and 6-19-'01, W. S. B.; Porter Co., Ind., 6-19-02, W. S. B.

Illinois: 8

N. Ill; Chicago, Ill, 3/9; Cook Co., Ill., Aug., Blackwelder; Cook Co., Ill., Col. & pres. by E. B. Chope.

Michigan: 3

Mich.; Washtenaw Co., Mich., VI-17-1921, M. H. Hatch.

Wisconsin: 1

Wis.

Minnesota: 4

Minn.; St. Paul, Minn., Elks Golf Ponds, June 20,1921, W. E. Hoffman; Chisago Co., Minn., O. W. Oestlund.

Iowa: 5

Ia.; Iowa; Iowa City, IV.29.00, Wickham; Iowa City, Iowa, IV.16; Sioux City Ia., 20/4.

Missouri: 1

St. L., Mo.

Arkansas: 1

Hope, Ark., 6/23/23.

Texas: 2

Tex.

Colorado: 1

Col.

CANADA

Quebec: 5

Berthier, P. Q., VI-9-21.

Listronotus manifestus new species

Plate V, Fig. 21.

Length 7 to 9 mm. Elongate-oblong. Body black. Densely covered with imbricated scales which are dark brown, light brown, fulvous, and sometimes with a cupreous or brassy tinge. Often with little indication of any definite color pattern, but sometimes with a longitudinal band of light scales on the elytra on the fourth to seventh intervals, this band interrupted for a short distance on the fourth interval a short distance in front of the middle of the elytra and not extending much past the middle on the seventh interval, sometimes extending onto the base of the eighth interval. The first three intervals of the elytra and most of the prothorax covered with dark brown scales. Disk of prothorax with a very faint median carina and slightly more distinct but irregular lateral carinae of light scales. Beak slightly longer than prothorax; rather stout; strongly curved; median carina fine and sharp, sides of beak rounded; lateral grooves and sulci not at all indicated; upper surface densely and finely punctate, thickly covered with small rounded scales. Head flattened between the eyes, very densely and finely punctate; upper part with narrow scales; between the eyes with rounded scales which become larger on the frontal fovea, which is

deep. Antennae moderately slender; second segment of funicle one-half longer than first, third segment elongate, longer than fourth. Prothorax one-fifth to one-fourth wider than long; ocular lobes very large, prolonged ventrally to form a ridge in front of the coxae on the ventral side of the prothorax and giving the appearance of the presence of a groove for the reception of the beak similar to that found in the Cryptorhynchinae; sides nearly straight, converging from base to apex; disk finely, densely, cribrately punctate, thickly clothed with imbricated scales which are slightly larger than those of the elytra; with only a very few open punctures bearing short inconspicuous setae. Scutellum elongate thickly covered with tiny light-colored scales. Elytra elongate; rather moderately deeply and angularly emarginate at base; humeri oblique; with an angular prominence just behind the humeri; sides gradually narrowed to apical fourth then strongly converging to the conjointly rounded apices; striae flatly impressed, distinctly punctate; intervals slightly convex; setae very small, not at all prominent; posterior calli obsolete. Ventral surface finely and densely punctate; everywhere thickly clothed with rounded scales except seventh abdominal sternum where the punctures bear setae instead of scales. Legs moderately stout; squamose and setose; femora with a preapical band of light scales; tibiae with apical mucrones short and stout; front and middle tibiae with a row of minute acute

teeth along their inner margins. Male with third abdominal sternum broadly and deeply concave at middle; seventh sternum very slightly convex. Female with basal part of third abdominal sternum convex, median posterior part slightly concave; seventh sternum unmodified; seventh tergum deeply emarginate at apex.

Notes on types. Holotype male, "Gregory, Tex., June 8, '04, at light." Allotype female, "Victoria, Tex., 7-16-16, J. D. Mitchell Collector, at light." Six paratypes as follows: 1 male, "Victoria, Tex., 8-5-16, J. D. Mitchell Collector, at light"; 1 male, "Victoria, Tex., 7-25-16, J. D. Mitchell Collector, at light, Hunter No. 3749"; 1 male, "Kingsville, Texas, C. T. Reed"; 1 male, "Hidalgo Co., Tex., 5-19-1930, J. C. Gaines Collector, Tex. Exp. Sta. Light Trap"; 1 male, 1 female, "Brownsv'le., Tex., VI, 11-16, '33, Darlington."

Holotype and allotype in the United States National Museum. Paratypes in the United States National Museum, the Museum of Comparative Zoology at Harvard College, and the Francis Huntington Snow Entomological Collections at the University of Kansas

Remarks and comparative notes. This species is rather distinct and is probably most closely related to L. sordidus (Gyllenhal). It may be readily distinguished by the very large ocular lobes, the anteriorly converging sides of the

prothorax, and the light band on the sides of the disk of the elytra. It may be separated from L. sordidus (Gyllenhal) by the smoother sculpturing of the beak, by the obsolete posterior calli of the elytra, and the absence of the elevated alternate intervals.

Biological notes. Taken at light.

Data on distribution. Known only from Texas.

Listronotus scapularis Casey 1895

Plate V, Fig. 18.
Plate VI, Fig. 18.

1895. Listronotus scapularis Casey, Coleop. Notices VI, Ann. N. Y. Ac. Sci., VIII, p. 828.

1920. Listronotus scapularis Casey. Leng, Catalogue of the Coleoptera of America, North of Mexico, p. 316.

1931. Listronotus scapularis Casey. Schenkling and Marshall, in Junk, Coleopterorum Catalogus, Subfam. Cylindrorrhininae, Pars 114, p. 12.

Original description. "Parallel and somewhat stout, moderately convex, black, densely clothed throughout with brown scales nearly uniform in color, on the pronotum slightly larger but not obscuring the punctures and slightly paler in a feeble oblique line at each side and in the middle toward the base. Head a little less than one-half as wide as the prothorax, densely fulvo-squamulose, the eyes separated by nearly four times their own width; beak long, about as long as the head and prothorax, straight, bent downward and gradually dilated toward the tip, tricarinate above, squamose and densely punctato-rugose throughout; antennae long and slender, inserted near the apex, the scrobes long, deep, coarse, straight, and horizontal, scape very long, slender, feebly enlarged distally, second joint of funicle greatly elongate, more than twice as long as

the first and almost as long as the next four combined. Prothorax two-fifths wider than long, the sides subparallel, conspicuously and almost evenly arcuate, a little more convergent toward apex than base, the former three-fourths as wide as the latter, truncate, the ocular lobes well developed; base broadly arcuate; disk sparsely, moderately coarsely punctate, each puncture bearing a small stiff hair. Scutellum circular, densely clothed with pale whitish scales. Elytra three-fifths longer than wide, between three and four times as long as the prothorax and nearly one-half wider; sides parallel and straight behind the post-humeral projection, outwardly oblique and straight from the base to the apex of the angulate prominence, gradually rounded in about apical third, the subapical umbones well marked; disk finely striate, the striae finely, feebly and indistinctly punctate; intervals flat, finely, sparsely punctate, each puncture bearing a small stout hair. Abdomen densely squamose on the two basal segments, thence coarsely pubescent with squamose sublateral areas to the apex; legs long, densely squamose and with short stiff sparse hairs, the scales paler toward the femoral apices. Length 12.0 mm.; width 5.0 mm. (across the post-humeral angular prominences 5.5 mm.).

"Texas (ElPaso). Mr. Dunn.

"This large and distinct species may be placed near callosus Lec., for the present, but is not closely allied

to any other thus far described. The type is probably a female. Two specimens."

Additional description. Length 8 to 12 mm. Thickly clothed with nearly uniform brownish scales, larger on prothorax, smaller and imbricated on elytra. In fresh specimens the following markings of light scales may be observed: a narrow irregular oblique line at each side of the prothorax, and a short median line at the base; a wider irregular band on the elytra, covering the humeri and extending caudad over the posterior calli. Occasionally there may be scattered small patches of light scales on the disk of the elytra. The extent of the light scales is variable and in some specimens there are very few present. On older specimens the light scales may become saturated with oil from the body, in which case they become dark or dirty, and the patterns are obliterated. Beak tricarinate above, median carina prominent, sharp, smooth; lateral carinae less prominent, more rounded, closely punctate. Antennae with second segment about twice as long as first, third longer than fourth, second almost as long as next three combined, as stated in original description. Head convex, finely and closely punctate, densely covered with elongate scales, becoming rounded in the area immediately surrounding the frontal fovea, which is deep and punctiform. Disk of prothorax closely, moderately coarsely punctate, each

puncture closed by a scale; a few scattered punctures larger, open, and bearing short setae. The original description mentions only these latter punctures, not the smaller ones which are covered over by the scales. Base of elytra deeply emarginate. Female with tips of elytra separately, very slightly subacuminate; seventh abdominal sternum very slightly emarginate at apex, nearly truncate, with an oblong median transverse depression which is impunctate and somewhat shining at the middle.

Notes on types. The types of this species are located in the Casey Collection in the United States National Museum, and have been examined. The type is a female from "Tex." A paratype male is also labelled "Tex" There is a third specimen in the series, a male, not a type, and without any locality label, although it is undoubtedly from Texas.

Remarks and comparative notes. This species has been found confused in collections with L. callosus LeConte which it resembles. It may be readily distinguished by the prominent post-humeral projections and the flat intervals of the elytra. The prothorax is relatively wider, being three-fifths wider than long while in L. callosus LeConte the prothorax is only one-fifth wider than long. The genitalia of the two species are very distinct.

Biological notes. This species has been taken at light.

Data on distribution. Known to occur only in Texas.

Texas: 53

Tex.; Gregory, Tex., June 8,'04, at light; S. Diego, Tex., May 23, Coll. Hubbard & Schwarz; S. Diego, Tex., May 25, E. A. Schwarz Collector; Mercedes, Tex., May 11-1934, C. L. Parnell, Thayer #161; Kingsville, Tex., C. T. Reed; Taft, Tex., 5/13/10; Brwnsvlle., Tex., XI-5, McMillan Collector, under board; Brownsville, Tex., VI-25-08; Brownsville, Tex., Oct.12,1910, R. A. Vickery Collector, Webster No. 6478; Brownsville, Tex., VI-8-34, J. N. Knull; Victoria, Tex., 5-18-'04, C. M. Walker Collector; Victoria, Tex., V.14.11, J. D. Mitchell, Collector, at light; Mc Allen, Tex., VII-9-1921, L. J. Bottimer, at light; Hidalgo Co., Tex., 6-16-1930, Light Trap Tex. Exp. Sta.; Hidalgo Co., Tex., 6-5-1930, J. C. Gaines Collector, Tex. Exp. Sta. Light Trap; Weslaco, Tex., 6-5-1930; Weslaco, Tex., 5-30-1930, S. W. Clark Collector, Tex. Exp. Sta. Light Trap; Weslaco, Tex., Oct., 1930, S. W. Clark; Plainview, Tex., 10-1-31, S. E. Jones Collector; Brownsville, Tex., Feb. 26, 1915, C. H. Popenoe Collector; Brownsville, Tex., VI-1-34 and VI-8-34, J. N. Knull; Brownsv'le, Tex., VI,11-16,'33, Darlington.

Listronotus rotundicollis LeConte 1876

Plate IV, Fig. 16.

1876. Listronotus rotundicollis LeConte, Proc. Am. Phil. Soc., Vol. XV, p. 132.

1876. Listronotus cribricollis LeConte, Proc. Am. Phil. Soc., Vol. XV, p. 134.

1911. Listronotus rotundicollis LeConte. Mitchell and Pierce, Proc. Ent. Soc. Wash., Vol. XIII, p. 50.

1916. Listronotus rotundicollis LeConte. Blatchley and Leng, Rhynchophora of North Eastern America, p. 157.

1916. Listronotus cribricollis LeConte. Blatchley and Leng, Rhynchophora of North Eastern America, p. 163.

1920. Listronotus rotundicollis LeConte. Leng, Catalogue of the Coleoptera of America, North of Mexico, p. 316.

1920. Listronotus cribricollis LeConte. Leng, Catalogue of the Coleoptera of America, North of Mexico, p. 317.

1935. Listronotus (?rotundicollis LeConte). Jones, Proc. Ent. Soc. Wash., Vol. XXXVII, p. 151.

1931. Listronotus cribricollis LeConte. Schenkling and Marshall, in Junk, Coleopterorum Catalogus, Subfam. Cylindrorrhininae, Pars 114, p. 11.

Original description. "Blackish, covered with the usual scales, of a dirty-brown; beak feebly carinate, lat-

eral grooves almost obsolete; frontal fovea distinct. Prothorax as wide as long, sides strongly rounded, clothed with paler scales; surface coarsely and densely punctured; an indistinct paler dorsal stripe may also be traced. Elytra with deep punctured striae, and convex interspaces; posterior callus obsolete. Length 7.5 mm.; .30 inch.

"Female. Last ventral with a large shallow rounded impression; elytra conjointly rounded at tip. Male wanting.

"One female, Georgia. Quite distinct by the more rounded prothorax. The funiculus of the antennae is as slender as in any of the preceding species; the setae of the elytra are rather more conspicuous."

Additional description. Length 5.5 to 8 mm. Beak slender, slightly curved, about same length as prothorax; covered with rounded scales until a short distnace behind insertion of antennae, shining and with only a few short slender setae from that point to apex; median carina fine, but distinct, partly covered by scales so that it does not appear to be quite as prominent in fresh specimens as in those with part or all of the scales rubbed off; coarsely and rugosely punctate, the punctures covered by the scales so that fresh specimens appear smooth; lateral sulci faint, also obliterated by scaly covering. Head convex, lower part very densely covered with scales, upper part clothed with setae; frontal fovea deep. Antennae slender, second segment of funicle not quite twice as long as first, third

segment elongate, longer than fourth, and nearly as long as first. Prothorax one-fifth wider than long; ocular lobes prominent; sides strongly rounded; disk convex, densely and coarsely punctate; scales on disk noticeably larger than those of elytra and distinctly striated, not imbricated; a narrow median and indistinct oblique lateral vitta of paler scales; a number of rather long, slender, semi-erect setae arising from larger open punctures. Elytra elongate-oblong, about three times as long as prothorax; base rather deeply emarginate, humeri oblique; sides nearly parallel for two-thirds of their length, then narrowed to the conjointly rounded apices; striae deeply impressed, their punctures small and closely placed; intervals convex, thickly clothed with imbricated scales, each interval with a single row of rather long, semi-erect, light-colored setae, which become longer on the declivity. Male with third and fourth abdominal sterna sparsely and moderately coarsely punctate, slightly impressed at middle; seventh sternum sparsely and finely punctate, sometimes with a very broad and feeble transverse impression toward the apex. Female with third and fourth abdominal sterna moderately and sparsely punctate, slightly convex at middle; seventh abdominal sternum with a large deep median impression, sometimes rounded, sometimes slightly transverse, usually shining and sparsely punctate.

Notes on synonymy. L. cribricollis LeConte has been found to be a synonym of L. rotundicollis LeConte. According to the original descriptions about the only difference that can be expected in the two is that of size. The structure of the seventh abdominal sternum of the female is described in about the same way. An examination of the types proves that these two species are the same. I do not know why LeConte placed L. cribricollis LeConte among those species having the third segment of the funicle globose and equal to the fourth. It is in reality elongate and longer than the fourth segment.

Notes on types. The types of both L. rotundicollis LeConte and L. cribricollis LeConte have been examined in the Museum of Comparative Zoology at Harvard College. Both types are females, and bear the orange disk indicating the "southern states." LeConte gives Georgia as the place of collection of both of these specimens. The type of L. rotundicollis LeConte has the disk of the prothorax somewhat rubbed. Beside the type in the LeConte Collection there is a female of L. frontalis LeConte, without any label. Beside the type of L. cribricollis LeConte there are two additional specimens, the first a male L. frontalis LeConte from "Alamose, Colorado," and the second a specimen of L. oregonensis (LeConte).

Biological notes. Mitchell and Pierce (1911) record the species as having been taken on cotton at Victoria, Texas. Some of the specimens on which this record is based have been examined. It was taken at Goliad, Texas, by C. R. Jones, on cotton. L. rotundicollis LeConte was taken on spider lily by Mitchell in Victoria, Texas, on March 20. The species is often taken at light. Jones (1935) records a species which was questionably determined as L. rotundicollis LeConte as having been taken in beach drift in Virginia after a storm. One of the specimens taken, bearing the information, "Va. Beach, Va., 10/18/32, Walker, Jones, & Brannon," has been examined and definitely belongs to this species.

Data on distribution. This species has been recorded previously from Virginia, Georgia, and Louisiana. We now know that the range extends as far north as Pennsylvania and south-west through Kentucky, Arkansas, Oklahoma, and Texas. Specimens examined have been as follows:

Pennsylvania: 1

Phila. Neck, Pa., VI-24, H. A. Wenzel Collector.

Virginia: 2

Va.; Va. Beach. Va., 10/18/32, Walker, Jones, & Brannon.

Georgia: 2

Georgia.

Florida: 1

Archer, Fla., 3.82.

Louisiana: 63

Gueydan, La., May 28, May 29, May 30, June 11, June 14, June 15, June 20, June 28, July 1, July 11, July 21, July 28, Aug.3, Aug.5, Aug.7, and Aug.16, 1925, E. Kalmbach, At Light; Gueydan, La., Apr.29,'26, E. Kalmbach, At Light; Covington, La., 28/5.

Kentucky: 2

Kentucky, Sanborn.

Arkansas: 1

Hope, Arkansas, June 6,1932, C. E. White collector.

Oklahoma: 2

Okmulgee, I. T., Je.24, J. D. Mitchell Collector, at light.
Oswalt, Okla., July 3,1937, Standish-Kaiser.

Texas: 35

Dallas, Tx., 11 Je.06, A. J. Leister Collector; Gregory, Tex., June 8,'04, at light; Victoria, Tex., 5.23.04, C. M. Walker Collector, on cotton; Victoria, Tx., J. D. Mitchell Collector; Victoria, Tex., 23.3, E. A. Schwarz Collector; Victoria, Tex., 9.9.04, F. H. Chittenden Coll.; Victoria, Tex., 3-20-17, J. D. Mitchell Collector, On spider lily; Victoria, Tex., 7-16-16 and IX-9-15, J. D. Mitchell Collector, at light; Victoria, Tex., 16-12-10, J. D. Mitchell Collector, in woods; Taft, Tex., 5/13/10; Goliad, Tx., 11 Aug.06, C. R. Jones Collector, on cotton; Corpus Chr., Tx., V.31.07, Spooner; Kingsville, Texas, C. T. Reed; Lelita, Tex., 7.6.16, J. D. Mitchell Collector, at light; College Station,

Tex., April 30, 1930, May 9,1930, May 20,1930, S. E. Jones Collector, Tex. Exp. Sta. Light Trap; College Station, Tex., May 7,1930, May 19,1933, May 20,1930, June 5,1931, H. J. Reinhard Collector, Tex. Exp. Sta. Light Trap; El Campo. Tex., 6-8-1923.

Listronotus distinctus new species

Plate IV, Fig. 15.
Plate VI, Fig. 15.

Length 7.5 to 10 mm. Oblong, robust. Body mostly black, antennae and tarsi piceous. Rather thickly clothed with large scales which are dark brown, light brown, or cinereous, indiscriminately arranged on the elytra to form irregular mottlings; scales of disk of prothorax larger, not imbricated, cinereous scales forming a very narrow median vitta and an irregular vitta on each side of the disk; head and beak thickly clothed with slender scales. Beak moderatley stout, slightly curved, a little more so in the female than in the male; about the same length as the prothorax; tricarinate, the median carina distinct, sharp, smooth, the lateral carinae not as sharp and usually not quite as prominent, punctate; lateral sulcus rather deep in basal half of beak; surface rough, finely, rugosely punctate. Antennae rather slender; second segment of funicle nearly twice as long as first; third segment elongate, longer than fourth, not quite as long as first. Head slightly convex, densely and coarsely punctate; frontal fovea rounded, distinct. Prothorax about one-fifth wider than long in male, slightly more in female; ocular lobes well developed; sides strongly rounded, widest at middle; disk convex, very densely, deeply, and moderately coarsely punctate; a great many scattered larger punctures bearing

elongate semi-erect setae. Scutellum slightly elongate, thickly covered with short, fine, whitish setae. Elytra deeply rounded at base; anterior margin slightly reflexed along first five intervals; humeri oblique; sides rounded immediately behind the humeri, then parallel for two-thirds the length, then narrowed to the conjointly rounded tips; striae fine, impressed, the punctures distinct, closely placed; intervals convex, each with a row of slender, semi-erect setae which become longer and more erect on the declivity; elytra without transverse wrinkles; posterior calli very feeble; first intervals raised and more prominent in the region between the posterior calli, at the beginning of the declivity. Legs moderately stout; apical half of femora with a covering of rounded scales and slender setae, basal half with only short slender setae; tibiae with a very few scattered small scales and many long whitish bristles; inner margin of apical half of tibiae denticulate, apical mucrones rather long. Male with third and fourth abdominal sterna impressed at middle; all the sterna rather sparsely punctate, the punctures not all the same size; very long, slender setae arising from the larger punctures; a few rounded scales along the sides of the abdominal sterna, more numerous on the third and fourth; seventh sternum convex in median half for its entire length. Female with third and fourth abdominal sterna convex at middle; punctation and covering of abdominal sterna much the same as in the male except that the setae are not as long or as numerous,

and that there are more rounded scales present, often extending entirely across the fourth sternum; seventh sternum with a large semi-circular area across the middle of the basal half, which is smooth and shining; a feeble impression across the entire width of the seventh sternum just before the apex which is slightly raised and has a semi-circular emargination at the middle; seventh tergum broadly and shallowly emarginate at apex.

Notes on types. Holotype male, "Dimmit Co., Texas., Col. Hubbard & Schwarz." Allotype female, "Waco, Tex., V.22." Fourteen paratypes as follows: 1 male, 1 female, "Waco, Tex., V.22"; 1 male "Kingsville, Texas, C. T. Reed"; 2 males, "Brownsv'le, Tex., VI-25-08"; 1 male, 2 females, "Victoria, Tex., 7-31-16, 8-5-16, and 8-7-16, J. D. Mitchell Collector, at light"; 2 males, "Madison Co., Tex., VI-20-31 and VI-21-31, Bibby & Tate Collectors"; 1 female, "Amarillo, Tex., 8/02"; 1 female, "El Campo, Tex., 6-8, 1923"; 1 female, "Altair, Colo. Co., I.10.11, C. T. Atkinson."

Holotype and allotype deposited in the United States National Museum. Paratypes in the United States National Museum, Museum of Comparative Zoology at Harvard College, Francis Huntington Snow Entomological Collections at the University of Kansas, and in the collections of the Illinois Natural History Survey at Urbana, Illinois, H. C. Fall at Tyngsboro, Massachusetts, and H. J. Reinhard at College Station, Texas.

Remarks and comparative notes. Related to L. scapularis Casey, but may be separated from it by the following characteristics: beak a little stouter, lateral carinae more prominent; disk of prothorax with more large punctures, and with setae longer and more prominent; base of elytra more deeply emarginate and humeri more oblique; elytra rounded behind the humeri and without the angulate prominences of L. scapularis Casey; elytral intervals more convex, first intervals more prominent at declivity of elytra, and posterior calli less prominent; seventh sternum of male convex; seventh sternum of female without the deep depression of L. scapularis Casey, and with the apical emargination narrower and deeper; and tips of female elytra conjointly rounded instead of separately cauminate. The males amy easily be separated by the shape of the median lobe and the females by the shape of the eighth sternum.

Also resembles L. rotundicollis LeConte to some extent but differs in the following respects: thicker and more strongly carinate beak; prothorax less constricted anteriorly and with coarser punctation on the disk; elytra more strongly emarginate at base; and humeri more oblique. The seventh and eighth sterna of the females are different and the genitalia of the males are very different.

Biological notes. This species has been taken at light.

Data on distribution. Known only from the southern half of Texas.

Listronotus blatchleyi new species

Plate XI, Fig. 19.

1928. Listronotus callosus Blatchley, nec LeConte. Blatchley, Jr. N.Y. Ent. Soc., XXXVI, p. 241.

Length 9 to 12.5 mm. Oblong, stout, black. Clothed with dark brown and light brown scales, the latter forming and irregular lateral vitta on the prothorax and extending onto the humeri of the elytra and sometimes to the posterior third of the elytra. In some individuals these light brown scales become almost cinereous. Beak moderately stout, very slightly curved, as long as prothorax; upper surface distinctly tricarinate; lateral sulci very deep; surface rugulosely punctate; clothed with narrow scales. Head convex, densely punctate, clothed with narrow scales; rugose between the eyes and with scales wider; frontal fovea very deep. Antennae moderately slender; second segment of funicle nearly twice as long as first, third segment very slightly elongate, not as long as first; fourth to seventh segments rounded. Prothorax slightly wider than long; ocular lobes moderately developed; sides nearly parallel at middle, strongly rounded at base, slightly constricted at apex; disk of prothorax more sparsely squamose than elytra, the scales not imbricated; the surface densely and coarsely punctate with scattered larger punctures open and seta-bearing; sides of prothorax granulate-

punctate. Scutellum elongate, clothed with tiny whitish setae. Elytra deeply emarginate at base; humeri oblique; rounded behind the humeri, sides parallel in male, very slightly wider at about the middle in the female; striae not impressed, but coarsely and deeply punctate; intervals convex, the third and fifth usually very strongly so; elytra with a very rough appearance caused by numerous prominent transverse wrinkles; setae rather short, decumbent, not very prominent. Ventral surface sparsely and unevenly punctate with intermixed large and small punctures; sterna nearly bare at middle, having only a few very short, slender, inconspicuous setae, but with the sides rather thickly clothed with rounded scales. Legs rather slender; middle and hind femora with a preapical band of light scales; tibiae strongly mucronate. Male with third and fourth abdominal sterna broadly concave; seventh sternum slightly convex; elytra conjointly rounded. Female with third and fourth abdominal sterna very strongly convex throughout their entire width; seventh sternum rather broadly and deeply transversely concave; seventh tergum broadly and shallowly emarginate at apex; tips of elytra separately acuminate.

Notes on types. Holotype male and allotype female, "Homestead, Fla., June, 1929, Darlington." Six paratypes as follows: 2 females, "Homestead, Fla., June, 1929,

Darlington"; 1 male, "Flagler Co., Fla., II-18-30, D. B. Webb, Florida Fruit Fly Trap Surv."; 1 male, "Paradise Key, Fla., IV-1-25"; 2 females, "Royal Palm Park, Fla., 12-12-24, W. S. B."

Holotype and allotype in the Museum of Comparative Zoology at Harvard College. Paratypes in the Museum of Comparative Zoology at Harvard College, the United States National Museum, the Francis Huntington Snow Entomological Collections at the University of Kansas, and in the collections of Purdue University and H. C. Fall.

Remarks and comparative notes. This species appears to be somewhat related to L. callosus LeConte, but may be separated from it by the following characters: beak more strongly tricarinate; fourth segment of funicle of antennae not elongate; elytra with transverse wrinkles and the odd intervals not as strongly convex; posterior calli not at all prominent.

Blatchley (1928) refers to L. blatchleyi n. sp. under the name L. callosus LeConte, and the species is, therefore, named after him.

Biological notes. Blatchley (1916) in referring to the two specimens of this species which were collected by him says, "Two females, each 13. mm. in length, were taken December 12, hibernating amidst the roots of a large tuft of roadside grass at Royal Palm Park."

Data on distribution. Known only from Florida.

Listronotus palustris Blatchley 1916

Plate III, Fig. 12.
Plate VI, Fig. 12.

1916. Listronotus palustris Blatchley, in Blatchley and Leng, Rhynchophora of North Eastern America. p. 161, fig. 60 a-b.

1920. Listronotus palustris Blatchley. Leng, Catalogue of the Coleoptera of America, North of Mexico. p. 317.

1931. Listronotus palustris Blatchley. Schenkling and Marshall, in Junk, Coleopterorum Catalogus, Subfam. Cylindrorrhininae, Pars 114, p. 12.

Original description. "Elongate-oblong, robust. Black, above rather thickly clothed with pale brown, fuscous and silvery gray scales, the gray ones forming a narrow stripe each side of thorax and along the sides to beyond the middle of the elytra, covering also the meso- and meta-sternal side pieces and sides of ventral segments, and forming a ring near apex of each femur; antennae, tibiae and tarsi dark reddish-brown. Beak rather stout, as long as thorax, distinctly tricarinate and quadrisulcate. Thorax short, convex, distinctly wider than long, sides broadly rounded, disc coarsely, evenly and densely punctured, each puncture closed by a round scale, much larger than those of elytra. Scutellum small, rounded. Elytra but slightly wider at base than middle of thorax, humeri oblique, sides subparallel to apical third, then strongly converging to apex where they

are conjointly rounded in male, but separately prolonged in short, obtuse processes in female; striae with very coarse punctures separated by their own diameters; first, third and fifth intervals convex, slightly elevated, the others flat; setae very short, visible only on the declivity. Fifth ventral of female broadly and deeply impressed. Length 6.2-8.5 mm.

"Dunedin, Florida, Jan. 17-April 6; common beneath boards and other cover along the margins of ponds; mating Feb.11 and April 1. Enterprise, Fla., May 25; LeConte collection without name. Marion County and Enterprise, Fla., May 27; Horn collection, without name. Specimens sent to Dr. Chittenden were returned as L. sulcirostris Lec., but careful comparison with the type of that species shows palustris to differ widely in the secondary sexual characters of female, as well as in the width, vestiture and punctuation of thorax."

Additional description. Length 6.5 to 9 mm. Beak as long as or slightly longer than prothorax; median carina smooth, usually more prominent than lateral carinae, which are punctate; lateral sulci deep, extending beyond middle of beak; upper surface rather thickly clothed with narrow scales and a few slender setae. Head convex; deeply and densely punctate; clothed with short stout setae; frontal fovea deep, with a small patch of rounded scales. Prothorax one-fifth wider than long; disk with a number of

scattered large punctures bearing short stout setae instead of rounded scales. Male with third abdominal sternum slightly concave; entire surface of seventh sternum convex, often with a short median longitudinal depression just before the apex. Female with third abdominal sternum slightly convex; seventh sternum with a moderately deep concavity across its entire width.

Notes on types. The types of this species, a male and female, were found mating at Dunedin, Florida, April 1, 1915, and were collected by W. S. Blatchley. They are located in the Blatchley Collection at Purdue University.

Biological notes. Several specimens have been taken from the stomachs of Bufo terrestris at Lake Kissimmee, Florida. There is a specimen of L. palustris Blatchley in the Harris Collection in the Boston Museum of Natural History. It had not been determined as any species. A number on the speciman refers to the Harris catalogue where we find that the specimen was taken under the bark of a rotten oak in "E. Fla.," by Doubleday.

Data on distribution. Described and previously recorded only from Florida. I have seen several specimens from two localities in Georgia. The records of distribution are as follows:

Georgia: 5

St. Simons Island, Ga., 18-VII-1931, Quirsfeld; St. Simons Island, Ga., VII-18-1931, C. A. Frost; Tybee Is., Ga., 7.1, H. A. Wenzel Collector.

Florida: 75

Fla.; Dunedin, Fla., I.2.1918, 1-19-1913, 2-11-1913, 2-17-20, Feb. 18,1914, 2-21-16, 2-23-24, 3-2-16, Mch.14.'20, 3-15-1913, 3-16-1913, 3-18-16, 3-31-1913, 4-1-1915, and 4-2-21, W. S. Blatchley Coll.; Dunedin, Fla., II.11.14, II-11-'17, and II-26-16; Dunedin, Pinellas Co., Fla., III-17-1925; Enterprise, Fla., 25.5 and 27.5, Coll. Hubbard & Schwarz; Enterprise, Fla., May 19, May 21, May 23, May 25, and May 27; Tampa, Fla., 26.4, Coll. Hubbard & Schwarz; Sebring, Fla., 8-5-30, Paul W. Oman; Lake Kissimmee, Fla., Bufo 1387; Lake Kissimmee, Fla., Bufo 1390; Lake Kissimmee, Fla., Bufo 1438; Kissimmee, Fla.

Listronotus blandus new species

Plate IV, Fig. 14.

Length 5.25 to 6.5 mm. Elongate, black. Clothed with rather large round scales, nearly uniform in color except on prothorax, where there are indications of three vitta which are a trifle lighter. Beak very slightly longer than prothorax; with three fine carinae, the median one a trifle more prominent; the lateral sulci moderately deep; rather sparsely and somewhat rugulosely punctate, especially at base; basal part with a few round scales which become narrower at middle and setiform at the apex. Head convex; densely punctate, slightly rugose between the eyes; clothed with short slender setae; frontal fovea deep, with a small patch of broad scales. Antennae slender; second segment of funicle nearly twice as long as first; third segment slightly elongate; fourth to seventh segments rounded. Prothorax slightly wider than long; ocular lobes moderately developed; sides evenly rounded; disk coarsely punctate, sparsely clothed with scales which are very slightly larger than those of the elytra; a few large open punctures bearing short stout setae. Scutellum nearly round, with a few very short stout, light-colored setae. Base of elytra broadly and slightly emarginate; humeri rounded; sides parallel to posterior third then gradually narrowed to the apex, the posterior third being rather

slender and slightly attenuate; striae slightly impressed, moderately punctate; intervals nearly flat, with short distant setae. Ventral surface with third and fourth abdominal sterna coarsely and very sparsely punctate, median part with tiny setae scarcely protruding beyond the puncture, sides with a small patch of round scales; fifth to seventh sterna more finely and closely punctate, and with minute setae. Legs slender; tibiae rather strongly bent at tip, apical mucrones rather long. Male with third abdominal sternum flat or very slightly concave; tips of elytra conjointly rounded. Female with third abdominal sternum convex; seventh sternum with a broad transverse concavity extending across the entire sclerite; tips of elytra separately subacuminate.

Notes on types. Holotype male, "Ind. River, Fla., 9/4." Allotype female, "Childs, Fla., 8-6-30, R. H. Beamer." Numerous paratypes from Florida, Georgia, Alabama, and Louisiana.

Holotype and allotype in the Francis Huntington Snow Entomological Collections at the University of Kansas. Paratypes in the Francis Huntington Snow Collections, the United States National Museum, the Museum of Comparative Zoology, American Museum of Natural History, and in the collections of the United States Biological Survey, Purdue University, H. C. Fall, and the Illinois Natural History Survey.

Remarks and comparative notes. This species is fairly closely related to L. palustris Blatchley but is much smaller; has the beak less coarsely sculptured; has the scales of a uniform color; and the elytral intervals are not convex as in L. palustris Blatchley.

Biological notes. This species has been taken in some numbers from the stomachs of Bufo terrestris at Lake Kissimmee, Florida. A specimen from Ponchatoula, Louisiana, was collected on turnip on May 2. This species has been taken at light in Louisiana.

Data on distribution. Rather common in Georgia, Florida, Alabama, and Louisiana.

Listronotus frontalis LeConte 1876

Plate II, Fig. 7
Plate VI, Fig. 7.

1876. Listronotus frontalis LeConte, Proc. Am. Phil. Soc., Vol. XV, p. 133.

1885. Listronotus frontalis LeConte. Townsend, Can. Ent., Vol. XVII, p. 72.

1895. Listronotus frontalis LeConte. Hamilton, Trans. Am. Ent. Soc., XXII, p. 344.

1910. Listronotus frontalis LeConte. Smith, Insects of New Jersey, p. 382.

1916. Listronotus frontalis LeConte. Blatchley and Leng, Rhynchophora of North Eastern America, p. 159.

1920. Listronotus frontalis LeConte. Leng, Catalogue of the Coleoptera of America, North of Mexico, p. 317.

1928. Listronotus frontalis LeConte. Leng, Cornell Univ. Agri. Exp. Sta., Memoir 101, p. 495.

1931. Listronotus frontalis LeConte. Schenkling and Marshall, in Junk, Coleopterorum Catalogus, Subfam. Cylindrorrhininae, Pars 114, p. 11.

1937. Listronotus frontalis LeConte. Bleasdell, Iowa St. Coll. Jr. Sci., Vol. XI, No. 4, p. 416.

Original description. "Blackish, less elongated, covered with rounded scales, which are no larger on the prothorax; these scales are dirty brown on the elytra, and

with a metallic lustre on the head and prothorax. Beak finely carinate, lateral grooves almost obsolete, frontal fovea deep. Prothorax very little longer than wide, broadly rounded on the sides, transversely impressed near the tip; lateral stripes and dorsal line indistinctly paler, punctures dense, of two sizes, the larger more distant. Elytra one-third wider than the prothorax, broadly emarginate at base, humeri rounded; striae strongly punctured, interspaces wide, nearly flat; tip conjointly rounded in both sexes. Length 5.7.10 mm.; .23-.40 inch.

"Male. Last ventral not impressed; anal segment slightly prominent.

"Female. Last ventral with three shallow impressions.

"Michigan, New York, Georgia, Texas. Stouter than L. nebulosus, and easily recognized by the above characters. The setae of the elytra are more obvious than usual."

Additional description. Beak about the same length as the prothorax, moderately stout; upper surface rounded, except for the sharp smooth median carina; surface rather densely, moderately punctate. Antennae with second segment of funicle about twice as long as first; third to seventh segments sub-globose, third not longer than fourth and not as long as first. Disk of prothorax slightly wider than long; ocular lobes moderately developed; punctures dense, rather small, with a few scattered larger punctures bearing

short, dark, stout setae instead of scales. Elytra with striae rather fine, moderately punctate, the punctures not distant; intervals nearly flat, scales not imbricated, setae moderately long, dark, semi-erect, rather prominent on posterior part of elytra. Ventral surface of abdomen not densely punctate; seventh sternum, however, more densely punctate than the others; punctures of varied size. Male with third and fourth sterna broadly and rather deeply concave at middle; seventh sternum nearly flat; disk of prothorax with only a slight median post-apical impression. Female with third and fourth sterna flat or slightly convex; seventh sternum with three broad, feebly impressed longitudinal impressions, one median and the other two sub-lateral; disk of prothorax with a median post-apical impression which is often rather deep.

Notes on types. The types of this species have been examined. They are in the LeConte Collection in the Museum of Comparative Zoology at Harvard College. There are four specimens in LeConte's series of frontalis. The first one is a female labelled "Tex." It is 9.5 mm. long. There is a deep impression just behind the apex of the prothorax. The second specimen is from the "middle states" of LeConte and is probably the New York specimen mentioned in the original description. It is a male and measures 6.2 mm. in length. The scales are slightly tinged with cupreous. The third of the series is a female and bears an orange disk indicating the "southern states," probably Georgia. The fourth specimen

in the series is labelled "S. Haven, Mich., 15.9.74." It does not bear a type label but is probably the specimen, or one of the specimens, upon which the Michigan record in the original description is based.

Biological notes. Sometimes taken at light. It was taken by Mitchell in Victoria County, Texas, in the early part of February, hibernating under pecan logs. Townsend (1885) found a number of L. frontalis LeConte in Louisiana, along with L. tuberosus LeConte, L. callosus LeConte, and L. nebulosus LeConte, beneath old railroad ties on the ground and under pieces of wood in dry places during the first part of April. Blatchley (1916) records the species as frequent along the beach of Lake Michigan and along the borders of ponds and ditches.

Data on distribution: This species has a very wide distribution. It has been found from Florida to California, northward through the entire United States, and in all the southern tier of Canadian provinces, from Quebec to British Columbia. The records of specimens examined are as follows:

UNITED STATES

Massachusetts: 39

Mass.; Chicopee, Mass., Apr.12,'95, Apr.23,'95, May 31,'95, June 9,'96, June 20,'95, and June 30,'95; Tyngsboro, Ms., Vi-16-21; Mass., Blanch.; Low., Mass.

Rhode Island: 1

Watch Hill, R. I., July 31,1909, W. Robinson.

New York: 2

N. Y., T.B.A.; Buffalo, N. Y.

New Jersey: 3

Berkley Hgts., N. J.; New Jersey; Hopatcong, N. J.

Pennsylvania: 4

Penn.; Jeannette, Pa., Klages; Frnakford, Pa., VI.21, and VI.27, A. Schmidt Collector.

District of Columbia: 3

Washgtn., D. C.

Florida: 4

Fla.; Lake Kissimmee, Fla., Bufo 1428.

Alabama: 5

Mobile, Ala., VI, Loding; Mobile, Ala., VII.1.21, H. P. Loding.

Louisiana: 73

La.; N. Orleans, La., 11/3, 14/3, 26/3, 3.VI.92, 6/6, 10/6, 26.X.91, and 4/11/91; New Orleans, La., Aug.3, F. R. Mason; Baton Rouge, La., June 4-15, T. H. Jones Collector, At light; Baton Rouge, La., May-5-19, O. W. Rosewall; Baton Rouge, La., 4/17/1934, 4/18/1934, 4/25.1934, 5/12.1934, F. E. Lyman; Gueydan, La., May 28, May 29, June 15, June 16, June 28, July 11, July, 21, and Aug.16,1925, E. Kalmbach, At Light.

Kentucky: 2

Ky.

Indiana: 5

Ind.

Illinois: 10

Ill.; N. Ill.; Chicago, Ill., 3/9; Cook Co., Ill., Aug., Blackwelder; Cook Co., Ill., Col. & Pres. by E. B. Chope.

Michigan: 16

Mich.; Cheboygan Co., Mich., 7-6-1936, R. L. Anderson; Oakland Co., Michigan, VII-4-1925, A. W. Andrews; Escanaba, Mich., 17.7; S. Haven, Mich., 15.9.74.

Wisconsin: 3

Wis.

Minnesota: 1

Minn.

Iowa: 10

Iowa; Iowa, Bufo 2052; Iowa City, III-25-98, Wickham; Iowa City, Ia., V-5-1896; Lake Okoboji, Ia., July 3, July 10, and July 26,1917, L. L. Buchanan; Monona Co., Iowa, IX-99, Shimek; Milford, Ia., Bufo am. 1997 (Lakeside Lab., F. N. Blanchard).

Nebraska: 1

Fillmore, Neb.

Kansas: 3

Kan.; Kan., T.B.A.; Lawrence, Kansas, 7-11-33, M. W. Sanderson, Oct. Light.

Texas: 12

Tex.; Victoria, Tex., 3.19, E. A. Schwarz Collector; Victoria, Tx., V.14.11, J. D. Mitchell Collector, at light; Calletto cr. bottom, Victoria Co., Tex., II-3-12, J. D. Mitchell Collector, hibernating under pecan log.

Colorado: 5

Alamosa, Col., 3.7; Col.

North Dakota: 5

Granna, N. D., VI-25-'12, 106242; University, N. D., June 15.96, R. P. Currie Collector.

South Dakota: 1

S. D.

Utah: 7

Dry Lake, Ut., 7/31/1926, G. F. Knowlton Collector.

New Mexico: 18

Albuquerque, N. Mex.

Arizona: 1

Ari.

California: 1

Cal.

Oregon: 23

Or.; Dalles, Oreg.; Dalles, Or.; The Dalles, Oreg., 1889, Dietz; Baker, Ore., Je.15,1924; Klamath, Oreg.

Washington: 1

Pullman, Wash., July 2,'98, Collector C. V. Piper.

CANADA

Quebec: 1

Montebello, Que., 7-24-37.

Ontario: 2

E. Ont., Can.

Saskatchewan: 1

Saskatoon, Sask., June 16,1924, Kenneth M. King.

Alberta: 12

Cypress Hills, Alta., VII.3.1926, F. S. Carr; Medicine Hat, Alta., 30.IV.1927, F. S. Carr Collector; Medicine Hat, Alta., VI-17-'27, Carr.

British Columbia: 9

Salmon Arm, B. C., 30.IV.31 and I.5.1930, Hugh B. Leech; Osoyoos, B. C.; Vancouver Is., B. C.

Listronotus nebulosus LeConte 1876

Plate II, Fig. 8.
Plate VI, Fig. 8.

1876. Listronotus nebulosus LeConte, Proc. Am. Phil. Soc., Vol. XV, p. 133.

1876. Listronotus sulcirostris LeConte, Proc. Am. Phil. Soc., Vol. XV, p. 132.

1877. Listronotus nebulosus LeConte. Popenoe, Trans. Kans. Acad. Sci., Vol. V, p. 39.

1878. Listronotus nebulosus LeConte. Popenoe, Trasn. Kans. Acad. Sci., Vol. VI, p. 85.

1885. Listronotus nebulosus LeConte. Townsend, Can. Ent., Vol. XVII, p. 72.

1893. Listronotus nebulosus LeConte. Beutenmuller, Jr. N. Y. Ent. Soc., Vol. 1, p. 40.

1903. Listronotus nebulosus LeConte. Ulke, Proc. U. S. N. M., XXV, p. 33.

1906. Listronotus sulcirostris LeConte. Evans, Can. Ent., Vol. XXXVIII, p. 100. (Name probably cited in error.)

1910. Listronotus nebulosus LeConte. Smith, Insects of New Jersey, p. 382.

1916. Listronotus nebulosus LeConte. Blatchley and Leng, Rhynchophora of North Eastern America, p. 159.

1916. Listronotus sulcirostris LeConte. Blatchley and Leng, Rhynchophora of North Eastern America, p. 158. (Probably refers to L. frontalis Lec.)

1920. Listronotus nebulosus LeConte. Leng, Catalogue of the Coleoptera of America, North of Mexico, p. 317.

1920. Listronotus sulcirostris LeConte. Leng, Catalogue of the Coleoptera of America, North of Mexico, p. 317.

1931. Listronotus nebulosus LeConte. Schenkling and Marshall, in Junk, Coleopterorum Catalogus, Subfam. Cylindrorrhininae, Pars 114, p. 12.

1931. Listronotus sulcirostris LeConte. Schenkling and Marshall, in Junk, Coleopterorum Catalogus, Subfam. Cylindrorrhininae, Pars 114, p. 12.

1937. Listronotus nebulosus LeConte. Bleasdell, Iowa St. Coll. Jr. Sci., Vol. XI, No. 4, p. 416.

Original description. "Elongate, blackish, clothed with scales, mottled brown and dark, on the head with a metallic lustre. Beak feebly carinate and sulcate as usual. Prothorax longer than wide, sides feebly rounded for two-thirds the length, then more rounded to the tip; scales small, a bifurcated lateral vitta, and an interrupted dorsal line paler; punctures dense and deep. Elytra about one-fourth wider than the prothorax, strongly emarginate at base, humeri oblique, slightly rounded; striae strongly punctured, interspaces wide and flat. Thighs with a pale band. Length 9.5 mm.; .375 inch.

"Female. Last ventral slightly impressed; elytra conjointly rounded at tip.

"One female, Missouri. Easily recognized by the elongate form and mottled color."

Additional description. Length 6.5 to 9 mm. Beak stout, thick, slightly curved on upper side; slightly shorter than prothorax; a little shorter and thicker in the male than in the female; usually with a very sharp smooth median carina; lateral carinae sometimes rather prominent; upper surface densely, rugulosely punctate, clothed with a few narrow scales and slender setae. Antennae stout; second segment of funicle nearly rounded, not at all elongate. Head convex, densely punctate, clothed with slender setae; frontal fovea usually rather deep, with a small patch of rounded scales. Prothorax as wide as long, not longer than wide, as is stated in the original description; ocular lobes moderately developed; sides broadly rounded, widest at middle, slightly wider at base than at apex; disk densely punctate; a number of scattered punctures are much larger and deeper, and bear short slender setae instead of rounded scales as do the other punctures. Legs stout. Ventral surface moderately punctate, large and small punctures intermixed; sparsely clothed with small scales, except median part of seventh sternum. Male with basal portion of third abdominal sternum slightly depressed; seventh sternum slightly convex, more densely and finely punctate than the other sterna. Female with seventh sternum very densely and

finely, slightly rugulosely punctate; a transverse concave preapical area.

Notes on synonymy. An examination of LeConte's types shows that L. nebulosus LeConte and L. sulcirostris LeConte are both the same species. Both species were described in 1876 in the same paper, but L. sulcirostris LeConte appears on page 132 and L. nebulosus LeConte on page 133, giving the former name page priority. L. nebulosus LeConte, however, is the name which is in common usage. The type specimen is also more typical of the species than are the two types of L. sulcirostris LeConte, which are abraded and represent extremes of variation found within the species. For these reasons the matter of page preference is being disregarded; L. nebulosus LeConte is retained as the name of the species, and L. sulcirostris LeConte is made the synonym.

Notes on types. The type of L. nebulosus LeConte bears a yellow disk indicating the "western states," and the original description gives Missouri as the locality. The specimen is a female, and is very typical of the species.

The types of L. sulcirostris LeConte, a female and a male, bear orange disks indicating the "southern states," Georgia being the locality given in the original description. These specimens have the lateral carinae of the beak rather prominent, but an examination of a number of specimens of

L. nebulosus LeConte will show that this is not an uncommon variation within the species. The female type of L. sulcirostris LeConte has the seventh sternum of the abdomen more strongly impressed than the average condition found in the species.

The types of L. nebulosus LeConte and L. sulcirostris LeConte are in the LeConte Collection in the Museum of Comparative Zoology at Harvard College.

Biological notes. Popenoe (1878) stated that this species occurred at Topeka, Kansas, with L. caudatus (Say) on Sagittaria. This record is probably based on a misdetermination, for I have seen a male specimen of L. caudatus (Say) from Topeka, Kansas, which had been determined by LeConte as L. nebulosus LeConte. Since the species actually does occur in this locality, the erroneous record of locality is inconsequential, but we must regard as questionable the record of the occurrence of L. nebulosus on Sagittaria.

Townsend (1885) records the species as being quite numerous in Louisiana with L. tuberosus LeConte, L. callosus LeConte, and L. frontalis LeConte beneath old railroad ties on the ground and under pieces of wood in dry places during the first part of April.

The species was found hibernating under a pecan log in Victoria County, Texas, on February 3, by J. B. Mitchell.

L. nebulosus LeConte is frequently taken at light.

Data on distribution. The range of this species seems to be limited mostly to the central states, extending from Texas and Louisiana, northward to Indiana, Illinois, and Wisconsin. I have examined specimens from the following localities:

Louisiana: 54

La.; N. Orleans, La., 14/3, 6/6, 10/6, 18/10; Gueydan, La., May 29, June 14, and July 11,1925, E. Kalmbach, At Light.

Indiana: 2

Ind.; Lake Co., Ind., 7-27-97, W. S. B.

Illinois: 1

Ill.

Wisconsin: 1

Wisc.

Iowa: 2

Iowa City, Iowa, E. J. Bashe Collector; Iowa City, Wickham.

Nebraska: 1

Neb. City, Nebraska, Shimek.

Kansas: 23

Ks.; Kan.; Kans.; Topeka, Kansas, Jul.8; Douglas Co., Kans., F. H. Snow; Kan., T. B. A.; Lawrence, Kansas, 7-21-33, M. W. Sanderson, At Light.

Missouri: 1

Mo.

Oklahoma: 1

Okmulgee, I. T., Je.24, J. D. Mitchell Collector, at light.

Texas: 17

Tex.; Calletto cr. bottom, Victoria Co., Tex., II-3-12, J. D. Mitchell Collector, hibernating under pecan log; Gregory, Tex., June 8,'04, at light; Brownsville, Tex., Nov. 21-1910, at light; Waco, Tex., Bufo #2080.

Listronotus appendiculatus (Boheman) 1842

Plate III, Fig. 10.

1842. Listroderes appendiculatus Boheman, in Schönherr, Genera et Species Curculionidum, VI, 2, p. 192.

1853. Listroderes appendiculatus Schönherr. Melsheimer, Catalogue of the described Coleoptera of the United States, p. 95.

1871. Listroderes appendiculatus Boheman. Gemminger and Harold, Catalogus Coleopterorum, VIII, p. 2359.

1873. Listroderes appendiculatus Boheman. Crotch, Check List of the Coleoptera of America, North of Mexico, p. 118.

1876. Listronotus appendiculatus (Boheman). LeConte, Proc. Am. Phil. Soc., Vol. XV, p. 132.

1881. Listronotus appendiculatus (Boheman). Snow, Trans. Kans. Acad. Sci., Vol. VII, p. 79.

1890. Listronotus appendiculatus (Boheman). Beutenmuller, Can. Ent., Vol. XXII, p. 200.

1893. Listronotus appendiculatus (Boheman). Beutenmuller, Jr. N. Y. Ent. Soc., Vol. 1, p. 40.

1894. Listronotus appendiculatus (Boheman). Webster, Ohio Agric. Exp. Sta. Bull., No. 58, p. 29, fig.

1894. Listronotus appendiculatus (Boheman). Webster, The Ohio Farmer, p. 97, 1 fig.

1894. Listronotus appendiculatus (Boheman). Webster, Insect Life, Vol. VII, p. 206.

1895. Listronotus appendiculatus (Boheman). Hamilton, Trans. Am. Ent. Soc., XXII, p. 344.

1903. Listronotus appendiculatus (Boheman). Ulke, Proc. U. S. N. M., XXV, p. 33.

1910. Listronotus appendiculatus (Boheman). Smith, Insects of New Jersey, p. 382.

1916. Listronotus appendiculatus (Boheman). Blatchley and Leng, Rhynchophora of North Eastern America, p. 160.

1916. Listronotus floridensis Blatchley, in Blatchley and Leng, Rhynchophora of North Eastern America, p. 160.

1919. Listronotus floridensis Blatchley. Blatchley, Can. Ent. Vol. LI, p. 68.

1920. Listronotus floridensis Blatchley. Blatchley, Jr. N. Y. Ent. Soc., Vol. XXVIII, p. 163.

1920. Listronotus appendiculatus (Boheman). Leng, Catalogue of the Coleoptera of America, North of Mexico, p. 316.

1920. Listronotus floridensis Blatchley. Leng, Catalogue of the Coleoptera of America, North of Mexico, p. 317.

1925. Listronotus appendiculatus (Boheman). Blatchley, Jr. N. Y. Ent. Soc., Vol. XXXIII, p. 92.

1926. Listronotus leucozonatus Chittenden, Jr. N. Y. Ent. Soc., Vol. XXXIV, p. 92.

1928. Listronotus leucozonatus Chittenden. Blatchley, Jr. N. Y. Ent. Soc., XXXVI, p. 241.

1928. Listronotus floridensis Blatchley. Blatchley, Jr. N. Y. Ent. Soc., XXXVI, p. 242.

1928. Listronotus appendiculatus (Boheman). Leng, Cornell Univ. Agri. Exp. Sta., Memoir 101, p. 495.

1929. Listronotus impressus Van Dyke, Pan-Pacific Entomologist, V, p. 106.

1931. Listronotus appendiculatus (Boheman). Schenkling and Marshall, in Junk, Coleopterorum Catalogus, Subfam. Cylindrorrhininae, Pars 114, p. 11.

1931. Listronotus floridensis Blatchley. Schenkling and Marshall, in Junk, Coleopterorum Catalogus, Subfam. Cylindrorrhininae, Pars 114, p. 11.

1931. Listronotus leucozonatus Chittenden. Schenkling and Marshall, in Junk, Coleopterorum Catalogus, Subfam. Cylindrorrhininae, Pars 114, p. 12.

1931. Listronotus impressus Van Dyke. Schenkling and Marshall, in Junk, Coleopterorum Catalogus, Subfam. Cylindrorrhininae, Pars 114, p. 11.

1933. Listronotus leucozonatus Chittenden. Leng and Mutchler, Second Supplement to Catalogue of the Coleoptera of America, North of Mexico, p. 49.

1937. Listronotus appendiculatus (Boheman). Bleasdell, Ia. St. Coll. Jr. Sci., Vol. XI, No. 4, p. 416.

Original description. "Oblongus, piceus, dense griseo-squamosus, antennis pedibusque ferrugineis, rostro crassiusculo, medio obsolete uni-carinato; thorace confertim punctulato; elytris obsolete punctato-striatis, interstitiis sub-setosis, apice spina incurva auctis.

"Patria: Pensylvania orientalis. A Dom. Zimmermann Benevole communicatus. Mus. Schh.

"Magnitudo Phytonomi suspiciosi. Caput rotundatum, convexum, confertim punctulatum, piceum, squamulis parvis, rotundatis, fusco-cupreis vestitum; oculi laterales, oblongi, nigri, haud prominuli; rostrum thorace vix longius, validum, parum arcuatum, confertim punctulatum, in medio obsolete et tenue carinatum, indumento capitis. Antennae ad apicem rostri insertae, longiusculae, ferrugineo-piceae, parce pilosae, clava ovata, acuminata. Thorax latitudine media longior, apice late et profunde emarginatus, lobis ocularibus valde productis, obtuse rotundatis intra apicem leviter constrictus et transversim impressus, lateribus nonnihil rotundato-ampliatus, basi parum profunde bi-sinuatus, supra modice convexus, confertim punctatus, dorso carinula antice psticeque abbreviata, valde obsoleta instructus; obscure ferrugineus, dorso parcius lateribus et subtus squamositate densa, grisea, tectus. Scutellum rotundatum, griseo-squamosum. Elytra oblonga, antice conjunctim leviter emarginata, thoracis basi dimidio latiora, pone basin rotundato-ampliata, humeris parum elevatis, versus apicem attenuata, apice sing-

ulatim spina brevi, valida, incurva, aucta, thorace quadruplo longiora, supra modice convexa, obsolete punctato-striata, interstitiis sub-planis; picea, squamositate densa grisea tecta, setulisque brevibus adspersa; intra apicem singuli elytri callus parum elevatus observatur. Pygidium occultatum. Corpus subtus confertim punctatum, piceo-ferrugineum, squamulis sub-cupreo-micantibus parce adspersum, segmentum anale ventris apice truncatum. Pedes mediocres, validi, ferruginei, parce cinereo-squamulosi; femoribus clavatis, muticis; tibiis teretibus, sub-rectis; tarsis modice dilatatis, subtus brunneo-spongiosis.--Bhn."

Additional description. Length 4.2 to 7 mm. Elongate-oblong. Color reddish brown, elytra usually with small black markings near the middle on the second and third intervals, sometimes extending obliquely forward to the humeri. Rather thinly clothed with small testaceous scales which may become imbricated on the posterior half of the elytra. A narrow median and a broader irregular sub-lateral vitta on the disk of the prothorax of lighter scales. Posterior third of elytra often thickly clothed with the same lighter scales, or sometimes the lighter marking confined to a spot at the beginning of the declivity between the third or fourth intervals, the declivity being covered with darker scales. Beak moderately thick, slightly curved on upper surface; slightly longer than prothorax; median carina fine, sometimes obsolete

except at apex; sometimes with portion of beak between lateral carinae slightly concave to point of insertion of antennae; supper surface finely punctate, thinly clothed with very narrow scales. Head convex, densely punctate, clothed with very narrow scales; frontal fovea distinct. Antennae moderately stout; second segment of funicle nearly twice as long as first; third to seventh segments rounded. Prothorax slightly wider than long; ocular lobes prominent; sides slightly rounded, somewhat constricted at apex; disk densely and moderately coarsely punctate; scales larger than those of elytra, with a few narrow scales intermixed; disk sometimes with a fine median carina which may, however, sometimes be rather prominent; this carina abbreviated at base and apex. Scutellum elongate. Elytra slightly arcuate at base; humeri rounded; striae fine, their punctures coarse and close-set; first two intervals depressed around scutellum, the strial punctures very coarse in this region; intervals flat or very slightly convex; setae very short, not conspicuous. Ventral surface with metathoracic sternum and third and fourth abdominal sterna usually black or rufo-piceus; densely, moderately punctate; partially clothed with slender setae except for a few rounded scales on the sides of the metathoracic sternum and third and fourth abdominal sterna. Male with third and fourth abdominal sterna broadly concave at middle; elytra conjointly rounded. Female with third and fourth abdominal sterna convex; seventh sternum unmodified;

tips of elytra normally prolonged into short, slender, parallel, cylindrical processes. The processes of the elytra are variable in their extent of development, sometimes being very short and occasionally entirely absent.

Notes on synonymy. This species has a wide distribution and displays a great deal of variation. Several synonyms have been created as a result of this variation. Listronotus floridensis Blatchley, Listronotus leucozonatus Chittenden, and Listronotus impressus Van Dyke are now to be considered as synonyms of Listronotus appendiculatus (Boheman). Type material of all these names has been studied. The conclusions in regard to synonymy have been formed only after careful examination of the types and long series of specimens. A very few individuals can be segregated into what might appear at first to be different species. By studying additional specimens, however, intermediate forms are found, and it is impossible to find any character or set of characters which will serve to separate even the majority of the specimens into groups.

Notes on types. The type of L. appendiculatus (Boheman) is in the Museum at Stockholm, Sweden, and has been examined. It is a female and was collected in Pennsylvania.

The type specimen and type series of L. floridensis Blatchley have been examined. These specimens are in the

greater part of the abdominal sterna black.

Biological notes. Beutenmuller (1890 and 1893) gives the following note concerning this species: "Mr. F. M. Chittenden found L. tuberosus, L. caudatus and L. appendiculatus while sweeping a small patch of aquatic plants composed entirely of Sagittaria and a species of Carex. L. appendiculatus, it is said, was found by Mr. William Julich breeding in the lower parts of the stems of some species of reed." Webster (1894) recorded it as attacking cabbage in Ohio, gouging out cavities in the stems of young plants and later attacking the bases of the larger leaves. Smith (1910) records this species from New Jersey, stating that it was commonly taken in winter by sifting. Blatchley (1919), using the name L. floridensis Blatchley, records the species as having been taken in numbers on March 2, from flowers of Sagittaria. Blatchley (1928), again using the name L. floridensis Blatchley, says, "This has proved to be a common species throughout southern Florida, scores having been taken at Royal Palm Park in April on flowers of arrow-head along the margins of the everglades." The specimens described by Van Dyke (1929) were taken from rice paddies in California.

The species has been taken in August at Waldoboro, Maine, on Sagittaria latifolia. It was bred from Sagittaria by Criddle at Treesbank, Manitoba. At Creston, British Columbia, it was taken on Sagittaria arifolia and on flood

debris, the altitude being given as 1750 feet. It was taken on Chelone glabra by D. H. Blake at Stoughton, Mass. It was taken on Nelumbo in Texas. Darlington found it in late March at Arlington, Massachusetts, in moss roots. It has been taken in Louisiana and the District of Columbia at light.

Data on distribution. L. appendiculatus (Boheman) has a wide distribution, being found in Canada from Quebec to British Columbia and in the United States throughout all the eastern and central, and part of the western states. The lack of records from the western states may be due to lack of material from that region rather than the absence of the species, since it has been seen from Wyoming, British Columbia and California. Specimens examined were as follows:

UNITED STATES

Maine: 11

Portland, Me., IX-'02; Waldoboro, Me., Aug., on flws. of Sagittaria latifolia.

New Hampshire: 4

Rumney, N. H., 18-VII-1930, Quirsfeld.

Massachusetts: 30

Mass.; Dorchester, Mass., Jul.9.1903, Jul.11.1903, Jul.25. 1903; Brookline, Mass.; Chicopee, Mass., July 13,'96 and July 22,'96; Stoughton, Mass., D. H. Blake, Collected on Chelone glabra; Berlin, Mass., VIII-4-1935, C. A. Frost; Tyngsboro, Ms.; Low., Mass.; Northfield, Mass., Aug.30.98; Arlington, Mass., III-26-26, Darlington, moss roots.

Connecticut: 1

Hamden, Ct., 25 Sept.1921, B. H. Walden.

New York: 39

N. Y.; New York, N. Y.; N. Y. City & vcty.; Warren Co., N. Y., 8.8.91; Ithaca, N. Y.; Ithaca, N. Y., Chittenden Collector; Ithaca, N. Y., July 1/84; Ithaca, N. Y., 24 Mar.97; Ithaca, N. Y., 27 July, '94; Wash. Co., N. Y.; Staten Is., N. Y., 8/23/13, on Sagittaria.

New Jersey: 32

N. J.; Newark, N. J., VII.4; Irvington, N. J., III-15, XI-7; Camden, N. J., III-3, XI-23 and 12-12; Slt. Mdows., N. J.; Milburn, N. J.; "Upper" Montclair, N. J., VI.4.1922, A. Nicolay Collector; Mchtville., N. J., 3.11; Elizabeth, N. J., XI.29; Westville, N. J., 11.25, H. A. Wenzel Collector; Gloucest. Co., N. J., IV.24, H. W. Wenzel Collector.

Pennsylvania: 6

Allegheny, Pa.; Greentown, Pa., 21-VII-1926, Quirsfeld; Pennsylv. orient., Zimmermann.

Maryland: 2

Md.; Hilld Brdg., Patuxent Riv. Md., June 26, '24, H. S. Barber.

District of Columbia: 10

D. C.; Washington, D. C. Je.27.06, I. J. Condit Collector; Wash., D. C., VII-12-23, J. R. Greeley, at light; Eastern Branch, Washington, D. C., 25 Oct., '21, H. S. Barber; Washgtn., D. C.; Wash. D. C., 3-3-1923, H. S. Barber; Washington, D. C., VI-20-23, J. H. Greeley Coll., at light;

Washington, D. C., 24-7-07, 30-7, W. L. McAtee Collector; Washington, D. C., 27-VI-13, W. L. McAtee Collector, at light.

Virginia: 4

Va.; Rosslyn, Va.

Georgia: 3

Ga.

Florida: 46

Fla.; Crescent City, Fla.; Dunedin, Pinellas Co., Fla., II-27-1925; Kissimmee, Fla.; Lake Kissimmee, Fla., Bufo 1384; L. Kissimmee, Fla., Bufo 1392; Dunedin, Florida, II.19.1926, Blatchley; Dunedin, Fla., III-16-'25, W. S. B.; Homestead, Fla., June,1929, Darlington; Brighton, Fla., Okeechobee, June 16,1929, Darlington; Bell Glade, Fla., 22-23 March,'27, M. D. Leonard Coll.; Paradise Key, Fla., Mrch.10-18, E. A. Schwarz; Lake Maggorie, Fla., 4-2-23, E. M. Craighead Collector; Big Bayou, Fla., 3-5-23, E. M. Craighead Collector.

Alabama: 3

Mobile Co., Ala., H. P. Loding.

Louisiana: 75

La.: N. Orleans, La., 10/6, 12/6; N. Orleans, La., 26.X.91, 30.V.95, and 6.7.95; Gueydan, La., June 20,1925, June 25,1925, June 26,1925, June 28,1925, July 11,1925, July 28,1925, Aug.3,1925, Aug.7,1925, VI,15-16,'25, VI, 25-26,'25, E. Kalmbach, at Light; Morgan Cy., La., Wickham; Dundee, L., VII-4-03.

Mississippi: 3

Gulf View, Miss., 20.III.92.

Ohio: 3

Ohio.

Indiana: 1

Marion Co., Indiana, VII-14-1924, Blatchley.

Illinois: 1

Peoria, Ill., Aug.11,'95.

Michigan: 30

Oakland Co., Michigan, VII-15-1928, A. W. Andrews; Monroe, Mich.; Detroit, 23 Jun.; Mich.; Detroit, Mich.; Det., Wint.; Cheboygan Co., Mich., 6.30.1934 and 8.2.1934, H. B. Hungerford; Cheboygan Co., Mich., 7-24-1936, David M. Gates.

Wisconsin: 4

Cranmoor, Wood Co., Wis., VI-23-07, C. B. Hardenberg; Trempelean, Wis., July 5,'27, F. M. Uhler; Victory, Wis., July 29, 1927, F. M. Unler.

Minnesota: 2

Red Wing, Minn., VII,13-21,'26, F. M. Uhler.

Iowa: 18

Ia.; Iowa; Sioux City, Ia., 25.III.89; Iowa City, IV.5.00, Wickham; Lake Okoboji, Ia., July 22,1917, July 23,1917, and July 24,1917, L. L. Buchanan; Lansing, Ia., Aug. 14,1929, F. M. Uhler; Iowa, Bufo 2052 (Lost Island Lake, Clay County, Iowa, A. G. Ruthven, July 26,1918); Milford, Ia., Bufo am. 2002 (July 3,1920, F. N. Blanchard).

Kansas: 1

Kan., T. B. A.

Missouri: 1

St. L., Mo.

Texas: 6

Tex.; Texas; N. Braunfls. Tx., 17 May,06, F. C. Pratt Collector, on Nelumbo; S. Diego, Tex., 25.5.

Wyoming: 1

Cheyenne, Wyo., 21.IV.89.

California: 3

Oroville, Cal., VII-12-1926, H. H. Keifer Collector; Williams, Colusa Co., Cal., XI.9.28, Collected from Rice Paddies; Colusa Co., Cal., XI-30-28, Williams, H. H. Keifer Collector, Collected from paddy rice.

CANADA

Quebec: 3

Kazubazua, Que., 18-viii-'31, W. J. Brown.

Ontario: 12

Ont.; Trenton, Ont., Can., 27.VI.11, Evans; Toronto, Can., V.1, V-30, R. J. Crew; Belleville, Ont., Can.

Manitoba: 11

Aweme, Manitoba, VII.21.11, E. Criddle, Sagittaria variabilis; Treesbank, Man., 16.IX.1925, N. Criddle, Bred from Sagittaria.

British Columbia: 6

Creston, B. C., 12.VIII.1933, G. Stace Smith, on Sagittaria

arifolia, 1750 ft.; Creston, B. C., 29.X.1933, 4.XI.1933, and 11.XI.1933, G. Stace Smith, On flood debris, 1750 ft.

Listronotus insignis new species

Plate III, Fig. 5.

Length 4.5 to 6 mm. Oblong, dark reddish-brown to piceous; rather thinly clothed with dull brown scales which are larger on the prothorax; with a broad curved transverse band of light yellow-brown scales at the beginning of the declivity of the elytra, the declivous portion of the elytra behind the light marking covered with chocolate-brown to black shining scales; prothorax with a very narrow median vitta and broad lateral vittae of light brown scales. Beak short, stout, about as long as prothorax; median carina very prominent, sharp and smooth, ending at point of insertion of antennae; lateral carinae usually rather sharp and strongly developed; lateral sulci deep; apical portion finely punctate, basal portion very coarsely and rugosely punctate; clothed only with very short slender setae. Head slightly convex; very coarsely and rugosely punctate; with short slender setae; frontal fovea large and deep. Antennae moderately slender; second segment of funicle one-half longer than first; third to seventh segments rounded. Prothorax one-sixth to one-fifth wider than long; ocular lobes prominent; sides nearly parallel, slightly constricted at apex; disk very coarsely and cribrately punctate, the scales scarcely covering the punctures; some of the punctures bearing short stout setae. Scutellum small, depressed;

with a few very small dirty white scales. Elytra rather stout; base broadly emarginate; humeri rounded; sides nearly parallel to apical fourth, then narrowed to the conjointly rounded apices; striae not at all impressed, coarsely and distantly punctate; intervals slightly convex, the first and third sometimes more strongly so; the setae very short and inconspicuous on basal two-thirds, slightly longer and stouter on the apical third. Ventral surface sparsely, very coarsely and deeply punctate; seventh abdominal sternum more finely and densely punctate; lower surface with only a very few rounded scales on the sides of the metathoracic sternum and the third and fourth abdominal sterna, mostly with very short inconspicuous setae. Legs slender, posterior femora with a pre-apical band of light scales, sometimes with a yellowish or metallic greenish cast; inner margin of all the tibiae with small, sharp, distinct teeth, apical mucrones rather long and sharp. Male with third and fourth abdominal sterna flat or very slightly concave; seventh sternum rather broadly and feebly convex through the middle. Female with third abdominal sternum slightly convex; seventh sternum with a feeble sub-lateral concavity on each side and with a broad convexity at the middle, this convexity marked by a rather deep median triangular depression at the apex; seventh tergum broadly and shallowly emarginate.

Notes on types. Holotype male, "Paradise Key, Fla., 23.2.1919, E. A. Schwarz." Allotype female, "Paradise Key, Fla., Feb. 28." Twenty-one paratypes as follows: 1 female, "Paradise Key, Fla., Feb. 21"; 1 male, "Paradise Key, Fla., Feb. 22, 1919, A. Wetmore Collector"; 2 females, "Paradise Key, Fla., Mar. 2.19, H. Barber Collector"; 1 male, "Paradise Key, Fla., Mar. 9"; 1 male, "Royal Palm Park, Fla., 2-26-29, W. S. B. "; 1 male, 1 female, "Fla."; 1 male, "Enterprise, Fla., 16.5, Coll. Hubbard & Schwarz"; 1 female, "Homestead, Fla., Feb. 28, 1918, A. Wetmore Collector, at light"; 1 female, "Lake Iamonia, Fla., 5-12-16, W. D. Pierce Collector"; 3 males, 6 females, "Lake Kissimmee, Fla., E. A. Mearns"; 1 male, "Kissimmee River, Fla., E. A. Mearns."

Holotype and allotype in United States National Museum. Paratypes in the United States National Museum, Francis Huntington Snow Entomological Collections, and the Blatchley Collection at Purdue University.

Remarks and comparative notes. This species is closely related to L. oregonensis (LeConte), but may be distinguished from it by the more strongly carinate and sulcate beak; the coarsely and rugosely punctate head; the large cribrate punctures of the disk of the prothorax, and the absence of tubercles; the characteristic marking of the apical portion of the elytra; the more coarsely punctate

ventral surface; and the modification of the seventh abdominal sternum of the female. The eighth sternum of the female and the internal genitalia of the male are quite different in the two species.

Biological notes. A number of specimens of this species have been taken from the stomachs of Bufo terrestris at Lake Kissimmee, Florida. The species has also been taken at light on February 28, at Homestead, Florida.

Data on distribution. Known only from Florida.

Listronotus oregonensis (LeConte) 1860

Plate III, Fig. 9.

1860. Listroderes oregonensis LeConte, Explorations and Surveys for a Railroad Route from the Mississippi River to the Pacific Ocean. Route Near the 47th and 49th Parallels, XII, pt. 3, p. 55.

1871. Listroderes oregonensis LeConte. Gemminger and Harold, Catalogus Coleopterorum, VIII, p. 2360.

1873. Listroderes oregonensis LeConte. Crotch, Check List of the Coleoptera of America, North of Mexico, p. 118.

1876. Listronotus oregonensis (LeConte). LeConte, Proc. Am. Phil. Soc., XV, p. 133.

1876. Listronotus latiusculus LeConte, nec Boheman, Proc. Am. Phil. Soc., XV, p. 134.

1876. Listronotus impressifrons LeConte, Proc. Am. Phil. Soc., XV, p. 134.

1877. Listronotus latiusculus LeConte, nec Boheman. Popenoe, Trans. Kans. Acad. Sci., V, p. 39.

1902. Listronotus latiusculus LeConte, nec Boheman. Chittenden, U. S. D. A. Yearbook, p. 731.

1903. Listronotus latiusculus LeConte, nec Boheman. Ulke, Proc. U. S. N. M., XXV, p. 33.

1909. Listronotus latiusculus LeConte, nec Boheman. Chittenden, U. S. D. A., Bur. Ent. Bull. 82, Pt. 2, pp. 14-19, figs. 3a, 3b, 3c, 3d, 4.

1914. Listronotus latiusculus LeConte, nec Boheman. 13th Rept. St. Ent. Conn., p. 252, Pl. XI, b.

1916. Listronotus latiusculus LeConte, nec Boheman. Blatchley and Leng, Rhynchophora of North Eastern America, p. 161, fig. 61.

1916. Listronotus impressifrons LeConte. Blatchley and Leng, Rhynchophora of North Eastern America, p. 163.

1916. Listronotus rudipennis Blatchley, in Blatchley and Leng, Rhynchophora of North Eastern America, p. 162.

1920. Listronotus latiusculus LeConte, nec Boheman. Britton, Conn. Geol. and Nat. Hist. Surv., Bull. 31, p. 283.

1920. Listronotus oregonensis (LeConte). Leng, Catalogue of the Coleoptera of America, North of Mexico, p. 317.

1920. Listronotus latiusculus LeConte, nec Boheman. Leng, Catalogue of the Coleoptera of America, North of Mexico, p. 316.

1920. Listronotus impressifrons LeConte. Leng, Catalogue of the Coleoptera of America, North of Mexico, p. 317.

1920. Listronotus rudipennis Blatchley. Leng, Catalogue of the Coleoptera of America, North of Mexico, p. 317.

1922. Listronotus latiusculus LeConte, nec Boheman. Hayes, Trans. Kans. Acad. Sci., XXX, 2, p. 207.

1924. Listronotus latiusculus LeConte, nec Boheman. Chittenden, Bull. Brook. Ent. Soc., XIX, pp. 84-86, fig.

1926. Listronotus latiusculus LeConte, nec Boheman. Chandler, Jr. Econ. Ent., XIX, pp. 490-494.

1926. Listronotus rudipennis Blatchley. Harris, Jr. Econ. Ent., XIX, pp. 494-496, pl. 7.

1927. Listronotus latiusculus LeConte, nec Boheman. Boyce, Jr. Econ. Ent., XX, pp. 814-821, fig. 39.

1927. Listronotus latiusculus LeConte, nec Boheman. Britton, Conn. Agri. Exp. Sta., Bull. 285, p. 173.

1928. Listronotus latiusculus LeConte, nec Boheman. Leng, Cornell Univ. Agri. Exp. Sta., Memoir 101, p. 495.

1931. Listronotus oregonensis (LeConte). Schenkling and Marshall, in Junk, Coleopterorum Catalogus, Subfam. Cylindrorrhininae, Pars. 114, p. 12.

1931. Listronotus latiusculus LeConte, nec Boheman. Schenkling and Marshall, in Junk, Coleopterorum Catalogus, Subfam. Cylindrorrhininae, Pars. 114, p. 12.

1931. Listronotus impressifrons LeConte. Schenkling and Marshall, in Junk, Coleopterorum Catalogus, Subfam. Cylindrorrhininae, Pars. 114, p. 11.

1931. Listronotus rudipennis Blatchley. Schenkling and Marshall, in Junk, Coleopterorum Catalogus, Subfam. Cylindrorrhininae, Pars. 114, p. 12.

1932. Listronotus latiusculus LeConte, nec Boheman. Buchanan, Bull. Brook. Ent. Soc., XXVII, pp. 7-8.

1933. Listronotus latiusculus LeConte, nec Boheman. Britton, Conn. Agri. Exp. Sta., Bull. 344, p. 137.

1935. Listronotus latiusculus LeConte, nec Boheman. Shropshire and Compton, Ill. Agri. Coll. Exp. Sta. and Ext. Serv., Circ. 437.

1935. Listronotus rudipennis Blatchley. Shropshire and Compton, Ill. Agri. Coll. Exp. sta. and Ext. Serv., Circ. 437.

1937. Listronotus latiusculus LeConte, nec Boheman. Bleasdell, Iowa St. Coll. Jr. of Sci., XI, 4, p. 416.

1938. Listronotus latiusculus LeConte, nec Boheman. Pepper and Hagmann, Jr. Econ. Ent., XXXI, pp. 262-266.

Original description. "Niger oblongus, sordide squamosus, rostro thorace vix breviore, confertim punctato et rugoso, subtiliter carinato, capite confertim punctato, thorace grosse confertissime punctato, latitudine vix breviore, lateribus rotundatis, antrorsum angustato ad apicem transversim paulo impresso, elytris thorace latioribus ad basin truncatis, latitudine sesqui longioribus, humeris paulo rotundatis, striis punctatis, interstitiis confertim punctulatis; antennis nigris, articulo 3io secundo fere duplo longiore. Long. "27; lat. elytrorum "11.

"One specimen, Shoalwater Bay, Dr. Cooper. The scales are nearly all removed by the spirits in which it was preserved."

Additional description. Length 4.5 to 7 mm. Body black. Scales dark brown, light brown, or with a metallic coppery tinge in some specimens; scales impricated on elytra but not on prothorax; occasionally a faint indication of a lighter median longitudinal vitta and two sublateral vittae on the prothorax; elytra sometimes without markings, other times with varied amounts of mottlings of darker scales which become almost black in some individuals. Beak rather variable; as long as or slightly longer than the prothorax; always with a median carina which may be feeble or very sharp; lateral carinae sometimes rather prominent; upper surface finely, densely, somewhat rugosely punctate; clothed with slender setae. Head convex, densely punctate; frontal fovea distinct. Antennae with second segment of funicle not quite twice as long as first; third rounded, not longer than fourth and not as long as first. Prothorax one-sixth to one-fifth wider than long; sides usually strongly rounded, sometimes slightly constricted at apex; ocular lobes not very strongly developed; disk of prothorax rather roughly sculptured, densely punctate with rather coarse punctures covered by large striate scales, the intervals between the punctures with numerous tubercles, each bearing a stout seta inserted in a small puncture on its dorsal surface; disk of prothorax usually with a feeble median longitudinal impression which is more distinct toward the base and apex than at the middle. Elytra rather stout; very slightly emarginate at base; hum-

eri rounded; sides parallel to apical third, then broadly rounded to apex, which is rather blunt, or sub-truncate; striae slightly impressed, the punctures small, closely placed, each bearing a tiny seta; intervals flat or slightly convex, the first two slightly depressed around the scutellum, the third usually more strongly convex at base; each interval with a row of short setae which are a little longer and very slightly clavate toward the apex of the exytra. Ventral surface densely, moderately punctate; sides of metasternum with a few rounded scales, the remainder of the ventral surface clothed only with slender setae. Male with third and fourth abdominal sterna broadly and feebly concave at middle. Female with third abdominal sternum slightly convex; seventh sternum unmodified.

Notes on synonymy. The Listronotus latiusculus of American authors is L. oregonensis (LeConte). The type of Listroderes latiusculus Boheman has been examined and is a member of the genus Hyperodes. Under the name of Listronotus latiusculus (Boheman), LeConte, in 1876, says, "I refer this name to a species which occurs in the Middle and Southern States, and is by no means rare." This statement is followed by a description of the species which must be known as Listronotus latiusculus LeConte, nec Boheman, since it does not refer to Boheman's latiusculus. Listronotus latiusculus LeConte is a synonym of Listronotus oregonensis

(LeConte), both names having been proposed for the same species. The latter name has priority by sixteen years. The type of Listroderes oregonensis LeConte has been examined, as has also the series of specimens on which the name Listronotus latiusculus LeConte is based.

In 1876 LeConte described Listronotus impressifrons. The types of this species have been examined and L. impressifrons LeConte is found to be a synonym of L. oregonensis (LeConte).

Blatchley described Listronotus rudipennis in 1916. Buchanan (1932) placed L. rudipennis Blatchley as a synonym of L. latiusculus (Boheman), at the same time expressing the opinion that there was some doubt as to whether L. latiusculus (Boheman) was the proper name for the species. He also suggested that if an examination of the type of Listroderes latiusculus Boheman showed that the name had been erroneously applied to the species in question, the name L. rudipennis Blatchley would become available. I have examined the type of L. rudipennis Blatchley and agree with Buchanan's conclusions regarding the synonymy of that species. I have also found as was suspected by Buchanan, that the name latiusculus Boheman cannot be applied to this species. However, an examination of the type of L. oregonensis (LeConte) shows that it is the same species to which the name L. rudipennis Blatchley was applied, and since L. oregonensis (LeConte) was the first name applied to the species, it has priority over all others.

Notes on types. The type of L. oregonensis (LeConte) is in the LeConte Collection in the Museum of Comparative Zoology at Harvard College. It is a female specimen and bears a blue disk indicating that it was taken in Oregon. The scales are nearly all gone, and the left elytron is broken from the body and mounted on a point on the pin beneath the body. There is a slight indication of the median thoracic impression mentioned by LeConte, but the appearance of the deepness of the impression is emphasized by the presence of some light scales at the bottom of the depression. These scales are the remnant of the lighter colored median vitta and were not rubbed off because they were protected by their location on the concave surface of the depression.

The types of L. impressifrons LeConte, and the specimens to which the name L. latiusculus LeConte, nec Boheman was applied are also in the LeConte Collection at Harvard College.

The type of L. rudipennis Blatchley is in the Blatchley Collection at Purdue University.

The type of Listroderes latiusculus Boheman is in the Zoologisches Institut at Halle, Germany.

Notes on biology. The first mention of any biological information concerning this species was by Popenoe (1877). He says that the species was common at Topeka, Kansas, and that it was found under stones in the spring, and was taken

on Peucedanum faeniculaceum. Specimens taken by Popenoe at Topeka, Kansas, have been examined.

The first known mention of the species causing any economic damage was made by Chittenden (1902) when he reported that it was discovered by Mr. F. C. Pratt, injuring parsley in Virginia. Some of the specimens taken from the roots of parsley by Mr. Pratt at Four Mile Run, Virginia, have been examined. Chittenden (1909) later reported on the life history and habits of the species.

Britton (1914) reported the "parsley stalk weevil" as causing damage to parsley in cold frames in Connecticut.

Chittenden (1924) again published on the "parsley weevil," reporting damage which it had caused to carrots in New York and Washington, D. C. Some of the specimens which he mentions from Astoria, Long Island, New York, have been examined as have also some of those which he mentions as having been so abundant on parsley in Washington, D. C., in 1916. In this article Chittenden points out several times that these weevils were doing damage in dry soil, then says, "....it would naturally appear that the original supposition that this species was semiaquatic and that the attack to cultivated plants was accidental rather than otherwise should be modified. It is evident that we now have to deal with a species which is liable to be injurious to carrots or parsley at almost any time and place in its rather wide distribution." At the end of the article he says, "There would naturally be some slight doubt as to whether the species reared by Dr. C. M. Weed in Ohio from Sagittaria is the same as the one under

discussion." The source of confusion here has been due to the face that Hyperodes solutus (Boheman), reared from Sagittaria by Weed, was determined as L. latiusculus (Boheman). When the true L. oregonensis (LeConte), the L. latiusculus of American authors, was found living in parsley and carrots in comparatively dry ground, the contrast with the supposed semi-aquatic habits of the species presented a perplexing situation.

Chandler (1926) reports serious damage to carrots in Illinois by this species and says that it is apparently single brooded in Illinois.

Using the name L. rudipennis Blatchley, Harris (1926) gives a report of damage to carrots in Iowa by this species. A short discussion of the life history is given and there are brief descriptions of the egg, adult, and habits of the adult. Harris states that there are probably three generations a year, and that hibernation is apparently in the adult stage.

Boyce (1927) discusses the serious damage caused to carrots by this weevil in the market gardens on Long Island, New York. His report of the life history covers one season's study and is the most comprehensive that has been published. For a detailed description of the egg, larva, pupa, and adult, see page 816 of Boyce's paper. A discussion of the life history is given on pages 816 to 819. Boyce (1927, pp. 814, 815, and 819) assumes that the species has changed its host plant and oviposition habits, but this is not the case; the

previous records involving Sagittaria as a host plant, as has been pointed out before, are based on another species of weevil. During the course of the study, adults were reared from larvae taken from carrot, wild carrot (Daucus carota L.), curled-leaved parsley, hymicha (Hamburg parsley, Apium petroselinum L.), and dill (Anethum graveolens L.). Three generations with overlapping broods were found to develop on Long Island.

Pepper and Hagmann (1938) report the carrot weevil as a pest of celery in New Jersey. They found three generations developing on celery in New Jersey. A brief discussion of the life history is given. A study was made of the food plants of the weevil. In addition to the plants mentioned by Boyce (1927), adults were reared from larvae in the following plants; celery (Apium graveolens L.), broad leaf plantain (Plantago major L.), and patience dock (Rumex patientia L.). The following is quoted from Pepper and Hagmann (1938, p. 263): "Large numbers of arrowhead plants (Sagittaria variabilis) which grow along the drainage ditches in the celery fields were carefully dissected and no signs of grubs or their injury were present in these plants. This is contrary to the findings of Weed (1889) and others. Our survey, however, does not prove that L. latiusculus never attacks the arrowhead plant."

Although Pepper and Hagmann (1938) make the first report of the carrot weevil causing damage to celery, I have seen specimens from Kalamazoo, Michigan, taken in May,

1934, which had been injuring newly set celery. Specimens reared from celery at Hackensack, New Jersey, have also been examined.

There is another host plant to be recorded for L. oregonensis (LeConte). Specimens have been examined from Biloxi, Mississippi, bearing the Truck Crop Number 1159, which had been collected by M. M. High on turnip. The extent of feeding or damage, if any, is not known to me.

A specimen of L. oregonensis (LeConte) has been examined which had been reared from carrot by Satterthwait at Webster Groves, Missouri. The species had been determined by him as L. sordidus (Gyllenhal) and was recorded as such under the Webster Groves Number 20549.

Harris (1926, p. 495) says that although the adults possess well developed wings and are apparently able to fly, no individual was ever observed to attempt to do so, but when disturbed would fall to the ground and lie motionless for a few moments before crawling away. Boyce (1927, p. 819) says, "The beetles have never been observed in flight although they have fully developed wings. An examination of their wings furnishes some evidence that they do not fly except under the most favorable conditions, as the wings appear to be inadequate to efficiently support in flight a body of such size. A study of the infestations also indicates that they do not fly actively, since they were found only in carrots planted on soil that was infested the previous year." Pepper and Hagmann (1938, p.

264) say, "As reported by Boyce (1927) and others, the adults are sluggish and invariably feign death when disturbed. There is no record in the literature of beetles having been observed in flight; however, the senior author has observed them on the wing. Four specimens which flew in the windows of a moving automobile were captured. Two adults were captured while in flight. From the above observations they seem to be poor fliers. Although the beetles fly, it is doubtful whether they migrate very far." Specimens have been seen which had been taken at light in New Jersey, District of Columbia, Montana, and Louisiana. I have taken specimens at Lawrence, Kansas, which had flown to lights, but from what distance they had come is not known.

Data on distribution. This species has a rather general distribution over most of the United States. Specimens have not been seen from the southwestern states, but the species may be present there. Material has been examined from the following localities:

UNITED STATES

New Hampshire: 1

Exeter, N. H., VI.24.24.

Massachusetts: 13

Cambridge, Mass., S. Henshaw; Nantucket, Mass., VIII.21.26, C. W. Johnson Collector; Framingham, Mass., C. A. Frost; Chicopee, M., May,31,95, June 30,95, and June 9.96; Chicopee, Mass.

Rhode Island: 3

Watch Hill, R. I., July 2,1909, W. Robinson; Providence, R. I., IV-21-12, J. Nylen.

Connecticut: 1

Kent, Ct., VII-4-1925, C. A. Frost.

New York: 42

N. Y.; N. Y. City & vcty.; Buffalo, N. Y.; West Point, N. Y., May 5,1907 and May 21,1910, W. Robinson; L. I.; Rochester, N. Y., 18 Je.'32; Astoria, L. I., Agu.1923, in carrot; Valley Stream, N. Y., 7/8/30, Reared ex. larvae in carrots; Long Beach, L. I., VI-16; Far Rockaway, L. I., 7/5/04; Babylon, N. Y., June 21,1892 and June 30,1892, G. D. Bredford; Charlotte, N. Y., 20.VI.1907, J. L. Zabriskie; Baren Is., L. I., 4.VII,1891, J. L. Zabriskie; Olcott, N. Y., 4-27-1924, VII.6.1921 and VII.10.1921, H. Dietrich.

New Jersey: 33

N. J.; Orange, N. J., Je.5, Elec. light; No. Arlington, N. J., III-17; Slt. Mdows, N. J.; Arlington, N. J., III-17; Arlington Mdws., N. J., III.20.1926, A. Nicolay; Boonton, N. J., VI.6.01; Peermont, N. J., 6/28/96; Hackensack, N. J., 1937, reared from Celery; "Upper" Montclair, N. J., VI.28.1924, A. Nicolay; Woodbury, N. J., 5.22.'96; Hopatcong, N. J.; Atlant. Cy., N. J., V-15, H. W. Wenzel Collector.

Pennsylvania: 12

Frankford Pa.; Philadelphia, Pa., 6.18.97; Roxborough,

Pa., IV.23.10 and VI.18.10; Hummelstn., Pa., VI-8, J. N. Knull Collector; Germant'n., Pa., V-31, F. R. Mason: Bethlehem, Pa., IV.12.03, G. W. Caffrey Collector; Glenside, Pa., VI.17.06; Media, Pa., XII.24.'15, timothy, A. F. S.

District of Columbia: 13

D. C.; Washington, D. C., VI-22-'23, J. R. Greeley Coll., at light; Washington D. C., 6.28.16, M. T. Van Horn Collector, Collected on Parsely; Washgtn., D. C., 15.10; Washngtn., D. C., Jul.29-10, Bred from Carrot; Washington, D. C., 5/30/95, Electric light; Washington, D. C., June, 93; Washington, D. C., 19 June, 95, Chittenden Collector.

Virginia: 9

Four Mile Run, Va., 29 July,1902, at roots of parsley (Pratt); Four Mile R., Va., Sept.02, in roots of parsley; Falls Church, Va., VI.21.17; Rosslyn, Va., nr. Wash. D. C., Mar.23,'23, M. T. Van Horn Collector; Rosslyn, 18.3.1923, H. S. Barber.

West Virginia: 1

W. Sulphur, W. Va., July 3.1912, W. Robinson.

North Carolina: 1

N. C.

Georgia: 2

St. Simons Island, Ga., 19-VII-1931, Quirsfeld.

Florida: 20

Fla.; Dunedin, Pinellas Co., Fla., III-17-1925; Dunedin, Fla., 1-20-17, W. S. B. Coll.; Bell Glade, Fla., July,1926, M. D. Leonard, Coll.; Brighton, Fla., Okeechobee, June 16,

1929, Darlington; Winter Park, Fla., 1.29.29; Paradise Key, Fla., Mar.9, H. Barber Collector; Sanford, Fla., Feb.19-'27, F. M. Uhler; Belle Air, Fla.; Lake Kissimmee, Fla., Bufo 1387; Lake Kissimmee, Fla., Bufo 1434; Lake Kissimmee, Fla., Bufo 2301.

Alabama: 11

Baldwin Co., Ala., H. P. Loding; Mobile Co., Ala., V.4.20, H. P. Loding; Mobile Co., Ala., IV.9.18 and IX.28.18; Orchard, Ala., H. P. Loding; Magazine Pt., Ala., H. P. Loding.

Louisiana: 18

La.; N. Orleans, La., 14/3; Gueydan, La., June 20,1925, June 28,1925, July 1,1925, July 11,1925, and VI,25-26,'25, E. Kalmbach, At Light.

Mississippi: 8

Biloxi, Miss., 5-6-36, M. M. High Coll., Truck Crop N. 1159, on turnip.

Kentucky: 1

Frankfort, Ky., 6.9.89.

Ohio: 15

Cincinnatti, Oh., 14.VI.91; Springfield, O., 8.10.90; Put-in-Bay, O., Catamba Isl., C. H. Kennedy Collector; Put-in-Bay, O., VII-7-35, J. N. Knull Coll.; Put-in-Bay, O., VI-15-35, R. C. Osburn Coll.; Columbus, O., VII-20-35, J. N. Knull Coll.; Franklin Co., O., VI-28-35, D. J. Horror Coll.; Summit Co., Ohio, 6-19-1937 and 9-1-1937, Louis J. Lipovsky.

Indiana: 9

Ind.; Wolf Lake, Ind., VI.11.11, Col. by A. B. Wolcott.

Illinois: 18

N. Ill.; N. Ill., Webster; Cook Co., Ill., Col. & pres. by E. B. Chope; W. Pullman, Ill., V.10.03, Col. by W. J. Gerhard; Chicago, Ill., VI.14 and VII.13, Col.& pres. by W. J. Gerhard; Chicago, Ill., VI-6-18; Summit, Ill., Jun. 16,'06.

Michigan: 14

Detroit, Jun.; Detroit, Mich.; Kalamazoo, Mich., May,1934, injuring newly set celery; Washtenaw Co., Mich., VI-11-1921, M. H. Hatch; Washtenaw Co., Mich., Botan. gardens, Ann Arbor, VI-11-1919, T. H. Hubbell; Marquette, Mich., 27.6, 28.6, 4.7, 7.7, and 14.7; Harbert, Mich., Bufo am. 1984.

Wisconsin: 4

Granmoor, Wis., VI.18.10, C. W. Hooker Collector; Bayfld., Wis., Wickham.

Iowa: 38

Burlington, Iowa, July 18,1925, H. M. Harris, On Carrot; Burlington, Ia., 17.7.25, C. J. Drake, injuring Carrots; Iowa City, Wickham; Ames, Iowa, 9 June,1924; Spirit L., Ia., J. H. B.; Lake Okoboji, Ia., 7-3-'16 and VI-27-'16, L. Buchanan; Lake Okoboji, Ia., June 26,1917 and July 10, 1917, L. L. Buchanan; Lake Okoboji, Ia., VII-4-'16, Briggs; Lake Okoboji, Ia., VII-1-'16, Stoner; Ames, Iowa, V-27-'13, D. Stoner; Iowa, Bufo 2052; Milford, Ia., Bufo am. 1997.

Kansas: 30

Topeka, Ks., Popence; Ks., 4.15.73; Topeka, Kan., Fe., Popence; Topeka, Kans.; Kans.; Lawrence, Kansas, 5-24-33, L. S. Henderson, Trap Light; Lawrence, Kansas, 5-17-34, L. S. Henderson, At Light; Lawrence, Kansas, 7-11-33, M. W. Sanderson, At Light; Doug. Co., Ks., 5-26-34, C. M. Amyx.

Missouri: 3

vic'y., St. Joseph, Missouri, Feeding on Carrot; Webster Groves, Mo., 6.18.20, Reared from lv. in Carrot, Issued VII.1.20, Webster Grvs. No. 20549, Satterthwait Collector; Onyx, Mo., IX.

Oklahoma: 1

Delaware Co., Okla., July 11,1931, Costher & Davis.

North Dakota: 3

Mooreton, N. Dak., VII-24; University, N. D., June 15.96, R. P. Currie Collector.

South Dakota: 1

Brookings, S. D.

Montana: 1

Poplar, Mont., July 13,1922, C. C. Sperry Collector, Electric Light.

Idaho: 2

Coerd'Alene, Idaho, June, Wickham.

Oregon: 1

Portland, Oreg.

CANADA

Quebec: 4

St. Hilaire, Que., VI.34, C. Chagnon; Berthierville, P. Q., VI-30-21; Mt. St. Hilaire, Que., VI.09.

Ontario: 1

Belleville, Ont., Can.

Manitoba: 4

Aweme, Manitoba, VI.18.09 and VI.23.12, Criddle; Winnipeg, Man.

Listronotus oregonensis (LeConte)
subspecies tessellatus Casey 1895

1895. Listronotus tessellatus Casey, Coleop. Notices VI, Ann. N. Y. Ac. Sci., VIII, p. 828.

1920. Listronotus tessellatus Casey. Leng, Catalogue of the Coleoptera of America, North of Mexico, p. 316.

1931. Listronotus tessellatus Casey. Schenkling and Marshall, in Junk, Coleopterorum Catalogus, Subfam. Cylindrorrhininae, Pars 114, p. 113.

Original description. "Elongate-oval, strongly convex, black, the tibiae, tarsi, and antennae rufo-piceous; scales very dense, rounded and with radiating strigosity, only slightly larger on the pronotum but more distinct, cinereous-white in color with two large transverse areas of black at the base of the pronotum and two smaller and feebler at the middle, the elytra with numerous isolated or partially anastomosing black spots throughout the extent; head densely, the beak more sparsely clothed with short narrow squamules. Head three-fifths as wide as the prothorax, without a fovea but with a rounded spot of pale scales between the eyes, the latter remotely separated; beak short and stout, not as long as the prothorax, bent downward and feebly dilated toward tip, finely, densely, rugosely punctate, with a single fine and feeble dorsal carinula; antennae rather short and thick, inserted at

outer third or fourth, the second funicular joint not quite twice as long as the first and but slightly longer than the next three, the third longer than the fourth. Prothorax small, slightly wider than long, the sides arduate; apex truncate, more than three-fourths as wide as the base, which is but feebly arcuato-truncate; ocular lobes moderately developed; disk evenly convex, finely, sparsely punctate, each puncture with a small suberect stout hair. Scutellum small, not conspicuous. Elytra one-half longer than wide, scarcely three times as long as the prothorax and one-half to nearly two-thirds wider, parallel and straight at the sides, gradually obtusely rounded behind, humeri rounded to the prothorax, exposed at base; subapical umbones obsolete; disk finely striate, the striae very finely, scarcely distinctly punctate, the intervals feebly convex, finely, sparsely punctate, each puncture bearing a stout erect and strigilate hair. Abdomen thinly clothed with short stout hairs, squamose toward the sides, strongly and closely punctate; legs moderately long, the femora more densely squamose and swollen distally but narrowed near the tip; hairs short, erect and sparse. Length 5.3-6.5 mm.; width 2.25-2.85 mm.

"Colorado (Denver). Mr. Hugo Soltau.

"A small but distinct species, quite conspicuous in maculation; it was taken by Mr. Soltau in considerable numbers. It may be placed near rotundicollis in the arrangement recently proposed by LeConte (Proc.Am.Phil.Soc.,XV,p. 128.)"

Additional description. Length 5 to 7 mm. The relative amount of the light and dark scales varies quite a bit. Some examples are found in which the light scales on the prothorax form a narrow median vitta and broader lateral markings, with the greater part of the disk covered by two broad longitudinal bands of black scales. Other specimens have been seen which had the entire prothorax covered with light scales, with the exception of a very small patch of dark scales on each side of the middle at the base. All degrees of development of the dark bands have been observed between the two conditions represented by the extremes which have been described. The darker forms are predominant, and the obliteration of the dark bands begins at the apex of the prothorax and progresses toward the base. Beak with a median carina which may sometimes be very prominent and sharp; lateral carinae sometimes slightly evident. Head very densely, coarsely, and rugosely punctate; frontal fovea rather deep, and covered with a small spot of rounded light-colored scales which contrast strongly with the shining black surface of the beak and the slender setae of the head and beak. Third segment of funicle of antennae only very slightly, if any, longer than the fourth. Prothorax one-fifth to one-fourth wider than long; sides usually rather strongly rounded, slightly constricted at apex, broader at base than apex; disk convex, often with a feeble median sulcus, and usually slightly constricted just before the apex; disk thickly clothed with scales which are larger than those of

elytra; surface more finely and densely punctate and granulate than in L. oregonensis (LeConte). Male with all of median portion of third abdominal sternum and basal part of fourth sternum concave. Female with third and fourth sterna flat; seventh sternum unmodified.

Notes on types. The type of L. tessellatus Casey has been examined. It is a female labelled "Denv., Col," and is located in the Casey Collection in the United States National Museum. There are also six paratypes which bear the same label. There is another specimen labelled "Cheyenne, Wyo., 4/19.89," which has been determined by Casey as tessellatus.

Remarks and comparative notes. L. tessellatus Casey is treated here as a subspecies of L. oregonensis (LeConte). The subspecies differs from the species mainly in the color of the body and scales. The body is nearly black and the scales lack all cupreous tinge, being either black or dirty white. The beak is a little stouter and more convex on the upper sufface, giving it the appearance of being bent downward at the tip. The median carina of the beak is more prominent and the basal portion of the beak and the front of the head are more densely, deeply, and rugosely punctate than in L. oregonensis (LeConte). The eighth sternum of the female and the genitalia of the male are the same in the subspecies as in the species.

Data on distribution. This subspecies has a very interesting distribution. I have seen specimens from six localities, extending from Denver, Colorado, to Medicine Hat, Alberta. These six points are all just east of the continental divide, and a line drawn through these points curves westward as it extends north, the curve corresponding almost exactly to that of the divide. Specimens have been examined as follows:

UNITED STATES

Colorado: 38

Denver, Col.,8.4.93; Denver, Colo., 7/4; Denver, Col., 10.6 , 2/10, 6.10, and 23/10.

Wyoming: 7

Cheyenne, Wyo., 4/19.89 and 20.4.89; Sheridan, Wyo., IX; Platte Co., Wyoming, Chugwater, El. 6100 ft., VII-25-1926, Huntington.

Montana: 1

Assinbne., Mon., 24.8.

CANADA

Alberta: 7

Medicine Hat, Alta., III.25.1923 and III-29-28, F. S. Carr; Medicine Hat, Alberta, Canada, III-4-1925, F. S. Carr.

Listronotus elegans Van Dyke 1929

1929. Listronotus elegans Van Dyke, Pan-Pacific Entomologist, V, p. 107.

1931. Listronotus elegans Van Dyke. Schenkling and Marshall, in Junk, Coleopterorum Catalogus, Subfam. Cylindrorrhininae, Pars 114, p. 11.

1933. Listronotus elegans Van Dyke. Leng and Mutchler, Second Supplement to Catalogue of Coleoptera of America, North of Mexico, p. 49.

Original description. "Elongate, subparallel; piceous, upper part of head, prothorax and elytra densely clothed with metallic scales, the underside of head, afterbody and legs less densely covered, scales of the base of head, pronotum and elytra golden brown except for two linear patches at the sides of pronotum posteriorly, and most of the fourth, fifth and sixth elytral intervals which are silvery green, the scales of beak, legs and underside of body greenish. Beak robust, moderately convex above, non-sulcate and without carinae except at times a faint median one near apex, a well marked though small fovea on the front between the eyes, the scales of head slightly elongate; antennae with the funicle moderately slender, the third and following segments rounded, subequal, second one and a half times as

long as first. Prothorax barely broader than long, ocular lobes but moderately prominent, sides arcuate, slightly constricted near apex, disk densely and coarsely though shallowly punctured, in fresh specimens entirely concealed by the scales, the scales but very little larger than those of the elytra. Elytra less than twice as long as broad, broadly emarginate at base, sides parallel from rounded humeri to apical fourth, thence broadly rounded to suture; striae and strial punctures fine; intervals wide and flat; setae fine and short, though conspicuous especially on apical declivity. Length, including beak, 6.5 mm., breadth 2.5 mm.

"Holotype (No. 2508 Mus. Calif. Acad. Sci.) and one paratype in my collection, taken near Sobre Vista, Sonoma County, California, May 8, 1910, and April 30, 1910, by Mr. J. August Kusche.

"This very attractive species like the preceding belongs in LeConte's second group and should be placed somewhere near Listronotus teretirostris Lec., the smaller specimens of which it equals in size and also resembles in its robustness and general parallel form. It differs from this in coloration, in lacking the evident rostral carinae, in having a broader prothorax, the elytral apices more suddenly and broadly rounded and the elytral striae and strial punctures finer. I believe that there is no marked difference between the sexes."

Additional description. Length 5.7 mm. Beak about the same length as the prothorax. Prothorax finely granulate-punctate; scales of disk narrower than those on sides. Ventral surface very finely and densely punctate; thickly clothed with setae. Female with third abdominal sternum slightly concave in median portion of posterior half; seventh sternum unmodified.

Notes on types. The paratype of L. elegans Van Dyke has been examined. It is a female collected at Sobre Vista, Sonoma Co., Cal., IV-30-1910, and was loaned to me from the collection of the author. The holotype is in the Museum of the California Academy of Science.

Remarks and comparative notes. The single female paratype is the only specimen of this very distinct species which I have seen.

Listronotus setosus LeConte 1876

Plate III, Fig. 11.
Plate VI, Fig. 11.

1876. Listronotus setosus LeConte, Proc. Am. Phil. Soc., XV, p. 134.

1894. Listronotus setosus LeConte. Hamilton, Can. Ent., XXVI, pp. 253, 256.

1916. Listronotus setosus LeConte. Blatchley and Leng, Rhychophora of North Eastern America, p. 163.

1920. Listronotus setosus LeConte. Leng, Catalogue of the Coleoptera of America , North of Mexico, p. 317.

1931. Listronotus setosus LeConte. Schenkling and Marshall, in Junk, Coleopterorum Catalogus, Subfam. Cylindrorrhininae, Pars. 114, p. 12.

Original description. "Blackish, covered with a dense crust of dirty gray and brownish round scales, larger upon the prothorax, and not becoming hair-like upon the head. Beak moderately tricarinate and quadrisulcate. Prothorax distinctly wider than long, sides suddenly rounded near the base and apex. Scutellum pale. Elytra not much wider than the prothorax, slightly emarginate at base; humeri rounded, striae punctured, interspaces slightly convex, with rows of clavate bristles longer and more evident than the setae of the other species; tip conjointly rounded in both sexes.

"Male. Last ventral slightly impressed at the tip.

"Female. Last ventral deeply impressed at the tip.

"Florida and Georgia: Messrs. Hubbard and Schwarz. Very easily recognized by the scaly head and long clavate bristles."

Additional description. Length 5 to 6.5 mm. Beak distinctly longer than prothorax; slender and curved; broad and flattened at base, with a rather wide ridge extending laterally over basal half of antennal groove; median carina prominent; lateral carinae usually rather distinct; lateral sulci deep; surface densely punctate; basal portion clothed with rounded scales; outer part with narrow scales and setae. Head flat; densely and coarsely punctate, thickly covered with rounded scales; frontal fovea deep. Antennae slender; second segment of funicle only one half longer than first; third segment very slightly elongate. Prothorax one-fifth wider than long; sides strongly rounded at base and apex; ocular lobes moderately large; disk sometimes with a faint median carina, abbreviated at base and apex; surface roughly granulate-punctate, thickly covered with scales which are much larger than those of the elytra, are slightly convex, and are often polygonal rather than rounded; a few scattered, very long, stout setae arising from punctures at the apices of small tubercles. Scutellum round, often elevated; Elytra with striae fine, not deeply impressed, but strongly punctate, the punctures close-set; intervals convex, the

odd ones more strongly so. Ventral surface coarsely and somewhat sparsely punctate with rounded scales at sides of metathoracic sternum and third, fourth, fifth, and sixth abdominal sterna; elsewhere with very short setae. Male with third abdominal sternum broadly and deeply concave. Female with third abdominal sternum flat or very slightly convex; seventh sternum with a narrow but very deep longitudinal groove beginning before the middle and extending to the apex, causing it to be strongly notched when viewed from the end; seventh tergum very deeply emarginate, the emargination fitting around the notch of the seventh sternum.

Notes on types. The types of L. setosus LeConte have been examined, and are located in the LeConte Collection in the Museum of Comparative Zoology at Harvard College. The first type is a female from "Cedar Keys, Fla." The second type is a female from "Tampa, Fla." The third type is a male bearing an orange disk, and is probably from Georgia, since that state is given as a locality in the original description. There is a fourth specimen in the series, a male, without a type label, but with the label, "Fla."

Biological Notes. Blatchley and Leng (1916) record the species as being "frequent beneath boards along the margins of ponds and on the flowers of Sagittaria." Pierce has recorded L. setosus LeConte as occurring on cotton at Victoria,

Texas, May 23. A specimen upon which this record is based has been examined and is not L. setosus LeConte as determined by Pierce, but is L. rotundicollis LeConte.

Data on distribution. Most of the specimens examined have been from Florida. I have seen three specimens, however, from the northern states, one from Massachusetts, and two from New.York City. This northern distribution may appear to be peculiar, but there is a region, especially around Martha's Vineyard, Massachusetts, where a number of typically sub-tropical forms of plants and animals have been found. These forms, as in the case of L. setosus LeConte, occur most abundantly in Florida and may be found in small numbers along the coastal region of Massachusetts and New York, not being foun in the territory between these two localities. Specimens have been examined from the following localities:

Florida: 45

Fla.; Tampa, Fla., 22.4, 28.4, and 1.5; Sebastian Riv., Fla., 7.4, Coll. Hubbard & Schwarz; Dunedin, Fla., 2-4-1913, Feb.18,1913, Feb.18,1814, 3-1-24, 3-23-20, and 4-2-21, W. S. Blatchley Coll.; Cedar Keys, Fla., June 6; Bellair, Fla.; Jacksonv., Fla.; Homestead, Fla., June, 1929, Darlington; Kissimmee, Fla.; Dunedin, Pinellas Co., Fla., III-17-1925.

Georgia: 1

Georgia.

New York: 2

New York, N. Y.

Massachusetts: 1

Mass.

Listronotus debilis Blatchley 1916

Plate I, Fig. III.
Plate VI, Fig. III.

1916. Listronotus debilis Blatchley, in Blatchley and Leng, Rhynchophora of North Eastern America, p. 164.

1920. Listronotus debilis Blatchley. Leng, Catalogue of the Coleoptera of America, North of Mexico, p. 317.

1925. Listronotus debilis Blatchley. Blatchley, Jr. N. Y. Ent. Soc., Vol. XXXIII, p. 92.

1931. Listronotus debilis Blatchley. Schinkling and Marshall, in Junk, Coleopterorum Catalogus, Subfam. Cylindrorrhininae, Pars 114, p. 11.

Original description. "Oblong, rather robust. Black, above and under surface, except abdomen, densely clothed with a crust of small, round, dirty white scales, each with a minute golden dot at center; antennae, tibiae and tarsi reddish-brown; femora piceous, densely scaly near apex. Beak slender, subcylindrical, as long as head and thorax, naked, feebly carinate and slightly widened on apical third, not carinate and densely scaly behind the antennae; frontal fovea large, deep. Thorax slightly wider than long, sides broadly rounded, feebly but distinctly sinuate at middle, disc densely and finely granulate-punctate. Elytra at base one-third wider than middle of thorax, humeri rounded, sides parallel to apical fourth, then converging to the conjointly rounded

apex; striae very fine, their punctures concealed; intervals wide flat, each with a row of short, white inclined bristles. Length 5.5 mm.

"Putnam and Vigo counties, Ind., rare; June 12-July 1. A unique form, easily known by the peculiar color of scales, sinuate thorax and scaly head. The last ventral is not impressed in either of the two specimens, both of which are probably males."

Additional description. Length 5.5 to 7 mm. Beak noticeably longer than prothorax, slender, curved; when viewed from above it narrows to the point of the insertion of the antennae and then becomes wider toward the tip; with a fine median carina; lateral carinae and lateral grooves obsolete; upper surface finely punctate, clothed with rounded scales to point of antennal insertion, then with only a few scattered short slender setae on apical portion. Antennae slender; second segment of funicle only about one-half longer than first; third segment very slightly elongate, but not as long as first; fourth to seventh segments rounded. Head slightly flattened between the eyes. Prothorax about one-eighth wider than long; ocular lobes moderately developed; sides sometimes broadly and evenly curved, in other cases nearly parallel along median portion and rather suddenly curved inward at base and apex; median sinuation of sides not always evident as mentioned in the original description; scales of disk of prothorax slightly

convex; a few scattered stout setae, without the coarser punctures found in many of the other species. Elytra only very slightly arcuate at base; setae of intervals rather prominent, distantly placed, more prominent and slightly clavate on declivity. Ventral surface clothed mostly with slender setae; sides of metasternum with rounded scales, and a few on the sides of the third and fourth abdominal sterna. Male with beak only slightly longer than prothorax; third abdominal sternum deeply concave at middle; all the abdominal sterna finely and moderately punctate, the seventh with a median apical area which is nearly smooth, having only a few scattered tiny punctures; tips of elytra conjointly rounded. Female with base of third abdominal sternum flat or slightly convex, sometimes with a small median concavity at the posterior margin; seventh sternum scarcely modified, having only a median apical area which is less densely and more finely punctate, this region being very slightly depressed; apex of seventh sternum truncate; apex of seventh tergum slightly emarginate at middle; tips of elytra very slightly separately sub-acuminate.

Notes on types. The type of this species, a female from Putnam County, Indiana, has been examined. The second specimen which Blatchley had before him when he described the species is a male from Vigo County, Indiana. The type is in the Blatchley Collection at Purdue University.

Biological notes. The food plant of this species is not known. It was taken at light on July 6, at Oakwood, Illinois.

Data on distribution. The species has been previously recorded only from Indiana. We now know that its range extends southeast through Maryland and the District of Columbia to Virginia, and southwest through Illinois, Kansas, and Oklahoma. Specimens have been examined from the following localities:

Indiana: 17

Marion Co., Ind., 5-18-21, 5-19-21, 5-21-22, 6-14-'22, and 9-23-22, W. S. B.; Marion Co., Ind., VII-14-1924 and X-9-1924, Blatchley; Putnam Co., Ind., 6-12-14, W. S. B.; Vigo Co., Ind., W. S. B.

Maryland: 3

Md. near Plummers I., May 27,1916, L. O. Jackson Collector; Plummers Is., Md., VI-17-13: Great Falls, Md.

District of Columbia: 3

Washington, D. C., 19-6-05, W. L. Mc Atee Collector; Washgtn., D. C.

Virginia: 1

Va., near Plummer I., Md., Aug., 1923, H. S. Barber.

Illinois: 2

Oakwood, Ill., July 6,1927, Coll. R. G. & T. F., At light; Urbana, Ill., Sep.26,'07.

Kansas: 1

Chanute, Kansas, Sept.25,1922, Wm. E. Hoffmann.

Oklahoma: 4

Spavinaw, Okla., June 18,1937, Standish-Kaiser; Sherwood, Okla., June 27,1937, Standish-Kaiser.

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PLATE I

Fig. 1. Dorsal and lateral view of male genitalia of L. americanus LeConte.

Fig. 2, 2a. Dorsal and lateral view of male genitalia of L. ingens n. sp.

Fig. 3. Dorsal and lateral view of male genitalia of L. debilis Blatchley.

Fig. 4. Dorsal and lateral view of male genitalia of L. tuberosus LeConte.

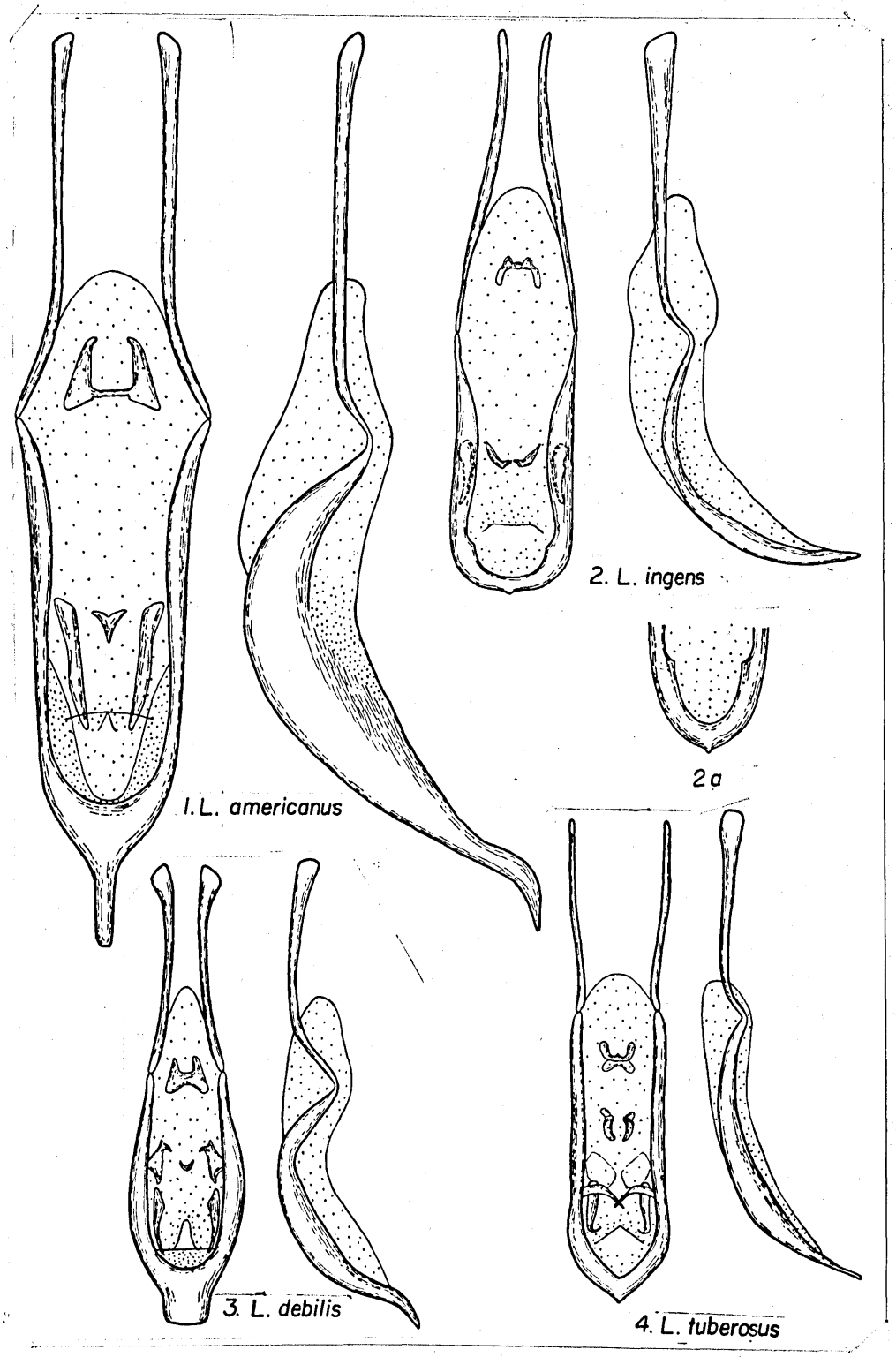

1. L. americanus
2. L. ingens
2a
3. L. debilis
4. L. tuberosus

PLATE II

Fig. 5. Dorsal and lateral view of male genitalia of L. insignis n. sp.

Fig. 6. Dorsal and lateral view of male genitalia of L. caudatus (Say).

Fig. 7. Dorsal and lateral view of male genitalia of L. frontalis LeConte.

Fig. 8. Dorsal and lateral view of male genitalia of L. nebulosus LeConte.

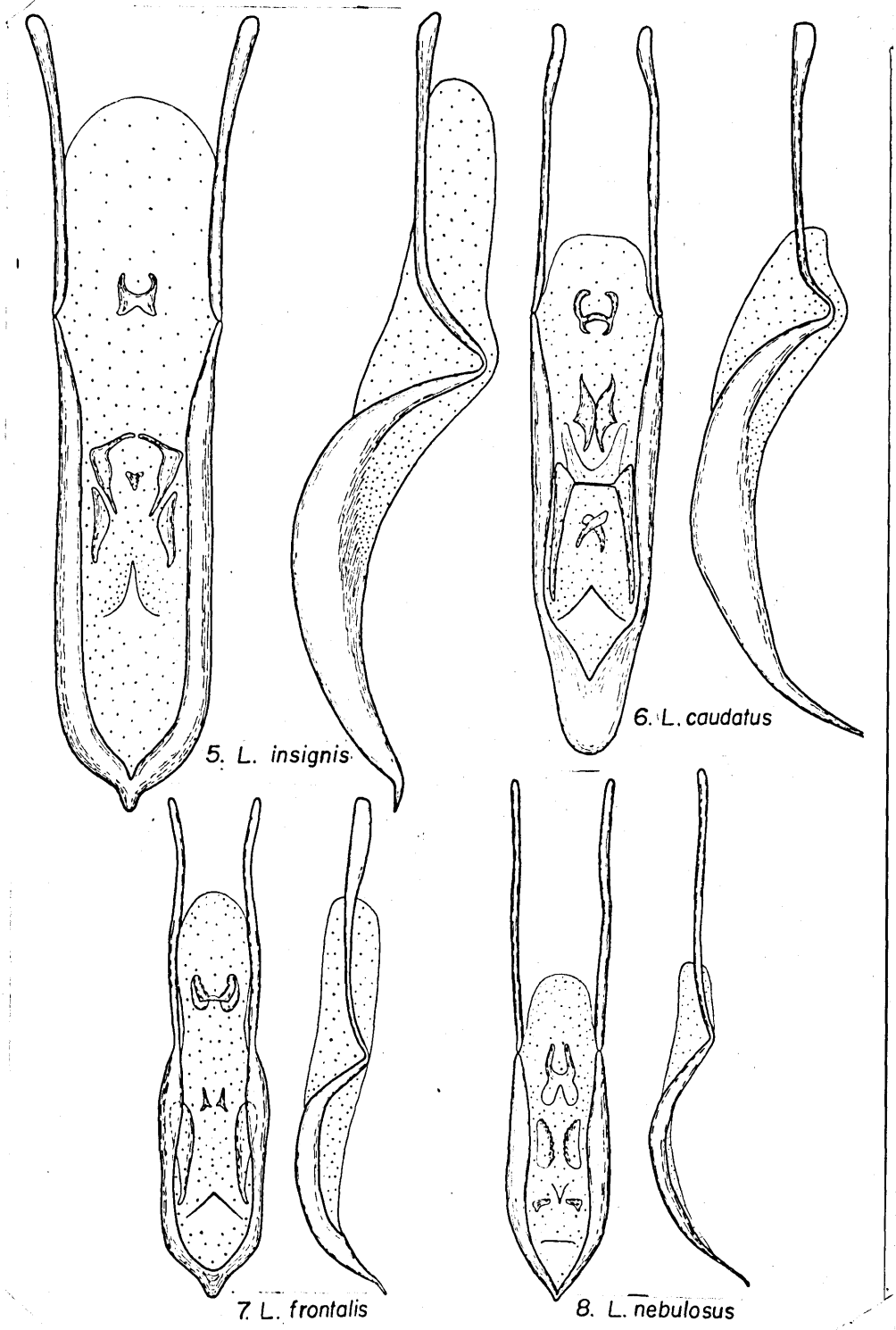

5. L. insignis
6. L. caudatus
7. L. frontalis
8. L. nebulosus

PLATE III

Fig. 9. Dorsal and lateral view of male genitalia of L. oregonensis (LeConte).

Fig. 10. Dorsal and lateral view of male genitalia of L. appendiculatus (Boheman).

Fig. 11. Dorsal and lateral view of male genitalia of L. setosus LeConte.

Fig. 12. Dorsal and lateral view of male genitalia of L. palustris Blatchley.

Fig. 13. Dorsal and lateral view of male genitalia of L. sordidus (Boheman).

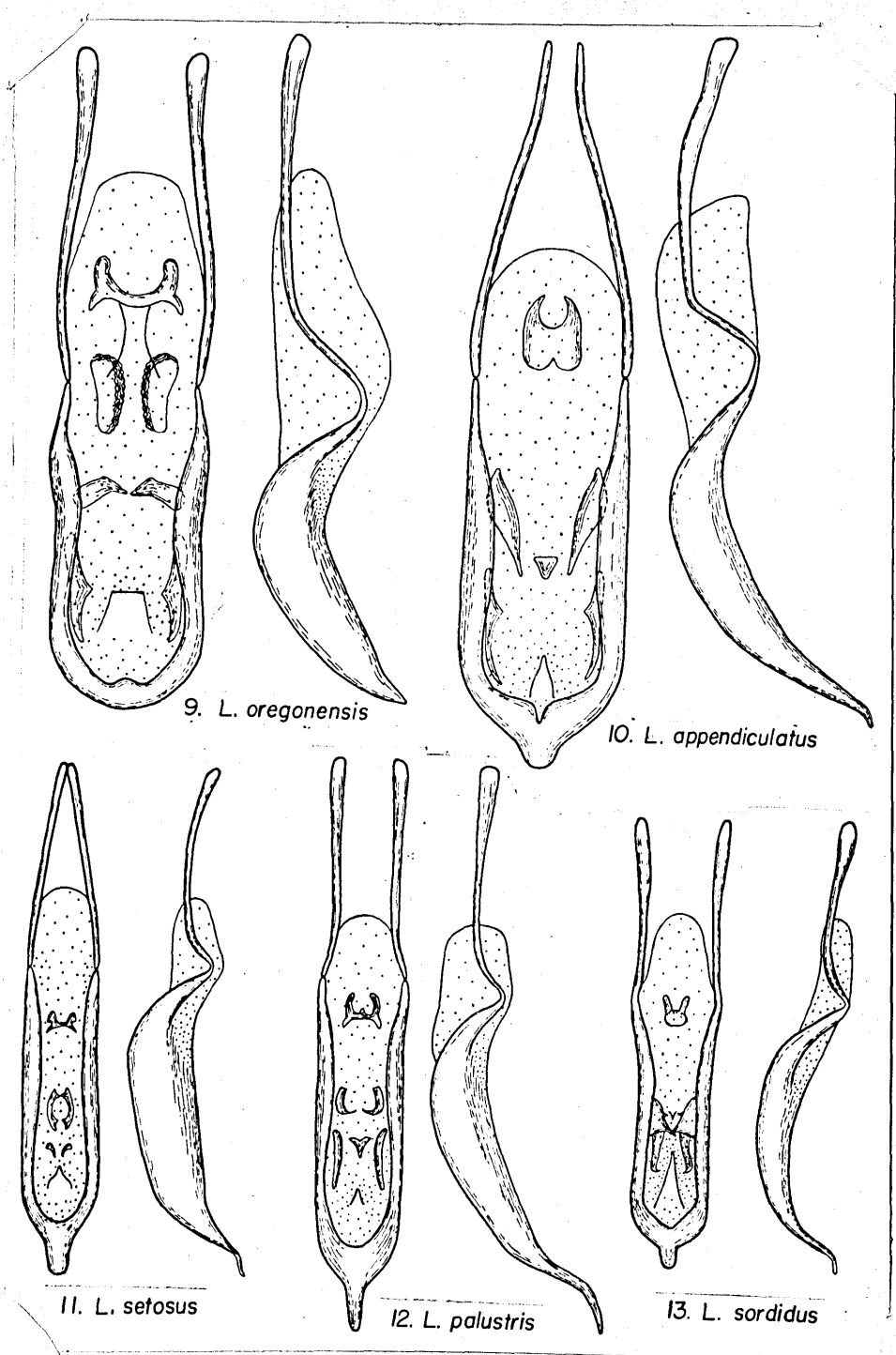

9. L. oregonensis
10. L. appendiculatus
11. L. setosus
12. L. palustris
13. L. sordidus

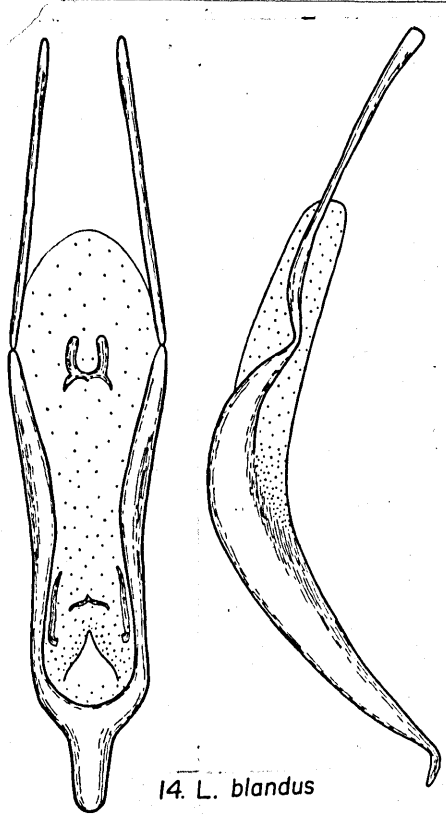
PLATE IV

Fig. 14. Dorsal and lateral view of male genitalia of L. blandus n. sp.

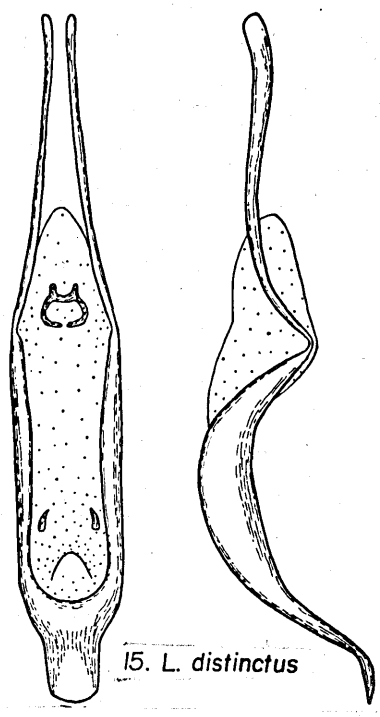
Fig. 15. Dorsal and lateral view of male genitalia of L. distinctus n. sp.

Fig. 16. Dorsal and lateral view of male genitalia of L. rotundicollis LeConte.

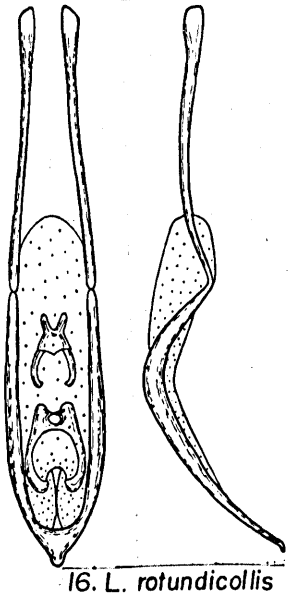
Fig. 17. Dorsal and lateral view of male genitalia of L. callosus LeConte.



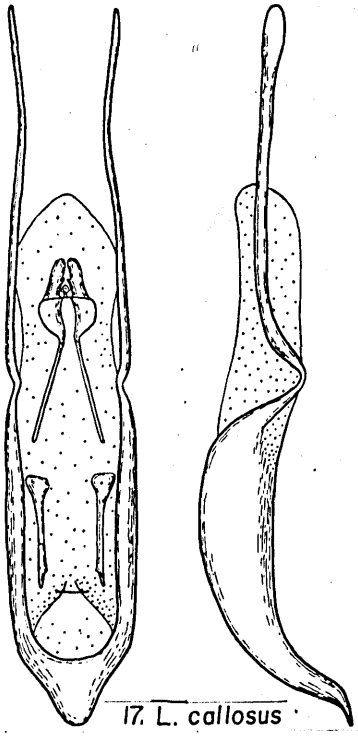
14. L. blandus



15. L. distinctus



16. L. rotundicollis



17. L. callosus

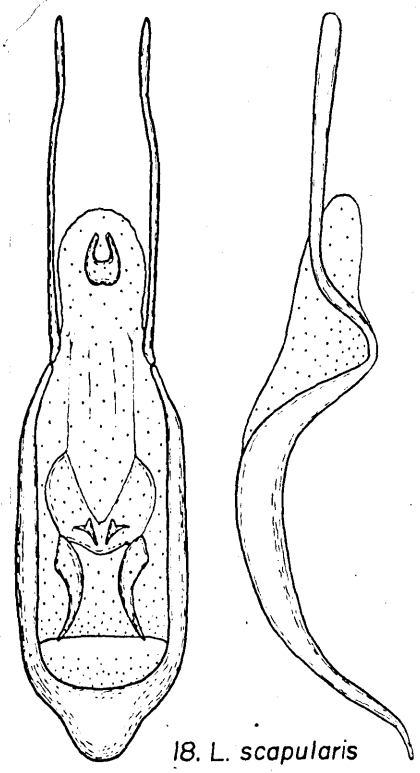
PLATE V

Fig. 18. Dorsal and lateral view of male genitalia of L. scapularis Casey.

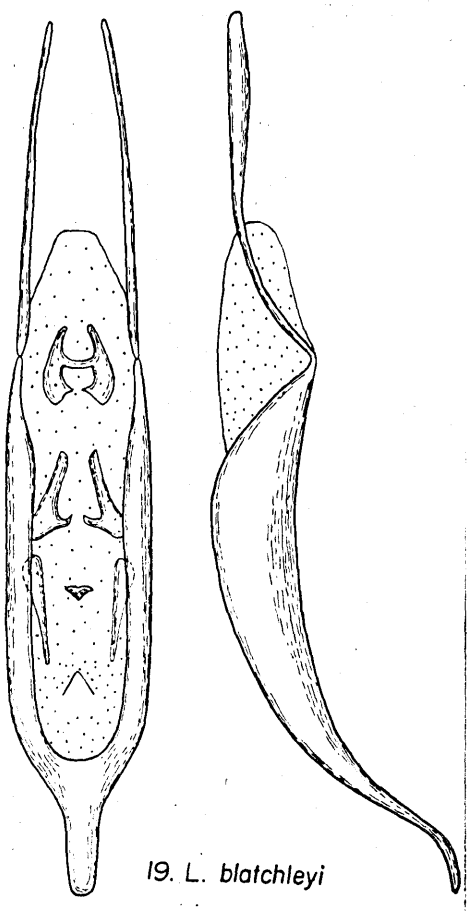
Fig. 19. Dorsal and lateral view of male genitalia of L. blatchleyi n. sp.

Fig. 20. Dorsal and lateral view of male genitalia of L. squamiger (Say).

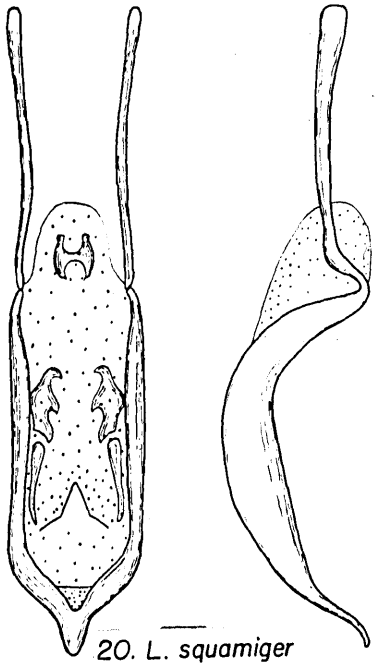
Fig. 21. Dorsal and lateral view of male genitalia of L. manifestus n. sp.



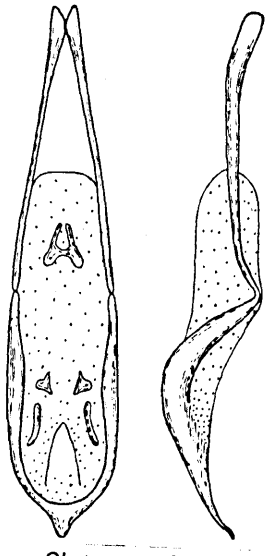
18. L. scapularis



19. L. blatchleyi



20. L. squamiger



21. L. manifestus

PLATE VI

Eighth Sterna of Females

Fig. 3. L. debilis Blatchley.

Fig. 4. L. tuberosus LeConte.

Fig. 6. L. caudatus (Say).

Fig. 7. L. frontalis LeConte.

Fig. 8. L. nebulosus LeConte.

Fig. 11. L. setosus LeConte.

Fig. 12. L. paulustris Blatchley

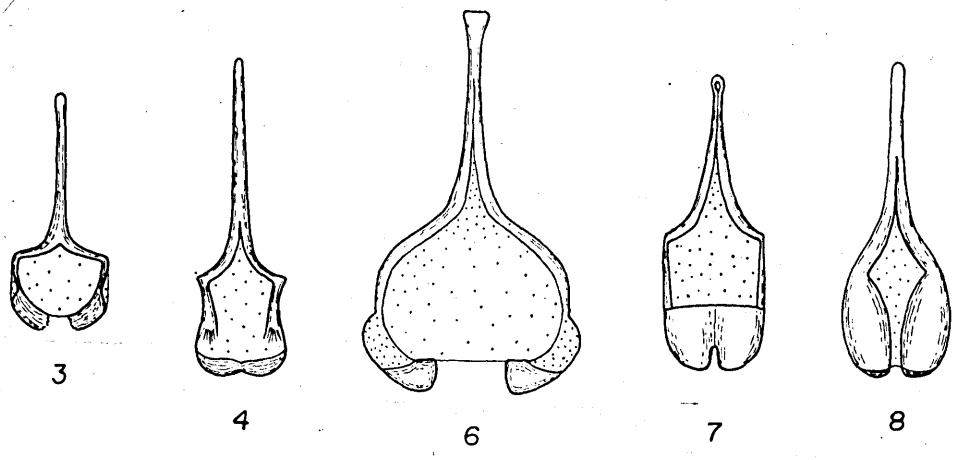
Fig. 13. L. sordidus (Gyllenhal).

Fig. 15. L. distinctus n. sp.

Fig. 17. L. callosus LeConte.

Fig. 18. L. scapularis Casey.

Fig. 20. L. squamiger (Say).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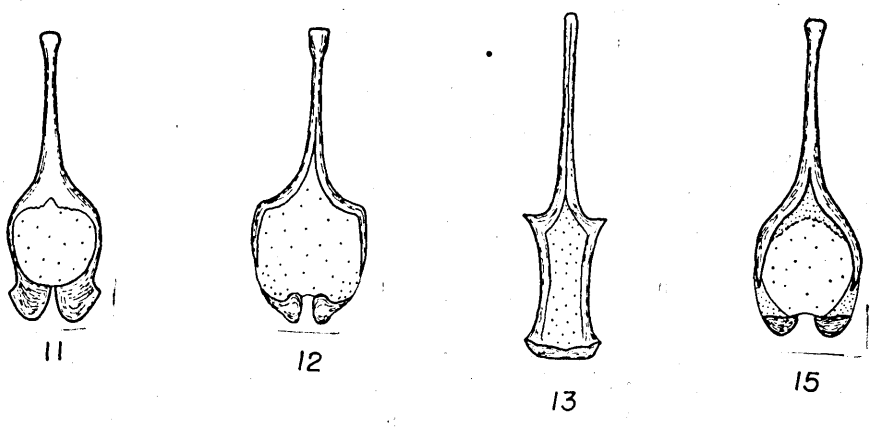
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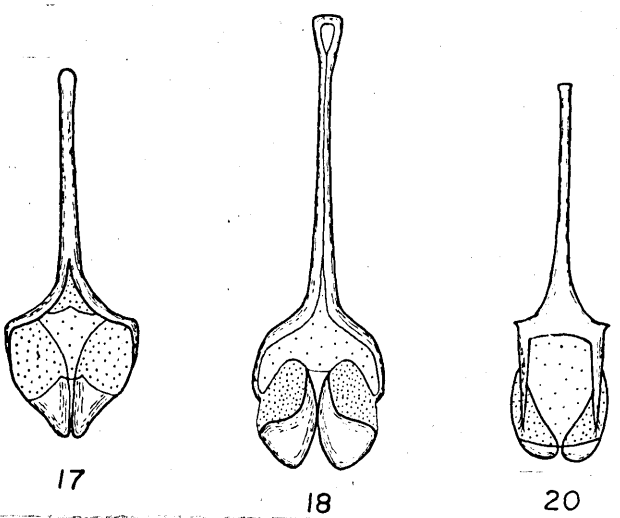
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18
20

ABSTRACT

This paper is a revision of the species of the Coleopterous family Curculionidae which are now considered to belong to the genus Listronotus. The species have been given a monographic treatment. All the information available pertaining to the biology and distribution of the species has been included.

Thirty-three species have been described in the genus. L. distinguendus ~~(Boheman)~~ (Gyllenhal) has already been listed as a synonym of L. sordidus ~~(Boheman)~~ (Gyllenhal). The following ten species have been reduced to synonymy in this paper: L. obliquus LeConte, L. inaequalipennis (Boheman), L. sulcirostris LeConte, L. floridensis Blatchley, L. rudipennis Blatchley, L. latiusculus LeConte (nec Boheman), L. cribricullis LeConte, L. impressifrons LeConte, L. impressus Van Dyke, and L. leucozonatus Chittenden. One species, L. tessellatus Casey, has been reduced to a subspecies of L. oregonensis (LeConte). The treatment of five species, L. bagoiformis Champion, L. teretircstris (LeConte), L. gracilis LeConte, L. nevadicus LeConte, and L. punctiger LeConte, has been deferred, since these species belong to the group of species now considered to comprise the genus Hyperodes, or are very closely associated with certain groups of Hyperodes and represent intermediate species. Six species of Listronotus are herein described as new. They are: L. ingens, L. manifestus, L. distinctus, L. ~~insignis~~ blatchleyi, L. blandus, and L. insignis.

Type material of all the species except L. sordidus (Gyllenhal) ~~(Boheman)~~, L. distinguendus (Gyllenhal) ~~(Boheman)~~, L. caudatus (Say), and L. squamiger (Say) has been examined. The Say types are lost, and the ~~Boheman~~ Gyllenhal types are in Sweden and have not been examined. No type species was designated for the genus when it was described. A genotype has been designated: L. caudatus (Say).

Illustrations and a key are included to assist in the determination of the species.